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Production and Comparison of Banana and Chikoo Flavoured Milk-based Beverages

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Abstract: Present study was carried out to produce a product with the object to investigate the chemical composition of flavoured milk-based beverages. A total of ten batches, each of banana and chikoo fruit flavoured milk-based beverages were prepared from skimmed buffalo milk at the Department of Animal Products Technology, Sindh Agriculture University Tando jam and evaluated for physico-chemical and sensory quality characteristics. Moisture content was remarkably higher ($p < 0.05$) in chikoo flavoured milk-based beverage ($84.00 \pm 0.08\%$) compared to that of banana flavoured milk-based beverage ($83.57 \pm 0.03\%$). Average fat content in chikoo flavoured and/or banana flavoured milk-based beverage was found to be $0.12 \pm 0.02\%$ and $0.18 \pm 0.02\%$, respectively. Maximum concentration of protein content was found to be in banana flavoured milk-based beverage ($4.14 \pm 0.13\%$) contrast to that of in chikoo flavoured milk-based beverage ($3.56 \pm 0.93\%$). Total carbohydrate content ($11.51 \pm 0.16\%$) was remarkably higher in chikoo flavoured milk-based beverage compared to that of in banana flavoured milk-based beverage ($10.96 \pm 0.14\%$). Regardless, the average ash content ($0.88 \pm 0.10\%$) in chikoo flavoured milk-based beverage was found to be slightly higher compared to that of found in banana flavoured milk-based beverage ($0.82 \pm 0.11\%$), the differences were statistically non significant ($p > 0.05$). Specific gravity was found to be higher ($p < 0.05$) in banana flavoured milk-based beverage (1.063 ± 0.004) compared to that of chikoo flavoured milk-based beverage (1.061 ± 0.005). Banana flavoured milk-based beverage was found to be more ($p < 0.05$) acidic ($0.20 \pm 0.003\%$) contrast to that of chikoo flavoured milk-based beverage ($0.18 \pm 0.004\%$). Mean pH value (6.53 ± 0.017) was not significantly different ($p > 0.05$) in chikoo flavoured milk-based beverage from that of banana flavoured milk-based beverage (6.49 ± 0.008). Chikoo flavoured milk-based beverage was concluded to be more acceptable ($p < 0.05$) and perceived the score 2.88 ± 0.10 (liked moderately) compared to that of banana flavoured milk-based beverage (score 4.35 ± 0.08 ; liked slightly).

Key words: Milk beverages, fruit flavoured milk, fruit juices in milk

INTRODUCTION

Fruit pulp and juices are rich source of many vitamins, minerals, digestible carbohydrates and organic acids that stimulate appetite and help in proper digestion of foods. Milk-based products like milk beverages are proven to be an extraordinary nutritional material with all essential and non-essential amino acids. Moreover, these drinks are light, refreshing, healthful and nutritious but less acidic than fruit juices. Researchers have reported the important trends in beverage consumption during the past few decades, most notably an increase in per capita regular carbonated soft drink consumption and a decrease in per capita fluid milk consumption (Nielsen and Popkin, 2005; French *et al.*, 2003). Mixed fruit juice and milk beverages fortified with vitamins, minerals and fibers are among the most widely consumed functional foods (Pszczola, 2005). Consumption of these products has increased by 30%

in Europe in the last 10 years. Despite the growing consumption of nutritional supplements (Kuzminski, 1999) and fortified foods such as ATBC drinks (supplemented with vitamins A, C and E as protective micronutrients), little attention has so far been paid to these types of food and to the amounts that finally reach the consumer. Thus present study has been planned to produce a product with the object to compare the physico-chemical characteristics of banana and chikoo flavoured milk-based beverages.

