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PRODUCTION AND SENSORY EVALUATION OF CHEESE MADE FROM COW MILK AND SOY BEANS ENRICHED WITH COCONUT MILK FOR CONSUMER ACCEPTABILITY

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Abstract

This work centers on production and sensory evaluation of cheese made from cow milk and soy bean enriched with coconut milk. The coconut milk was obtained by grounding coconut and removing the shaft. The milk was gotten from the cow mammary gland. Two samples were processed separately using soy bean and cow milk. The processing was carried out at the Food Processing Unit of Home and Rural Economics department. The soy and dairy cheese were subjected to sensory evaluation to compared the more preferred. The samples were assessed in terms of taste, flavor, colour, appearance and overall acceptability using 20 respondents consisting of staff of Oyo State College of Agriculture and Technology, Igboora on 9 point hedonic scale. The sensory attributes considered are taste (6.65: 6.35), colour (6.65: 6.45), texture (6.10: 5.95), flavor (6.15: 6.10), appearance (6.15: 6.10) and overall acceptability (5.90: 5.65). The result showed that the respondents preferred cheese made from cow milk to that from soy bean. Coconut milk is a product from coconut palm used by confectionaries and dairy products manufacturers to enrich their products. Family members should be enlightened on procedures involved in making soy cheese and dairy cheese.

Keywords: Sensory, Cheese, Cow milk, Soybean, Coconut.

Introduction

Cheese is a concentrated dairy produced by acid or rennet coagulation or curdling milk, stirring and heating the curd, draining off the whey, collecting and pressing the Curd and the cheese is ripened, cured, or aged to develop the flavour and texture. Cheese is made most from pasteurized cow milk, but the milk of other mammals can be used. Cheese production is common to households in many developing countries that provide a useful service in increasing the shelf-life of valuable human food- stuff like milk. In Nigeria, milk production is practiced, maily by the Fulani nomadic people that are pastoralists in the rearing of cattle and moved from one location to another in search of green pasture (Connor, 2013).

As a result of inadequate refrigeration facilities, the Fulani women process the surplus fresh milk into a soft, un-ripened Cheese called “Warankasi” or “Wara” (Subbaraman, 2012).

The principle of cheese processing is based on the coagulation of the protein in milk, during which about 90% of the milk fat is entrapped. The coagulated mass is the curd; while the remaining liquid is called whey. Curd (cheese) consists mainly of milk proteins (casein) and milk fat; while whey contains water, milk sugar (lactose), protein (serum proteins) and B vitamins. In many parts of tropical Africa, milk and milk products are scarce and unaffordable by majority of the populace. The high and unaffordable cost of milk in some developing countries like Nigeria has made it necessary to source for less expensive plant products that could be used as substitutes for milk products or to augment the use of milk products for effectiveness in fighting protein malnutrition (Connor, 2013)..

Soy milk, sometimes called soy drink or soy beverage, is a white emulsion that resembles cow milk (conventional milk) in both appearance and consistency. Milk from soybean provides malnourished infants as well as individuals that suffers from cow milk associated allergies with an alternative. There is increasing interest among nutritionists in considering soy milk as a potential substitute for cow milk and human milk. Soy milk is reported to have great potentials to supplement cow milk, as it contains high quality protein and essential amino acids; essential minerals and vitamins. Soy milk contains phytochemicals that have anti-tumor activity and prevent cancer; high blood pressure and cardiovascular diseases (Subbaraman, 2012). Therefore this work is aimed to evaluate the production and sensory evaluation of cheese madem from cow milk.

Materials and methods

Source of Materials

The raw materials like fresh cow milk, coconut and soybean, were procured from Igboora market under Ibarapa Central Local Government of Oyo State Nigeria.

Sample Preparation

Production of Coconut Milk

Coconut milk was produced by the method described and with slight modification. 3 kg of coconut was purchased, shelled, washed and shredded using a traditional coconut grater. Coconut milk was produced by mixing the shredded pulp with an equal weight of warm distilled water (60 °C) in a blender, filtered through a double-layered cheese cloth, and manually squeezed with a twisting motion to extract most of the milk. The extracted emulsion was pasteurized and stored at 30°C before the production of cheese, and took place within 24 h of production.

