

Studies on keeping quality of Shrikhand prepared from buffalo milk blended with soymilk

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ABSTRACT

The investigation was undertaken in Department of Animal Husbandry and Dairying, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola. The overall acceptability for fresh Shrikhand under treatment T₁ (Shrikhand prepared with 100% buffalo milk), T₂ (Shrikhand prepared with 90% buffalo milk + 10% soymilk), T₃ (Shrikhand prepared with 80% buffalo milk + 20% soymilk) and T₄ (Shrikhand prepared with 70% buffalo milk + 30% soymilk) at room temperature and refrigeration temperature storage were same *i.e.* 92.53, 93.80, 91.91 and 90.93, respectively. While on 15th day of storage, mean score of overall acceptability of Shrikhand T₁, T₂, T₃ and T₄ were 58.12, 58.10, 53.71 and 49.43 for room temperature and 67.16, 69.82, 65.57 and 60.28 for refrigeration temperature, respectively. The overall acceptability was high in T₂ than T₁, T₃ and T₄. So, it can be concluded that Shrikhand made from buffalo milk and made from buffalo milk blended with soymilk can be stored at refrigeration temperature for at least 15 days.

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Key Words : Buffalo milk, Soymilk, Blending, Shrikhand, Chemical composition, Sensory evaluation, Cost of production

INTRODUCTION

Milk has been used as a human food since the time in memorable. Shrikhand is a fermented and sweetened product popular in western part, especially in Maharashtra, Gujarat and Karnataka. This indigenous fermented milk product contains high percentage of casein and large amount of sugar therefore; it is a heavy dish for digestion. One of the most useful aspects of the fermented milk products is their strong therapeutic potentials, which are mainly due to the antagonistic *i.e.* anti microbial properties of the starter organisms.

Soymilk proteins are alkaline in nature and increase alkalinity of the blood which is very important from the health point of view. Soybean contains about 30-40 per cent protein, 18-20 per cent fat, 5 per cent minerals and 4 per cent fibre. It is good source of phosphorus and lecithin thus, it can be used for cure of nerve diseases. The soybean oil is rich in unsaturated fatty acids, which is best for diabetic patients, due to alkaline nature, it reduces the activity in blood (Gupta and Patel, 1984).

During the summer season, a fairly large quantity of Shrikhand is manufactured by the dairies and in restaurants by conventional process (Upadhyay and Dave, 1977). With the reality that the short supply of milk and

widespread protein malnutrition in Indian population, it becomes necessary to use vegetable protein to supplement the available milk in the country to meet the nutritional requirement of the people. It is the basic need to make increase supply of milk at reasonable rate. In China and Manchuria, soymilk is being used commonly as a substitute of buffalo milk. Soybean has been utilized in the preparation of milk substitute and a variety of fermented product. This indicate that there is tremendous scope for milk product prepared from soybean which increases the nutritive value of product of cheaper rate.

Milk and milk products are highly perishable one but they can be stored for more period at refrigeration temperature than room temperature, hence we can store the milk products made from addition of soymilk for increasing the therapeutic value of milk products. The addition of soymilk in milk products will be new era for milk product industries.

METHODOLOGY

The present investigation was undertaken in the Department of Animal Husbandry and Dairying, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola during the year 2010 -2011. The procedures adopted for

experimentation in the present study are given below.

Plan of work:

During the course of investigation, four treatments were studied and each treatment was observed six times. The treatments used in present study were T₁ (Shrikhand prepared with 100% buffalo milk), T₂ (Shrikhand prepared with 90% buffalo milk + 10% soymilk), T₃ (Shrikhand prepared with 80% buffalo milk + 20% soymilk) and T₄ (Shrikhand prepared with 70% buffalo milk + 30% soymilk). Sugar was added in all the treatments @ 40 per cent and storage temperatures were studied as room temperature and refrigeration temperature. The freeze dried curd culture of *Lactobacillus bulgaricus* and *Streptococcus thermophilus* from National Culture Collection unit, N.D.R.I., Karnal were used in 1:1 proportion @ 1 per cent. Shrikhand was prepared as per procedure described by De (2009).