MATERIALS AND METHODS

A total of ten batches, each of banana and sapodilla/chikoo fruit flavoured milk-based beverages were prepared from skimmed buffalo milk at the Department of Animal Products Technology, Sindh Agriculture University Tandojam, according to the

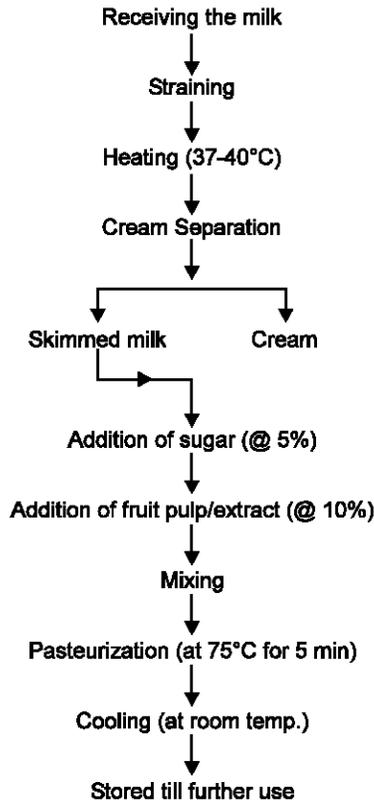


Fig. 1: Flow diagram showing the basic steps for the preparation of fruit flavoured milk-based beverages

method as described by Ibrahim *et al.* (1993). The basic methodology for the preparation of fruit flavoured milk-based beverages is shown in Fig. 1. Pre-heated (37-40°C) buffalo milk was strained to remove any dust or dirt and cream was separated using cream separator. The skimmed milk obtained was divided in two batches and coded with A and B symbols. In each batch sugar (@ 5%) was added and mixed. Thereafter, fruit extract/pulp of chikoo and banana (each @ 10 %) was added to batch A and B, respectively and mixed. The mix was pasteurized (75°C) for 5 min and stored till further analysis.

Analysis: Moisture, fat, protein and ash contents and acidity (%), specific gravity and pH values of fruit flavoured milk-based beverages were examined according to the method of Association of Official Analytical Chemists (AOAC, 2000). Total carbohydrate content of fruit flavoured milk-based beverages was determined by subtracting sum of percentages of protein, fat and ash contents from the total solids content. Sensory evaluation was performed through affective testing by a panel of six judges and they were offered the chikoo and banana flavoured milk-based beverages to taste and rank the products. The score

was rated as per nine points "Hedonic scale" of likeness and dislikeness, where score one was liked extremely, two liked very much, three liked moderately, four liked slightly, five neither liked nor disliked, six disliked slightly, seven disliked moderately, eight disliked very much and the nine disliked extremely (Hue, 1993).

Statistical analysis: The data so obtained was tabulated and analyzed according to statistical procedure of Analysis of Variance (ANOVA) and the treatment means were computed using Least Significant Difference (LSD) at 5% level of probability through computerized statistical package i.e. Student Edition of Statistics (SXW), Version 8.1 (Copyright 2005, Analytical Software, USA).

RESULTS AND DISCUSSION

Moisture content (Fig. 2) was remarkably higher ($p < 0.05$) in chikoo flavoured milk-based beverage ($84.00 \pm 0.08\%$) compared to that of banana flavoured milk-based beverage ($83.57 \pm 0.03\%$). It could be argued that both types of flavoured beverages were prepared from skimmed buffalo milk of similar batch and with similar processing technique. However, the variation in moisture content of the products could be attributed with fruits moisture that is considerably varied from one another (Egan *et al.*, 1981).

Average fat content in chikoo flavoured milk-based beverage was observed as $0.12 \pm 0.02\%$. Whilst in case of banana flavoured milk-based beverage, it was resulted as $0.18 \pm 0.02\%$ (Fig. 3). It is of interest to note that the concentration of fat content in fruit flavoured beverages in the present study is found to be within the normal range of skimmed milk (0.1-0.5%). However, significant ($p < 0.05$) variation among the fat contents of the products could be due to fat contents of the fruits (Sangwan, 2008).