Production of Soy Milk

Soy milk was produced by the method described and with some modification. Briefly, 2 kg of soybean seeds were cleaned, sorted and soaked for 12 h. The rehydrated soybeans were dehulled by rubbing between palms and the hulls were drained of excess water by the process of water floatation. Four cups of water were added to the dehulled soybeans and blended in a blender until smooth. The slurry was strained using a muslin cloth. The recovered milk was boiled for about 20 min at 82 °C in stainless steel pan, while stirring continuously with a wooden stirrer to prevent from burning. The milk was homogenized using a blender and cooled to 45°C.

Preparation of the cheese

Cheese was produced by the method of Igyor *et al.* (2006) briefly, raw fresh cow milk, coconut milk and soy milk (one litre each) were placed inside stainless steel pots separately. Each milk sample was heated on a magnetic stirrer until boil.

Heating of the milk continued until curds were formed inside the pots. The pots were then removed from the heat source, cooled inside a water bath for 15 mins, drained using Muslin cloth to remove the whey. The curds (Cheese) were then packaged and refrigerated for further analysis.

Sensory evaluation

Sensory evaluation was conducted using a 9-point hedonic scale and a semi-trained panel consisting of 20 member's with the consumption of warankashi. The panelists were instructed to evaluate the coded samples for colour, taste, texture, aroma, and overall acceptability. Each sensory attribute was rated on a 9point hedonic scale (1 = dislike extremely and 9= like extremely) (Iwe, 2003).

Results and discussion

Discussion

From the result on the scores of both cow milk cheese and soy milk enriched with coconut milk ranges from 40.0 to 47.5 but in terms of response from the panelist soybeans milk cheese enriched with coconut milk had the highest percentage (47.5) with 19 in frequency followed by 40.0 in percentage recorded by cow milk cheese in colour observation; These values were however significantly difference from one another, but had the same ranges with cow milk and soybeans milk cheese that is 25.0-25.0; also gave the different trend of parameter, finally cow milk cheese enriched with coconut had the lowest score in colour observation (5.0) in percentage with 2 frequency. The result agrees with the findings of Balogun *et al.* (2016) who reported increase in moisture content as the level of coconut increases (66.69% and 71.86% for cheese produced from cow milk and soy milk enriched with coconut milk respectively).

The taste scores of soybeans milk and cow milk cheese enriched with coconut milk techniques had the highest degree of taste (45.0 and 40.0) respectively has observed by the panelist in terms of taste compared with soybeans milk cheese enriched with coconut milk. The taste scores obtained from cow milk cheese enriched with coconut milk ranges from (45.0:2.5), soybeans milk cheese enriched with coconut milk ranges (45.0 and 2.5). Generally, the least taste of soybeans milk cheese enriched with coconut milk and had the same trend of 2.5 in terms of taste

variation. Hussein *et al.* (2016) also reported that the cow milk and soybeans had the same trend and the coconut milk is increased in the blend of cow milk cheese production.

The data obtained on the texture of soybeans milk cheese and cow milk cheese enriched with coconut milk in this study showed significantly difference and highest percentage in soybeans milk cheese and cow milk cheese enriched with coconut milk (65.0-32.5). Therefore, cow milk cheese enriched with coconut milk had the highest percentage of texture observed by panelists. Generally, there are no significant difference in soybeans milk and cow milk cheese enriched with coconut milk with lowest (7.5%), and (5.0%) percent in soybeans milk cheese enriched with coconut milk that had lowest ranges. This is supported by the findings of Balogun *et al.* (2016) who reported that there is decrease in the texture value as there is increase in the soybeans milk cheese while in the cow milk cheese it decreased from 0.88%-0.32% with 5% and 3% proportions of added coconut milk respectively. This was in contrast with the findings of Hussein. (2016) who reported that sample with cow milk has the lowest texture 4.56 while the result supports the findings of Balogun *et al.* (2016) who reported that cow milk has the best texture.