Chemical analysis of Shrikhand:

Shrikhand samples from each combination were analyzed for, percentage of fat was determined as per the procedure recommended in I.S.I. Hand Book of Food Analysis, Dairy Products, Part 1 (1980). Protein was determined by method as prescribed by Indian Standard Institute in I.S.I Handbook of Food Analysis, Dairy Products, Part 1 (1980). Total solids content of samples was determined by as per IS: 4079 (1967). The titratable acidity of sample was determined as per the procedures recommended in ISI Hand Book of Food Analysis, Dairy Products, Part 1 (1980). Microbiological qualities in respect of yeast of mould count were determined using Potato dextrose agar medium procedure (as mentioned in IS – 1479 (Part – III), 1962). Standard plate count (SPC) colonies were counted with the help of Quebec Colony Counter (As mentioned in IS: 1479 Part III, 1962). The samples of fresh product were subjected to organoleptic evaluation by 100 point numeric score as described by Pal and Gupta (1985) for Shrikhand was adopted with slight modification.

Statistical analysis:

The observations were analyzed as per the Factorial Randomized Block Design in which four treatments factors were replicated six times (Amble, 1975).

OBSERVATIONS AND ASSESSMENT

The results obtained from the present investigation as well as well as relevant discussion have been presented under following heads :

Chemical and microbial changes during storage of Shrikhand :

The data pertaining to the chemical and microbial changes of Shrikhand made from buffalo milk and blended soymilk Shrikhand at different storage temperature are presented in Table 1.

Fat :

The data pertaining to the average fat content of Shrikhand made from buffalo milk and blended soymilk Shrikhand at different storage temperature are presented in Table 1. Fat percentage of Shrikhand prepared from buffalo milk and Shrikhand prepared buffalo milk blended with soymilk was slightly decreased from 5th day to 15th day of storage at both the temperatures. At room temperature storage, reduction of fat percentage of Shrikhand T₁, T₂, T₃ and T₄ was greater than refrigeration storage temperature. As per BIS specification, IS 5432 (1980). Shrikhand should content total solids 58.0 per cent, fat 10.5 per cent, tiatratable acidity 1.4 per cent and sucrose 72.5 per cent (maximum). The results on composition of Shrikhand are within the limit of ISI specifications.

Protein :

The data pertaining to the protein percentage of Shrikhand made from buffalo milk and Shrikhand made from buffalo milk blended with soymilk at room temperature and refrigeration temperature in Table 1. Score of protein of Shrikhand slightly decreased form 5th day to 15th day. In this T₁, T₂, T₃ and T₄ treatments showed increased in protein percentage with increased level of soymilk as per treatment. The highest score was obtained in treatment T₄ while lowest score was recorded by treatment T₁ at room temperature storage and refrigeration storage temperatures, respectively. In this T₁, T₂, T₃ and T₄ treatments showed decrease in protein percentage at both storage temperatures from 5th day to 15th day.

Moisture :

Moisture percentage at Shrikhand was increasing from 5th day to 15th day at room temperature. In this highest moisture percentage obtained in treatment, T₄ and lowest percentage recorded in treatment T₁. On 15th day of storage, mean of moisture percentage of T₁, T₂, T₃ and T₄ increased at room temperature, while on 15th day storage, mean of moisture percentage of T₁, T₂, T₃ and T₄ decreased at refrigeration temperature.

Total solid :

The total solid contents of Shrikhand stored at room temperature and refrigeration temperature prepared from

Table 1: Effect of storage interval, storage temperature and treatments on chemical and microbial changes in Shrikhand