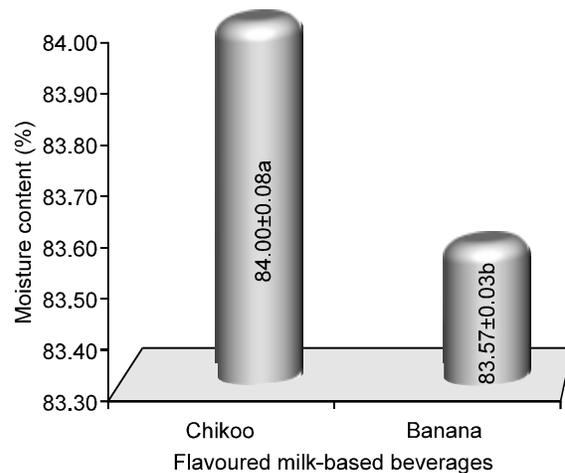


Fig. 2: Moisture content (%) of chikoo and banana flavoured milk-based beverages. LSD (0.05) = 0.238, SE ± = 0.113

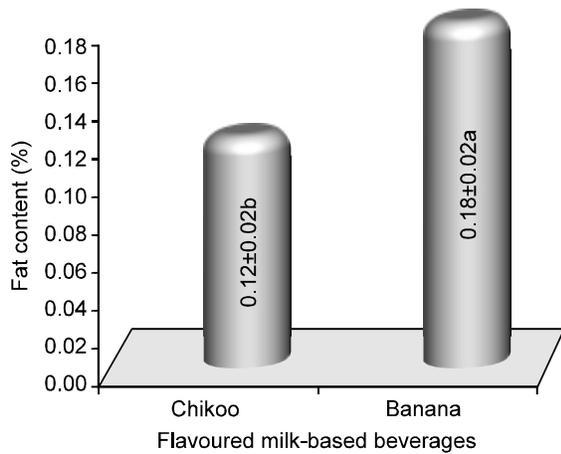


Fig. 3: Fat content (%) of chikoo and banana flavoured milk-based beverages. LSD (0.05) = 0.059, SE± = 0.028

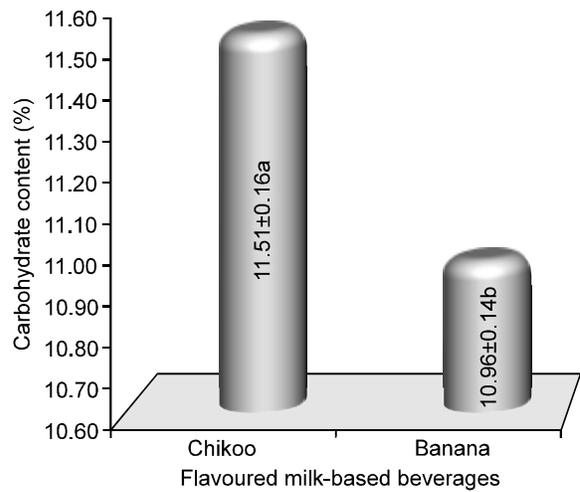


Fig. 5: Carbohydrate content (%) of chikoo and banana flavoured milk-based beverages. LSD (0.05) = 0.462, SE± = 0.220

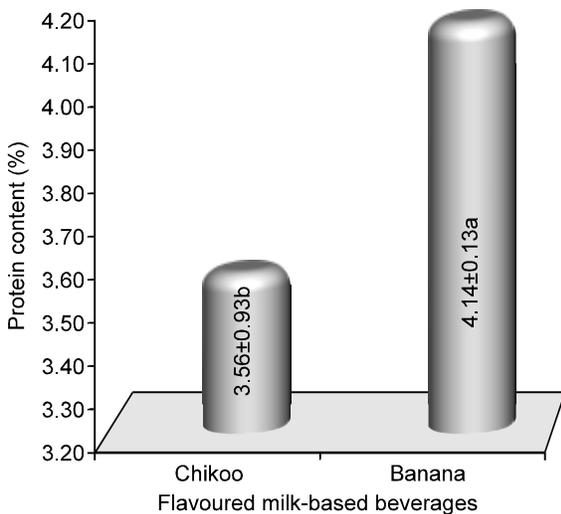


Fig. 4: Protein content (%) of chikoo and banana flavoured milk-based beverages. LSD (0.05) = 0.343, SE± = 0.163