The result showed that the appearance was significantly difference on the soybeans milk and cow milk cheese enriched with coconut milk and cow milk cheese enriched with coconut milk coat had the highest percentage 45.0 with 18.0 frequency and soybeans milk cheese enriched with coconut milk gave 37.5 percent. Ekanem. (2017) reported sample containing 75:30% cow-coconut milk cheese blend to have the highest value for appearance (6.85) which may be due to the appearance and flavor of the essential oils in the coconut milk.

From the result, colour, design, texture and appearance, the overall acceptability of the produced (soybeans milk cheese and cow milk cheese enriched with coconut milk), gave the highest significant different. However, cow milk cheese enriched with coconut had the highest acceptability of 65.0 value indicated that consumers preferred it than 45.0 of soybeans milk cheese enriched with coconut milk. The scores from the findings on (soybeans milk cheese and cow milk cheese enriched with coconut milk) exceeds 20.0 on a 9-point hedonic scales indicating that sensory qualities of cheese especially soybeans milk cheese and cow milk enriched with coconut milk are generally acceptable by the panelists.

TABLE 1:
The sensory qualities of cheese produce from cow milk and soybeans milk enriched with coconut milk.
Sample A sensory qualities

Parameter	Score	Colour	Design	Texture	Appearance	Overall acceptability
Like extremely	9	19 (47.5)	13 (32.5)	12 (30.0)	7 (17.5)	2 (5.0)
Like very much	8	11 (27.5)	18 (45.0)	13 (32.5)	18 (45.0)	26 (65.0)
Like moderately	7	10 (25.0)	8 (20.0)	13 (32.5)	10 (25.0)	12 (30.0)
Like slightly	6	—	1 (2.5)	2 (5.0)	5 (12.5)	—
Neither like nor dislike	5	—	—	—	—	—
Dislike slightly	4	—	—	—	—	—
Dislike moderately	3	—	—	—	—	—

Dislike very much	2	—	—	—	—	—
Dislike extremely	1	—	—	—	—	—
TOTAL		40(100.0)	40(100.0)	40(100.0)	40 (100.0)	40 (100.0)

TABLE 2:

SAMPLE B: (sensory qualities)

Parameter	Score	Colour	Design	Texture	Apearance	Overall acceptability
Like extremely	9	10 (25.0)	8 (20.0)	3 (7.5)	8 (20.0)	3 (7.5)
Like very much	8	12 (30.0)	15 (37.5)	26 (65.0)	13 (32.5)	18 (45.0)
Like moderately	7	16 (40.0)	16 (40.0)	8 (20.0)	15 (37.5)	18 (45.0)
Like slightly	6	2 (5.0)	1 (2.5)	3 (7.5)	4 (10.0)	1 (2.5)
Neither like nor dislike	5	—	—	—	—	—
Dislike slightly	4	—	—	—	—	—
Dislike moderately	3	—	—	—	—	—
Dislike very much	2	—	—	—	—	—
Dislike extremely	1	—	—	—	—	—
TOTAL		40 (100.0)	40 (100.0)	40 (100.0)	40 (100.0)	40 (100.0)

3. Conclusion

This study showed that 85% cow- coconut milk and soybeans milk cheese were highly accepted by the consumer but with no significant difference compared with other samples. Therefore, it is concluded that, coconut milk could be used by both individually and together to supplement cow milk up to 50 % without much negative effect on its chemical properties, (impairing the nutrients and acceptability of the final product). However 25 % of penalist indicated their findings on consumer acceptability thus, it is concluded that.

4. Recommendations

Milk from plant sources should be encouraged from this result in the production of cheese as this would not only reduced the overdependence on cow milk but also reduce cost and improved the health of the consumer revealed from this work that vegetable sourced milk such as tigernut milk, coconut milk and bambara milk can be used



extensively in supplementation of cow milk with health benefits (cardio-vascular diseases, cancer, dental caries, and building up the immune system and body defense). Further research can be carried out on mineral composition of the cow- tigernut - coconut cheese blend as well as ways to further improves the keeping quality and keeping period of the blended cheese without adverse effects on the cheese quality.

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