| Interaction between storage interval, storage temperature and treatments | Average / mean values. | | | | | | |
|--|------------------------|-------------|--------------|------------------|-------------------------|--------------------------------|-------------------------------|
| | Fat (%) | Protein (%) | Moisture (%) | Total solids (%) | Titrateable acidity (%) | Avg. yeast and moulds per gram | Average SPC X 10 ³ |
| Storage interval (Factor A) | | | | | | | |
| 0 | 8.86 | 10.02 | 55.18 | 44.81 | 1.82 | 22.55 | 25.96 |
| 5 | 8.79 | 9.99 | 57.41 | 42.59 | 1.90 | 29.90 | 34.03 |
| 10 | 8.71 | 9.95 | 59.00 | 41.00 | 1.98 | 37.31 | 41.55 |
| 15 | 8.67 | 9.92 | 59.65 | 40.35 | 2.05 | 43.94 | 48.95 |
| F test | Sig. | Sig. | Sig. | Sig. | Sig. | Sig. | Sig. |
| S.E. ± | 0.04 | 0.014 | 1.04 | 0.034 | 0.01 | 1.46 | 1.31 |
| C.D. (P=0.05) | 0.13 | 0.042 | 3.12 | 0.10 | 0.03 | 4.40 | 3.95 |
| Temperature (Factor B) | | | | | | | |
| RT | 8.72 | 9.95 | 60.82 | 40.01 | 1.97 | 40.23 | 41.24 |
| FT | 8.79 | 9.99 | 54.80 | 44.10 | 1.90 | 26.62 | 34.00 |
| F test | Sig. | Sig. | Sig. | Sig. | Sig. | Sig. | Sig. |
| S.E. ± | 0.03 | 0.009 | 0.73 | 0.02 | 0.008 | 1.03 | 0.90 |
| C.D. (P=0.05) | 0.09 | 0.027 | 2.21 | 0.07 | 0.026 | 3.11 | 2.70 |
| Shrikhand (Factor C) | | | | | | | |
| T ₁ -Buffalo milk (100%) | 9.94 | 9.44 | 54.77 | 44.22 | 2.01 | 37.39 | 41.27 |
| T ₂ -Buffalo milk+ Soymilk (90%+10%) | 9.38 | 9.85 | 57.27 | 42.72 | 1.96 | 33.73 | 37.24 |
| T ₃ -Buffalo milk+ Soymilk (80%+20%) | 8.49 | 10.15 | 58.98 | 41.01 | 1.92 | 31.95 | 36.38 |
| T ₄ -Buffalo milk+ Soymilk (70%+30%) | 7.22 | 10.44 | 60.21 | 40.01 | 1.86 | 30.61 | 35.60 |
| F test | Sig. | Sig. | Sig. | Sig. | Sig. | Sig. | Sig. |
| S.E. ± | 0.04 | 0.014 | 1.04 | 0.03 | 0.01 | 1.46 | 1.31 |
| C.D. (P=0.05) | 0.13 | 0.042 | 3.12 | 0.10 | 0.03 | 4.40 | 3.95 |

buffalo milk and buffalo milk blended with soymilk were recorded in Table 1. There was no significant change in total solid percentage of Shrikhand T₁, T₂, T₃ and T₄ stored at room temperature and refrigeration temperature. On 15th day, the values of total solid percentage in T₁, T₂, T₃ and T₄ at room temperature were 36.84, 35.17, 34.50 and 34.00, respectively and 49.00, 46.00, 44.14 and 43.17 at refrigeration temperature, respectively.

Titrateable acidity :

It is revealed from Table 1 that the minimum acidity in the fresh Shrikhand prepared from buffalo milk blended with soymilk than Shirkhand prepared from buffalo milk. The titrateable acidity of Shrikhand T₁, T₂, T₃ and T₄ stored at room temperature increase gradually. The titrateable acidity of Shrikhand T₁, T₂, T₃ and T₄ at refrigeration temperature also increased as on 15th day. Highest value of titrateable acidity observed at room temperature than refrigeration temperature in T₁, T₂, T₃ and T₄ treatment.

Biological changes during storage of Shrikhand:

Yeast and moulds :

The data pertaining to the yeast and moulds counts of Shrikhand prepared from buffalo milk and Shrikhand

prepared from buffalo milk blended with soymilk at different storage temperature are also presented in Table 1. The mean of yeast and moulds counts per gram of fresh Shrikhand *i.e.* T₁, T₂, T₃ and T₄ with two dilutions was different in T₁, T₂, T₃ and T₄ at both storage temperatures. The yeast and moulds counts of Shrikhand were increased very fastly from 5th day to 15th day. The results obtained were in agreement with the result of Sharma and Zariwala (1980) who reported that the growth of microorganisms in Shrikhand was faster at room temperature than refrigeration storage temperature.

