Sensory Quality Characteristics of Couscous Yoghurt Produced from Soya Milk

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Abstract: This study was conducted to investigate the effect of milk type and mixture ratios on the sensory acceptability test of couscous yoghurt. Yoghurts were first made from cow milk (CM), soya milk (SM) and equal mixture of both types of milk. Processed Couscous was then mixed with yoghurts from cow milk (CMCY); soya milk and cow-soya milk (CSCY) at ratios of 90:10, 80:20 and 70:30 (yoghurt: couscous) respectively. CSCY was made from 50:50 mixtures of CM and SM. The experiment was arranged in a 2³ factorial layout in a completely randomized design. Thirty assessors were used for the sensory acceptability of the product. The results for sensory quality showed significant (p<0.05) differences for all the analysed products. Evaluation by untrained panelists showed that CMY only and lowers ratios of CMCY and CSCY had a higher preference. It can be concluded that CMCY at lower ratios is best for consumption.

Keywords: Couscous, Cow milk, Cow +Soya milk, Soya milk, Sensory acceptability, Yoghurts.

1. Introduction

Yoghurt is a semi solid food produced by bacteria fermentation of milk. [5] revealed that yoghurt is one of the oldest fermented milk products consumed all over the world; and it is produced by fermenting milk with lactic acid bacteria which are responsible for the development of the typical yoghurt flavour [6]. Yoghurt is nutritionally rich in proteins, minerals and vitamins and the values differ from other dairy products owing to a number of reasons such as sources of milk, processing methods and ingredients used. In yoghurt production sensory characteristics are different based on the additives used. For that reason, in the improvement of yoghurt sensory characteristics, and the quantity of the additive is very important [6]. But the addition of too little or too much can reduce sensory attributes [6].

2. Materials and methods

2.1 Location of the Study

The study was conducted at the Crop Utilization Laboratory of the International Institute of Tropical Agriculture (IITA), Ibadan, south west Nigeria.

2.2 Materials used

Soya bean seeds (variety TGX 1987, 62 F) were obtained from IITA headquarters Ibadan. Grains of millet (variety JARANI Brown) were obtained from IITA Kano, northern Nigeria. Fresh cow milk was obtained directly from the livestock farm of the Federal University of Agriculture Abeokuta, Ogun state, Nigeria. Commercially available yoghurt starter cultures (Streptococcus thermophilus and Lactobacillus bulgaricus) sugar and flavourings were purchased from a reputable source in Abeokuta, Ogun State.

2.2.1 Soya Milk Preparation

Soya beans were cleaned manually to remove dust, damaged seeds, weeds, and metals. Pre-cleaned soya beans (1kg) were soaked in a 16 Litres clean tap water for 10-12 h. The soaked beans were de-hulled manually and milled into a smooth paste. The paste was mixed with 12 Litres of clean tap water to the thickness of milk and sieved through a muslin cloth into a clean fitted container, using method the described by [10].

2.2.2 Preparation of Yoghurts

Soya milk and cow milk were pasteurized separately at 82 °C for 30 min and allowed to cool to 42 °C. Freeze-dried starter culture (Streptococcus thermophilus and Lactobacillus bulgaricus) was dissolved in a small quantity 75cl of lukewarm milk in a cup and poured into the two milk samples then stirred well. The milk was Incubated at 45 °C according to manufacturer’s instructions for the starter culture until it had reached the desired firmness. Sugar and flavourings
were added to the coagulum and, stirred very well. Using method the described by [10].

2.2.3 Preparation of Couscous

Figure 3 shows the flow chart of couscous preparation. Grains of millet (variety JARANI Brown) were cleaned, sorted and washed using tap water and were allowed to dry at 55°C for 24h using box oven drier. Millet grains were then milled using fabricated milling machine into a smooth powder and sieved using 0.04mm sieve. Water was sprinkled on the milled millet powder and rolled by hand to form pellet, the pelletized millet was then dried for 5h at 55°C using box oven to form couscous. The couscous was then steamed for 5min in a tight fitted container with boiled water [9]

2.4 Sensory quality evaluation

All the samples were evaluated for sensory acceptability test (appearance, texture, taste, aroma, flavour and overall acceptability) using 30 panelists (students of the Federal University of Agriculture, Abeokuta) using a 9 point hedonic scale where 9 indicated “like extremely” and 1 indicated “dislike extremely”. Each panelist was provided with enough privacy to avoid a biased assessment as demonstrated by [8].