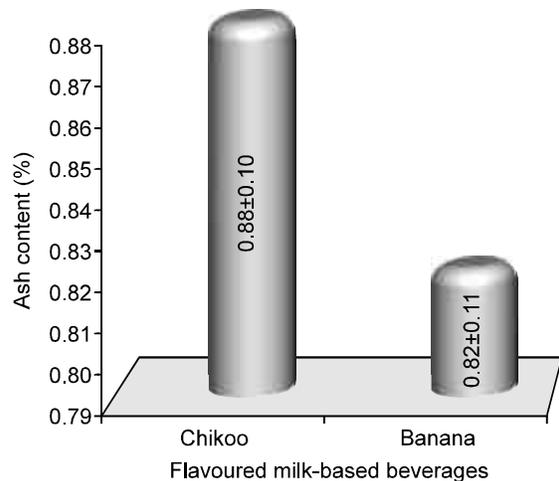


Fig. 6: Ash content (%) of chikoo and banana flavoured milk-based beverages

In the present study the maximum concentration of protein content (Fig. 4) was found to be in banana flavoured milk-based beverage (4.14±0.13%) compared to that of in chikoo flavoured milk-based beverage (3.56±0.93%). It was observed that protein content in chikoo flavoured milk-based beverage was in agreement with the findings of Hinds *et al.* (1997). Whilst the result for banana flavoured milk-based beverage was not agreed with findings of them. However, variation in the protein content in the present study might be due to higher protein content in banana as compared to that of found in chikoo (Seckinkomal, 2004).

Total carbohydrate content (11.51±0.16%) was remarkably higher in chikoo flavoured milk-based

beverage compared to that of in banana flavoured milk-based beverage (10.96±0.14%). It is of interest to note that chikoo fruit is rich source of carbohydrate that may have resulted the significantly ($p < 0.05$) higher concentration in the end products (Fig. 5).

Regardless the average ash content (Fig. 6) was found to be slightly higher in chikoo flavoured milk-based beverage (0.88±0.10%), compared to that of found in banana flavoured milk-based beverage (0.82±0.11%), but results are statistically non significant ($p > 0.05$). It could be argued that both fruits are rich in mineral contents and the concentration of these minerals in the end products might be originated in similar fashion.

Average acidity (Fig. 7) was found to be higher in banana flavoured milk-based beverage (0.20±0.003%) in

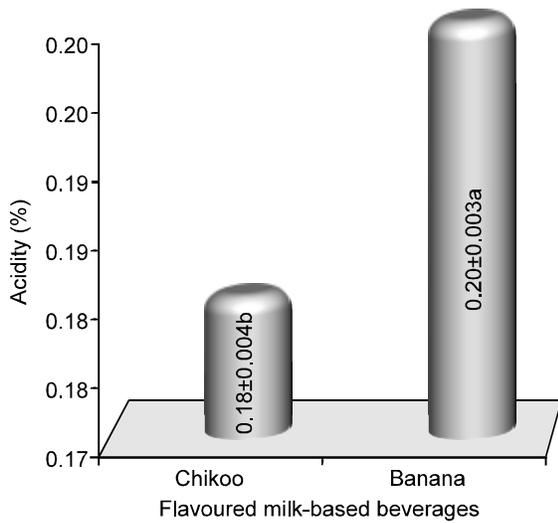


Fig. 7: Acidity (%) of chikoo and banana flavoured milk-based beverages. LSD (0.05) = 0.010, SE± = 0.005