Standard plate count :

The mean of standard plate counts per gram of fresh Shirkhand with three dilution was different in T₁, T₂, T₃ and T₄ treatments at room temperature and refrigeration temperature respectively. Standard plate counts of Shrikhand was increased very fastly from 5th day to 15th day at room temperature. Highest microbial or SPC counts was obtained by treatment T₁ while lowest counts recorded in treatment T₄ at both storage temperatures. At room temperature storage standard plate counts of T₁, T₂, T₃ and T₄ were increasing very fastly than the refrigeration storage temperature. The results obtained are in agreement

with the results of Sharma and Zariwala (1980) who reported that the growth of microorganisms in Shrikhand was faster at room temperature storage than refrigeration storage temperature.

Sensory evaluation of Shrikhand preparation:

Data in respect of sensory evaluation of Shrikhand prepared from buffalo milk and buffalo milk blended with soymilk are presented in Table 2.

Flavour :

The data pertaining to the flavour score of Shrikhand with room temperature and refrigeration temperature are presented in Table 2. The mean score of flavour for fresh Shrikhand prepared from buffalo milk was same at room temperature and refrigeration temperature. Score of flavour has been decreased from 5th day to 15th day storage at room temperature and refrigeration temperature. The average flavour score showed a decreasing trend at both the temperature conditions during storage period, for T₁, T₂, T₃ and T₄ treatments. The flavour scores for T₄ at refrigeration temperature was less as compared to T₁, T₂ and T₃. The Shrikhand stored at room

temperature obtained less score as compared to Shrikhand stored at refrigeration temperature. On 15th day of storage, mean flavour score of treatment T₁, T₂, T₃, T₄ at room temperature and refrigeration temperature decreased. The highest score was obtained by treatment T₂ while the lowest score was recorded by treatment T₄.

The results obtained were in agreement with the result of Sen and Rajhoria (1990). They reported that the rate of decreasing flavour was faster in samples stored under room temperature than refrigeration temperature.

Body and texture :

The data pertaining to the body and texture score of Shrikhand with different types of treatment i.e. T₁, T₂, T₃ and T₄ at different storage temperature are presented in Table 2. Score of body and texture of Shrikhand has been decreased from 5th day to 15th days of storage in both temperature conditions for T₁, T₂, T₃ and T₄ treatments. Highest score was obtained by treatment T₂, while the lowest score was recorded by treatment T₄ at room temperature as well as refrigeration temperature. On 15th day of storage, mean body and texture score of treatment T₁, T₂, T₃ and T₄ at room temperature and at refrigeration

Table 2 : Interaction between storage interval, storage temperature and treatments on sensory evaluation(score) of Shrikhand (45 point)

| Interaction between storage interval, storage temperature and treatments | Sensory evaluation (Average score obtained) (Max. Marks) | | | |
|--|--|-----------------------|----------------------------|-----------------------------|
| | Flavour (45) | Body and texture (35) | Colour and appearance (20) | Overall acceptability (100) |
| Storage interval (Factor A) | | | | |
| 0 | 41.61 | 31.95 | 18.69 | 92.24 |
| 5 | 38.89 | 29.15 | 16.89 | 84.93 |
| 10 | 34.55 | 25.71 | 13.92 | 74.18 |
| 15 | 28.71 | 21.05 | 10.51 | 60.27 |
| F test | Sig. | Sig. | Sig. | Sig. |
| S.E.± | 0.46 | 0.51 | 0.38 | 0.76 |
| C.D. (P=0.05) | 1.39 | 1.53 | 1.15 | 2.28 |
| Temperature (Factor B) | | | | |
| RT | 34.70 | 26.04 | 14.31 | 75.05 |
| FT | 37.18 | 27.89 | 15.69 | 80.76 |
| F test | Sig. | Sig. | Sig. | Sig. |
| S.E.± | 0.32 | 0.36 | 0.27 | 0.53 |
| C.D. (P=0.05) | 0.98 | 1.08 | 0.81 | 1.61 |
| Shrikhand (Factor C) | | | | |
| T ₁ -Buffalo milk (100%) | 36.64 | 27.36 | 15.11 | 79.11 |
| T ₂ -Buffalo milk+ Soymilk (90%+10%) | 37.06 | 27.89 | 15.81 | 80.76 |
| T ₃ -Buffalo milk+ Soymilk (80%+20%) | 35.65 | 26.70 | 14.89 | 77.24 |
| T ₄ -Buffalo milk+ Soymilk (70%+30%) | 34.42 | 25.91 | 14.10 | 74.52 |
| F test | Sig. | Sig. | Sig. | Sig. |
| S.E.± | 0.46 | 0.51 | 0.38 | 0.76 |
| C.D. (P=0.05) | 1.39 | 1.53 | 1.15 | 2.28 |