2.5 Statistical Analysis

The experiment was designed based on 2 factors (milk types and mixing ratios) at 3 levels each, i.e., a 3 x 3 factorial resulting in a total of 9 treatments. Cow milk yoghurt without couscous was used as the control.

The data obtained were subjected to One-way analysis of variance (ANOVA) using statistical package for social scientists (SPSS) version 21.0 where Duncan’s multiple new range F test was used to compare the means and the least significant difference (LSD).

3 Results

Table 1 shows the result for sensory attributes of the different mixture ratios for four different yoghurt types. The result obtained for the parameters of sensory attributes shows that there were significant (p<0.05) differences for all the analysed products according to mixture ratios. The sensory evaluation by untrained panelists showed that samples produced using CMY only and lowers ratios of CMCY and CSCY have a higher preference for all the parameters measured. SMCY samples had the lowest mean values for sensory quality in terms of texture, taste, flavour, aroma and appearance. The panelists reported that yoghurt from SMCY had a strange characteristic after-taste which has been recognized as the throat-catching factor.

The results for Table 2 in the appendix for show that the main effects of milk type and mixture ratio were statistically significant (p<0.05) for all the variables of the sensory attributes but none of the interaction effects of the milk types with the mixtures were statistically significant (p>0.05) for all the variables of the sensory attribute.

Table 1: Sensory attributes of different yoghurt mixes with millet couscous

<table>
<thead>
<tr>
<th>Products</th>
<th>Appearance</th>
<th>Texture</th>
<th>Taste</th>
<th>Flavor</th>
<th>Aroma</th>
<th>Overall acceptability</th>
</tr>
</thead>
<tbody>
<tr>
<td>CM yoghurt only</td>
<td>8.00±0.95&lt;sup&gt;a&lt;/sup&gt;</td>
<td>7.30±1.09&lt;sup&gt;ab&lt;/sup&gt;</td>
<td>8.00±0.95&lt;sup&gt;a&lt;/sup&gt;</td>
<td>7.60±0.67&lt;sup&gt;ab&lt;/sup&gt;</td>
<td>7.47±0.78&lt;sup&gt;ab&lt;/sup&gt;</td>
<td>7.83±0.83&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>CM Yoghurt:couscous mix 70:30</td>
<td>6.00±1.82&lt;sup&gt;cd&lt;/sup&gt;</td>
<td>6.23±1.45&lt;sup&gt;c&lt;/sup&gt;</td>
<td>6.53±1.38&lt;sup&gt;bcd&lt;/sup&gt;</td>
<td>6.17±1.49&lt;sup&gt;b&lt;/sup&gt;</td>
<td>6.13±1.89&lt;sup&gt;c&lt;/sup&gt;</td>
<td>6.67±1.27&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>80:20</td>
<td>6.80±1.61&lt;sup&gt;bc&lt;/sup&gt;</td>
<td>6.67±1.45&lt;sup&gt;bc&lt;/sup&gt;</td>
<td>7.20±1.19&lt;sup&gt;ab&lt;/sup&gt;</td>
<td>6.67±1.42&lt;sup&gt;bc&lt;/sup&gt;</td>
<td>6.83±1.39&lt;sup&gt;bc&lt;/sup&gt;</td>
<td>6.93±1.23&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>90:10</td>
<td>7.77±0.97&lt;sup&gt;a&lt;/sup&gt;</td>
<td>7.67±1.32&lt;sup&gt;a&lt;/sup&gt;</td>
<td>7.60±1.57&lt;sup&gt;a&lt;/sup&gt;</td>
<td>7.50±1.31&lt;sup&gt;a&lt;/sup&gt;</td>
<td>7.63±1.33&lt;sup&gt;a&lt;/sup&gt;</td>
<td>7.97±1.03&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>SM Yoghurt:couscous mix 70:30</td>
<td>6.40±1.69&lt;sup&gt;bd&lt;/sup&gt;</td>
<td>6.20±1.61&lt;sup&gt;c&lt;/sup&gt;</td>
<td>6.17±1.70&lt;sup&gt;d&lt;/sup&gt;</td>
<td>6.37±1.38&lt;sup&gt;b&lt;/sup&gt;</td>
<td>6.13±1.68&lt;sup&gt;c&lt;/sup&gt;</td>
<td>6.43±1.70&lt;sup&gt;b&lt;/sup&gt;</td>
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<td>80:20</td>
<td>6.13±1.72&lt;sup&gt;bd&lt;/sup&gt;</td>
<td>6.40±1.59&lt;sup&gt;c&lt;/sup&gt;</td>
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<td>6.60±1.33&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>90:10</td>
<td>6.97±0.85&lt;sup&gt;b&lt;/sup&gt;</td>
<td>6.37±1.47&lt;sup&gt;c&lt;/sup&gt;</td>
<td>6.87±1.61&lt;sup&gt;c&lt;/sup&gt;</td>
<td>6.90±0.99&lt;sup&gt;bc&lt;/sup&gt;</td>
<td>6.70±1.62&lt;sup&gt;bc&lt;/sup&gt;</td>
<td>7.03±1.13&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>CM+SM Yoghurt:couscous mix 70:30</td>
<td>5.90±2.04&lt;sup&gt;d&lt;/sup&gt;</td>
<td>6.13±1.89&lt;sup&gt;c&lt;/sup&gt;</td>
<td>6.13±1.78&lt;sup&gt;d&lt;/sup&gt;</td>
<td>6.40±1.40&lt;sup&gt;bc&lt;/sup&gt;</td>
<td>6.53±1.81&lt;sup&gt;d&lt;/sup&gt;</td>
<td>6.50±1.53&lt;sup&gt;b&lt;/sup&gt;</td>
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<td>6.63±1.54&lt;sup&gt;bc&lt;/sup&gt;</td>
<td>7.07±1.39&lt;sup&gt;bc&lt;/sup&gt;</td>
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<td>6.93±1.41&lt;sup&gt;bc&lt;/sup&gt;</td>
<td>6.97±1.33&lt;sup&gt;b&lt;/sup&gt;</td>
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<td>7.07±1.70&lt;sup&gt;ab&lt;/sup&gt;</td>
<td>7.50±1.28&lt;sup&gt;ab&lt;/sup&gt;</td>
<td>7.77±0.94&lt;sup&gt;a&lt;/sup&gt;</td>
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4 Discussion

