

Full Length Research Paper

Sensory quality evaluation and acceptability determination of yoghurt made from cow, goat and soy milk

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Yoghurt is one of most important dairy product consumed throughout the world. However, recently production of yoghurt from other non animal based milk is also on the increase and is necessitated by a number of factors such as health reasons and consumer changing demands. A study was carried out to assess the sensory quality and acceptability of yoghurts made from cow, goat and soy bean milk. Yoghurt was processed from cow, goat and soy bean milk and sensory quality in terms of smell, mouth feel and taste as well acceptability were evaluated. Results showed both sensory quality and acceptability were significantly affected ($p<0.05$) by type of milk used in making yoghurts. Yoghurt made from cow milk had higher sensory quality scores in all the attributes followed by goat milk yoghurt while soy milk yoghurt had the lowest scores. Furthermore, cow milk yoghurt was more acceptable than the other types of yoghurt and soy milk yoghurt was the least accepted. It can be concluded that the type of milk from where the yoghurts are made from significantly affected ($p<0.05$) both sensory quality attributes and overall acceptability.

Keywords: Cow milk, soy milk, goat milk, acceptability, sensory quality, yoghurt.

INTRODUCTION

Yoghurt is one of the oldest fermented milk product consumed all over the world and it is produced by fermenting milk with lactic acid bacteria which is responsible for the development of typical yoghurt flavour. Fermentation is one of the oldest methods practised by human beings for the transformation of milk into products with an extended shelf life (Tamime and Robinson, 1999). The conversion of lactose to lactic acid in fermented products has preservative effect on as the pH of cultured milk inhibit the growth of putrefactive bacteria and other determined organisms, thereby prolonging the shelf life of products (Elagamy, 1992). Yoghurt is nutritionally rich in proteins, minerals and vitamins and the values differ due to a number of reasons such as sources of milk, processing methods and ingredients used. Yoghurt can be ideal to lactose-intolerant individuals as they can tolerate yoghurt better than the other dairy products since lactose is converted

to glucose and galactose.

Yoghurt has traditionally being made from animal milk especially cow milk. However, over the years, milk from other sources has been used to make yoghurt. This development has been necessitated by a wide range of reasons such as allergies and affordability by consumers. Soy milk yoghurt has been adopted as substitute to cow's milk yoghurt especially by the low income earners due to its cheap raw materials as protein supplement at household level. The utilization of soy yoghurt as household food and drink is a result of its nutritional compositions, absence of cholesterol, high protein content and its raw materials being accessible within the household resources and can also be processed with simple processing technology (Haenlein, 1996). Yoghurt can also be made by making blends from different sources as reported by Makanjoula (2012) who concluded that yoghurt can be produced from blends of soy milk and corn milk using various substitution levels. The use of goat milk has also become an opportunity to diversify the dairy market since it allows the development of added value to the fermented products with particular

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characteristics compared to cow milk. There are many differences in different types of milk which might ultimately affect the physico-chemical properties of dairy products such as yoghurt. In some cases, milk from different sources have been blended to improve sensory quality as reported by Kolapo and Olubamiwa (2012) who concluded that addition of coconut milk to soy milk improved the sensory characteristics of soy yoghurts. Different sources of milk differ in composition which after fermentation provides different types of flavoured yoghurt with different consistencies. The type of milk used in various parts of world differs with food habits and popularity of the kinds of milk products consumed (Miller, 2000). There are currently many different ways of producing yoghurt and different modifications are continuously being developed and applied as reported by Farinde et al (2010) who concluded that soy milk and cow milk can be fermented using maize steep water as starter and flavoured with natural fruit juice.

This current study was therefore carried out to evaluate the sensory quality attributes in terms of smell, taste and mouth feel and determine the overall acceptability of yoghurt made from cow, goat and soy milk

MATERIALS AND METHODS

Study area and raw material collection

The study was carried out in the department of food science and technology at Bunda College Campus of the newly established Lilongwe University of Agriculture and Natural Resources (LUANAR). The soy beans used for milk production were purchased from local farmers from villages surrounding Bunda College. All the ingredients needed for yoghurt making with the exception of starter culture were purchased from local super markets within Lilongwe city. The starter culture used in yoghurt making was sourced from Kenrinie Investment, a local agent in food additives based in Blantyre city. The cow and goat milk were obtained from the department of animal science at the college.