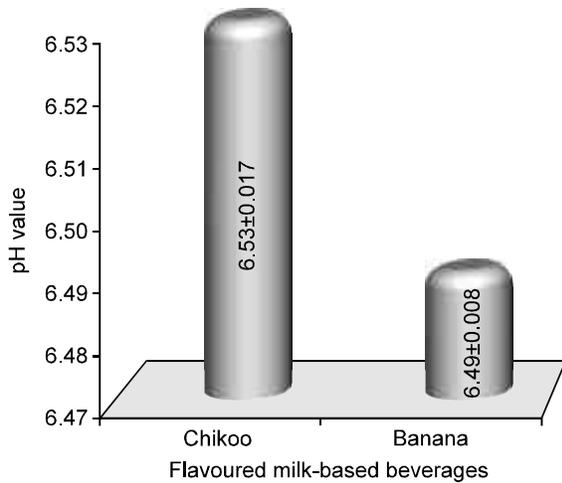


Fig. 8: pH value of chikoo and banana flavoured milk-based beverages

contrast to that of in chikoo flavoured milk-based beverage (0.18±0.004%). The differences among the mean of acidity of flavoured milk-based beverages were statistically significant ($p < 0.05$). Mean pH value (6.53±0.017) was found to be higher in chikoo flavoured milk-based beverage as compared to that of in banana flavoured milk-based beverage (6.49±0.008). No significant difference ($p > 0.05$) was observed among the pH values of flavoured milk-based beverages (Fig. 8). In the present study, specific gravity (Fig. 9) was found to be higher in banana flavoured milk-based beverage (1.063±0.004) compared to that of chikoo flavoured milk-based beverage (1.061±0.005). Significant differences ($p < 0.05$) were observed among the specific gravity of both types of flavoured milk-based beverages.

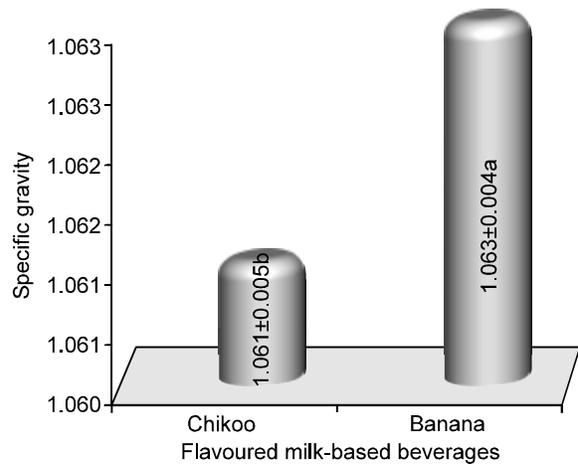


Fig. 9: Specific gravity of chikoo and banana flavoured milk-based beverages. LSD (0.05) = 0.001, SE± = 0.006

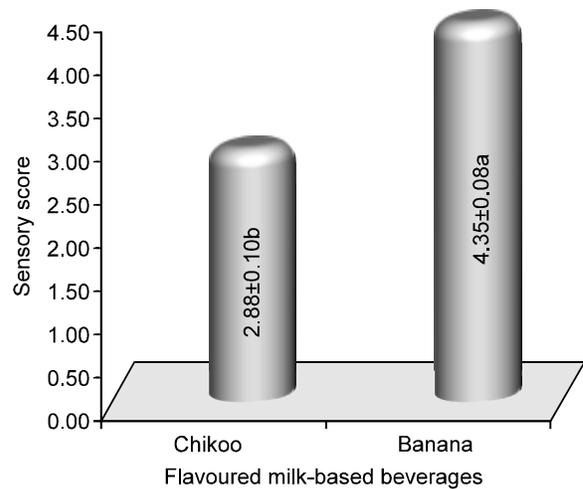


Fig. 10: Sensory analysis of chikoo and banana flavoured milk-based beverages. Score was rated on nine point Hedonic scale, where score one was for liked extremely and nine for disliked extremely. LSD (0.05) = 0.281, SE± = 0.133

Chikoo flavoured milk-based beverage (Fig. 10) perceived the mean score of 2.88±0.10, while the banana flavoured milk-based beverage, it averaged 4.35±0.08 and ranked as liked moderately and liked slightly, respectively.

Conclusion: Study concludes that moisture and total carbohydrate contents were comparatively higher in chikoo flavoured milk-based beverage than that of observed in banana flavoured milk-based beverage. Where as protein and fat contents and acidity (%) were comparatively higher in banana flavoured milk-based beverage than that of observed in chikoo flavoured milk-

based beverage. Ash content and pH value were comparatively similar in both chikoo and Banana flavoured milk-based. Regardless banana flavoured milk-based beverage was seems to be more nutritious, the chikoo flavoured milk-based beverage received more acceptable score of likeness.

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