temperature had shown decreased trend. The highest score was obtained by treatment T_2 at refrigeration temperature.

The results obtained are in agreement with the result of Sen and Rajhoria (1990) observed that the rate of decreasing body and texture score of Shrikhand was faster in room temperature.

Colour and appearance :

The data pertaining to the colour and appearance score of Shrikhand made with buffalo milk and buffalo milk with soymilk at different storage temperatures are presented in Table 2. Score of colour and appearance of Shirkhand has been decreased from 5th day to 15th day of storage at room temperature and refrigeration temperature. These values indicate that the colour and appearance score of T_2 was more than T_1 , T_3 and T_4 at room temperature as well as refrigeration temperature. Also the table indicates that mean colour and appearance score of Shrikhand T_2 was more score up to 15th day than T_1 , T_3 and T_4 at room temperature and refrigeration temperature, respectively. Colour and appearance of Shrikhand was found superior in refrigeration storage temperature than room temperature.

The result of presented study is in agreement with the results of Sen and Rajhoria (1990). They reported that the rate of decreasing colour and appearance score of Shrikhand was faster at room temperature storage than refrigeration temperature storage.

Overall acceptability :

The data pertaining to the overall acceptability score of Shrikhand T_1 , T_2 , T_3 and T_4 at different storage temperatures are presented in Table 2. Score of overall acceptability of Shrikhand decreased for T_1 , T_2 , T_3 and T_4 at room temperature and refrigeration temperature. Overall acceptability score of Shirkhand T_2 was high on 15th day than T_1 , T_3 and T_4 . Overall acceptability score was same at room temperature and refrigeration temperature for T_1 , T_2 , T_3 and T_4 . Highest score was obtained by treatment T_2 and lowest score was recorded by treatment T_4 at both the temperatures. On 15th day of storage, mean overall acceptability score of treatment T_1 , T_2 , T_3 and T_4 were decreased for room temperature and refrigeration temperature. Overall acceptability score of Shrikhand T_1 , T_2 , T_3 and T_4 was found superior at refrigeration storage temperature than the room temperature stored.

The results obtained are in agreement with the results of Sen and Rajhoria (1990) reported that the rate of decreasing overall acceptability score of Shrikhand was

moderately faster at room temperature than refrigerator temperature.

Conclusion:

Sensory quality of Shrikhand (T_2) prepared from buffalo milk blended with 10 per cent soymilk was superior quality than Shrikhand prepared from buffalo milk at refrigeration condition. Shrikhand prepared from buffalo milk and Shrikhand prepared from buffalo milk blended with soymilk (T_2 , T_3 , T_4) showed very high increase in titratable acidity at room temperature and refrigerating temperature. Very small decrease in fat, protein and total solids was observed at room temperature and refrigeration temperature. Moisture percentage increased in Shrikhand at room temperature while there was very small decrease in moisture percentage at refrigeration temperature storage. Shrikhand prepared from buffalo milk blended with 10 per cent soymilk stored at refrigeration temperature was acceptable up to 15th days than stored at room temperature than Shrikhand prepared from buffalo milk. Shrikhand made from buffalo milk (T_1) and Shrikhand made from buffalo milk blended with soymilk (T_2 , T_3 , T_4) were spoiled within one week at room temperature storage.

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