Soy bean milk processing

Soy milk was produced using one of the two methods developed by the department of food science and technology at Bunda College. The carefully selected and cleaned soy beans were placed in boiling water and boiled for 30 minutes. The boiled beans were then dehulled and the dehulled beans were cleaned using cold tap water. The clean beans were crushed in a food blender and water was added to the paste in the ratio of 1:3 (w/w). The mixture was then filtered using a clean cheese cloth. The filtered soy milk was boiled for 10 minutes, cooled and refrigerated before use.

Yoghurt making

The procedure was the same for all the types of yoghurt made. The milk was first filtered using a clean cheese cloth. The milk was warmed to 43-45°C and thereafter 6.5% sugar and 2.5% skimmed milk powder were added and stirred. The milk was further heated to 85-90°C and was held at this temperature for 30 minutes with continuous stirring. After 30 minutes, the milk was cooled to 45°C after which it was inoculated with freeze dried YC-X11, thermophilic yoghurt starter culture and the amount to be used was based on manufacturer's specifications. The amount of starter culture to be inoculated was calculated since the pack containing the starter culture was meant for 50 litres of milk while the study samples was 5 litres each for the three types of milk. The milk was incubated for 4-6 hours after which the milk was refrigerated for 12 hours to stop the fermentation process. The set yoghurt for all the three types of milk was stirred by first breaking the curd and presented to panelists in white identical cups for sensory quality evaluation and acceptability determination.

Sensory quality evaluation

Sensory quality evaluation for the yoghurt was done using a descriptive test. The descriptive test was done using trained panelists from the study body. The sensory quality attributes under consideration were smell, mouth feel and taste and appropriate descriptions were used. For smell and taste, a well defined key used with numbers from 1-5 numbers with 1 being poor and 5 excellent. For mouth feel or consistency, the key used had 1-5 numbers with 1 being thin and 5 being extremely thick.

Acceptability determination

Determination of acceptability was done using 30 untrained panelists who were familiar with yoghurt and were willing to participate. A food action rating scale was used to determine overall acceptability of the yoghurt and had numbers 1-7 with 1 being highly acceptable (I would drink this yoghurt every opportunity I had) and 7 being the least acceptable (I would drink this yoghurt only if I would be forced to)

Data analysis

All the data obtained from the study was analysed using statistical package for social scientists (SPSS) version 16.0 where analysis of variance was used to compare the means and the least significance difference (LSD) was used to determine the level of significance.

Table 1. Sensory quality attributes of the yoghurt

Type of yoghurt	Sensory quality attribute score		
	Smell	Mouth feel	Taste
Soy milk yoghurt	2.7±1.1 ^a	2.5±1.1 ^a	2.8±0.6 ^a
Goat milk yoghurt	3.3±0.7 ^a	3.1±0.7 ^a	3.4±0.8 ^a
Cow milk yoghurt	4.2±0.8 ^b	4.0±1.1 ^b	4.8±0.6 ^b

Means in the same column with different letters as superscripts are significantly different ($p < 0.05$)

Table 2. Acceptability of the yoghurt

Type of yoghurt	Acceptability score
Soy milk yoghurt	4.97±1.7 ^a
Goat milk yoghurt	2.27±1.2 ^b
Cow milk yoghurt	2.13±1.1 ^b

Means in the same column with different letters as superscripts are significantly different ($p < 0.05$)

RESULTS AND DISCUSSIONS

Sensory quality evaluation

Smell of the yoghurt

Results for the smell scores as a sensory quality attribute are presented in table 1. The results have shown that the smell of the yoghurt was significantly affected ($p < 0.05$) by the type of the yoghurt. However, the results also showed that there were no significant differences in smell for yoghurt produced from the goat and soy bean milk. The panelists reported that yoghurt from soy milk had a strange characteristic smell which others refer as fresh paint. This odour is usually beany but is unique to the soy beans as reported by Gupta (1997). The results further revealed that cow milk yoghurt was more preferred in terms of smell and this is in consistent with findings of Bille (2000) who reported that cow milk yoghurt was also preferred in aroma and further stated that preference was attributed to higher content of citrates in cow milk yoghurt. However, these results seems to disagree with findings of Obi and Maduagwu (2009) who reported that yoghurts from goat and sheep milks were more preferred to yoghurt from cow milk.

