INFLUENCE OF ADDITION OF ORANGE (CITRUS SINENSIS) JUICE ON SENSORY AND MICROBIOLOGICAL QUALITIES OF LASI DURING STORAGE

D.S. Jadhav, K.D. Chavan* and R.J. Desale
Dept. of Animal Science and Dairy Science, Mahatma Phule Krishi Vidyapeeth, Rahuri Dist. Ahmednagar–413 722, India
Received: 19-08-2013 Accepted: 26-02-2014

ABSTRACT
The effects of addition of orange juice on sensory and microbiological qualities of lassi during storage were investigated. Addition of different levels of orange juice in lassi samples did not adversely influence the colour and appearance and body and texture of the product but the flavour and overall acceptability of the product were significantly (P<0.05) influenced during its storage period. The standard plate counts (SPC) in lassi samples decreased as storage period progressed up to 7 days. The addition of different levels of orange juice significantly (P<0.05) influenced the SPC count in the lassi samples during all the days storage period. The addition of various levels of orange juice also significantly (P<0.05) affected the year and months and Coliform counts of lassi samples during storage period. A good quality lassi can be prepared by incorporation of 12 % orange juice and 10 % sugar. The prepared product could remain acceptable up to five days at refrigerated (7± 2°C) temperature.

Key words: Coliform, Lassi, Orange juice, Sensory quality, Storage, SPC, YMC,

INTRODUCTION
Fermented foods are of great significance since they provide and preserve vast quantities of nutritious foods in a wide diversity of flavour, aromas and textures. Fermented milk products are rich in proteins, vitamins and minerals. They are reported to be effective in treatment of many diseases like constipation, diarrhoea, acidity, gastro-enteritis, gingivitis, tumor genesis hypercholesterolemia etc, (Patel, 1997).

Lassi is the popular indigenous fermented milk beverage in India, made by blending yoghurt with water, salt and spices. Lassi is a white to creamy - white, viscous liquid, with a sweetish, rich aroma and mild to acidic taste. It is flavoured either with salt or sugar and other condiments, depending on regional preferences. Lassi is obtained from pasteurized milk or part skimmed milk, cultured with lactic acid and aroma / flavour producing organisms.

Recently, there has been an increasing trend to fortify cultured milk products with fruit pulp/juices. Fruits are rich sources of various phytonutrients viz, vitamins, minerals, antioxidant and dietary fiber.

MATERIALS AND METHODS
Composite samples of fresh crossbreed cow’s milk were obtained from the herd maintained at the Research Cum - Development Project (RCDP) on Cattle, Department of Animal Science and Dairy Science, Mahatma Phule Krishi Vidyapeeth, Rahuri ( M. S. ). Clean potable drinking water was used for preparation of lassi. BIS mark cane sugar was procured from the local market. Good quality fully ripened orange fruits were procured during pre-experimental and experimental trials.

Preparation of lassi Samples: Lassi samples were prepared as per the procedure described by Gupta and Kulkarni (1983). The lassi samples were incorporated with 0, 3, 6, 9, 12 and 15 per cent orange juice levels and 10 % sugar level. The samples were subjected to sensory evaluation by six semi-trained panel of judges.

Sensory evaluation of lassi: Lassi samples prepared under pre-experimental and experimental treatments were subjected to sensory evaluation as per the method described in (BIS: 6272, Part II 1971).

*Corresponding author’s e-mail: chavankrd@rediffmail.com, krishnachavan158@gmail.com
Present address: aAnimal science & Dairy Science, College of Agriculture, Dhule.
Enumeration of microorganism: The pour plate method was adopted for enumeration of different groups of microorganisms. Standard Plate Count (SPC) was determined by adopting standard procedure using Standard Plate Count Agar (SPCA) media as mentioned by Amin, (1997). Yeast and Mould Count (YMC) was determined as per procedure described in IS: 5403 (1969) using Potato Dextrose Agar (PDA). Coliform count lassi samples was determined as per procedure described in IS: 5550(1970) using McConkey’s agar.

Appropriate dilutions of the respective samples were transferred to sterile petriplates in duplicate. Plates were poured with respective media. Most aseptic condition was observed to avoid contamination in this case. The plates were incubated at optimum growth temperatures and period mentioned in respective procedures. After incubation period, the colonies were counted.

All lassi samples were stored at 7±2°C in refrigerator for shelf life studies. The samples of stored lassi were analyzed for sensory and microbiological qualities over a period of 7 days or till they became sensorily unacceptable at interval of 2 days.