Sensory data showed that although all the samples were acceptable, acceptability scores were reduced significantly with increased mixing ratios. The preparation methods employed in this study could be a major contributing factor resulting in the differences in texture of the yoghurt types. The higher score in CMCY when compared with SMCY was in line with the work of [5] but contrary to findings of [2] who reported that goat milk yoghurt was preferred in terms of mouth-feel than CMCY because the total solids content in goat milk resulted in yoghurt with a better its mouth-feel, hence it was more preferred. These findings also contrast to findings of [7] who reported that the textures of yoghurts from goat and sheep milks were thicker than that of yoghurt from cow milk. The results on the taste of the yoghurt types are contrary to the findings of [2, 1] who reported that there is no significant difference in terms of taste between SMCY and CMCY and further reported that SMCY can compete favourably with other yoghurts such as those from cow and goat milks and can be a good substitute for commercial production. The study further revealed that CMY only obtains the highest score for taste. This is in line with the findings of [5] who also reported that CMY was preferred in terms of mouth-feel when compared with goat and soya milk yoghurts. The significant (p<0.05) differences between the yoghurt types with different ratios observed in this study corroborate the findings of [5] who also reported significant (p<0.05) differences for aroma on the evaluation of different yoghurt types. The panelists reported that SMCY had a strange characteristic flavour and referred to it as beany. The beany flavour is usually unique to the soya beans as reported by [4]. The results further revealed that CMCY was preferred in terms of aroma and this is in consistent with findings of [2] who reported that CMY was also preferred in aroma and further stated that preference was attributed to the higher content of citrates in CMY. However, these results seem to disagree with the findings of [7] who reported that yoghurts from goat and sheep milks were preferred to yoghurt from cow milk.

5 Conclusion

According to the result it can be concluded that acceptable couscous yoghurt can be obtained from either cow or soya milk with the latter being more acceptable than the former. The most acceptable soya couscous yoghurt is that from 10% couscous addition.

6 Recommendation

Add flavoring agent to SMCY in the ratio 90:10 to help reduce the beany flavour on the product and also the astringency which has been recognized as the throat-catching factor.

7 Acknowledgments

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8 References