Mouth feel of the yoghurt

Results of mouth feel scores as a sensory quality attribute are presented in table 2. There were significant differences among the three types of yoghurt in terms of mouth feel. However, no significant differences in mouth feel was observed in soy milk and goat milk yoghurt. These findings are in line with findings of other researchers (Amanze, 2011, Gupta, 1997). There are

many reasons that contribute to differences in mouth feel such as preparation methods as reported by Sigh (1987) who reported that in order to have a good mouth feel, the best approach is to use traditional Chinese and Japanese methods where soy beans are soaked and are ground with cold or water prior to heating and cooking the resulting slurry. The cow milk yoghurt had a higher score as compared to the other types of yoghurt. This observation is contrary to findings of Bille (2000) who reported that goat milk yoghurt was more preferred in terms of mouth feel than cow milk yoghurt because the total solids content in goat milk resulted in yoghurt which improves its mouth feel hence more preferred. There could be contributing factors to these contrary findings such as quality of the milk used which could subsequently be affected by factors like feeding and breeds of the animals. These findings are in contrast to findings of Obi and Maduagwu (2009) who reported that the textures of yoghurts from goat and sheep milks were thicker than yoghurt from cow milk which was watery.

Taste of the yoghurt

Results for the taste scores of yoghurt as a quality attribute are presented in table 2. The results showed that taste of the yoghurt was significantly affected by the type of the yoghurt. The results further showed that cow milk yoghurt was more preferred than goat and soy milk yoghurt. These findings are contrary to the findings of Bille (2000) and Amanze (2011) who reported that there was no significant difference in terms of taste of soy milk yoghurt and cow milk yoghurt and further reported that soy milk yoghurt can compete favourably with other yoghurts like cow and goat milk yoghurt and it can be a good substitute for commercial production

Acceptability of the yoghurt

Table 2 present results for the acceptability scores for the three types of yoghurt. The results have revealed that acceptability was significantly affected by the type of the yoghurt. However, it has been observed that there was no significant difference in acceptability between cow and goat milk yoghurt and soy milk yogurt was the least accepted yoghurt. It is an established fact that soy bean based products have been known to have a beany flavour and this might attribute to the low acceptable scores other studies have demonstrated that a good acceptable yoghurt which is comparable to one made from cow milk can equally be made from soy milk.. Although significant differences were not observed for cow and goat milk yoghurt, cow milk yoghurt had a higher acceptability score than goat milk yoghurt and this is finding is in agreement with what was reported by Eissa, et al (<http://www.irrd.org/irrd22/8/eiss22137.htm>) who found out that cow milk yoghurt had better sensory scores compared to goat milk yoghurt. There might also be other reasons attributing to differences in acceptability scores such as preparation method and ingredients used as reported by Trindade, et al (2001) who concluded that yoghurt with best sensory quality was obtained using homogenized soy milk (17MPa) with 2% sucrose addition and fermented for 6 hours.

CONCLUSIONS

The findings of the study have revealed that both sensory quality and acceptability of yoghurts was significantly affected ($p < 0.05$) by the type of the yoghurt. Cow milk yoghurt scored highly in all the sensory attributes namely smell, mouth feel and taste followed by goat milk yoghurt while soy milk yoghurt had the lowest sensory quality scores. The results have also revealed that cow milk yoghurt was more acceptable than the other types of yoghurt while soy milk yoghurt was the least accepted. It is concluded that the type of milk used in yoghurt making significantly affected sensory quality and acceptability.

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