The experiment was laid out in completely randomized design with three replications. The experimental data were analyzed using the statistical method of Snedecor and Cochran, (1994).

RESULTS AND DISCUSSION

The mean sensory score offered to colour and appearance of the product under different treatments showed non-significant differences. All these treatment samples had uniform, attractive, pleasant appearance with light yellow to whitish colour.

The body and texture differences in the mean scores were found to be non-significant during storage. The mean score ranged from 7.10 (T₀) to 8.48 (T₄) during storage period. The addition of various levels of orange juice in the lassi samples did not affect body and appearance of the product.

Flavour: The influence of addition of orange juice on flavour of the lassi samples is given in (Table 1). The experimental treatments significantly (P<0.05) affected the flavour during storage.

Although the treatments showed significant differences the scores obtained by the samples under treatments T₁ and T₂ were at par on day 3 of storage. The additions of 12% orange juice in lassi samples maintained the flavour of product till day 5 of storage. On further storage period i.e. day 7, it could be seen that there was higher reduction in the scores of all the lassi samples.

Overall acceptability: The addition of different levels of orange juice in the lassi samples significantly (P<0.05) influenced the overall acceptability of the product during storage (Table 2). The mean overall acceptability scores of the lassi samples under various treatments ranged from 8.12 (T₀) to 8.70 (T₄) on day 0. It was noticed that the sample T₄ with 12% of orange juice remained sensorily acceptable up to five days storage with sensory score was 8.11. The sensory score of rest of the samples i.e. T₁, T₂, T₃ and T₀ also remained score in between liked very much to like extremely.

Influence of addition of orange juice on microbiological quality of lassi during storage

Standard plate count (SPC): The lassi samples under various treatment samples showed a variation in microbiological quality (Table 3). The differences in SPC due to the experimental treatments were found to be significant (P<0.05). The mean SPC counts of experimental samples were 13.50 x 10⁷ cfu/g. The control sample had significantly lower SPC counts over the rest of the samples during storage.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Flavour ( Sensory score out of 9 )</th>
<th>Overall acceptability ( Sensory score out of 9 )</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>T₀</td>
<td>8.05a</td>
<td>7.90a</td>
</tr>
<tr>
<td>T₁</td>
<td>8.19b</td>
<td>8.15b</td>
</tr>
<tr>
<td>T₂</td>
<td>8.21c</td>
<td>8.21c</td>
</tr>
<tr>
<td>T₃</td>
<td>8.25d</td>
<td>8.22cd</td>
</tr>
<tr>
<td>T₄</td>
<td>8.51e</td>
<td>8.44e</td>
</tr>
<tr>
<td>SÉ±</td>
<td>0.012</td>
<td>0.012</td>
</tr>
<tr>
<td>CD @ 5%</td>
<td>0.036</td>
<td>0.038</td>
</tr>
</tbody>
</table>
The sample $T_4$ had significantly higher SPC count probably due to moisture content as well as acidic pH of the product. Every treatment showed significant ($P<0.05$) difference amongst each other.

**Yeast and Mould Count (YMC):** The different experimental treatments showed significant ($P<0.05$) difference for the YMC in the lassi samples on a day 0 as well as on the other days storage (Table 4). The YMC in control sample ($T_0$) was the highest initially ($16.26 \times 10^2$ cfu/g) as well as on a day 7 of the storage ($30.26 \times 10^2$ cfu/g). The treatment $T_4$ was found to be significantly superior to rest of treatments in slower rate of increase in the YMC in the samples.

**Coliform count:** The presence of coliform in milk and milk product is suggestive of unsanitary condition followed during production, processing and storage. The coliform count revealed (Table 5) that the addition of various levels of orange juice significantly ($P<0.05$) affected the coliform count in the experimental lassi samples. The differences in the coliform count in lassi samples under different treatments were found to be significant ($P<0.05$) on day 0 as well as on other days of storage. The number of coliform count in control sample ($T_0$), was highest initially (3.76 cfu/g) but reduced on day 7 (2.15 cfu/g) of storage. The differences were significant ($P<0.05$) on all the days of storage. The treatment $T_4$ was found to be most superior to rest of the samples.

**CONCLUSION**

It can be concluded that optimum quality orange juice fortified lassi can be prepared by mixing of 12 % orange juice and 10 % sugar. The microbiological quality of product remained within the standard limit during storage of seven days period.

**REFERENCES**


