



Preparation of strawberry *Lassi*

B.K. GHULE, R.J. DESALE, M.S. GAVHANE AND M.C. KHORE

ABSTRACT : In present study of strawberry fortified *Lassi* the chemical composition observed as fat content ranges from 3.25 to 3.11, protein from 3.64 to 3.78, lactose from 3.73, to 3.82, total sugar 13.92 to 16.29, ash from 0.73 to 0.8. Acidity (% LA) from 0.90 to 1.02 and pH from 4.13 per cent, respectively. The fat content of *Lassi* samples is decreases as increase in the level of strawberry pulp while lactose content is increases as increase in the level strawberry pulp. The overall acceptability for sensory score for *Lassi* prepared by using 5 per cent strawberry pulp is (8.09 to 7.90). The mean lactobacilli count was observed to be 4.33×10^7 cfu/ml lit was observed that *Lassi* samples under study did not show presence of any yeast and mould growth. The cost for the sensorial superior combination *Lassi* prepared with 8 per cent sugar and 5 per cent strawberry pulp could make a 200 ml serving at Rs. 6.80 which may be sufficiently lower with the value added and nutritionally enriched combination of strawberry pulp.

KEY WORDS : *Dahi*, *Lassi*, Strawberry pulp

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INTRODUCTION

Lassi is a popular indigenous fermented milk beverage, which is usually prepared by mixing *dahi* and water in required proportions. It is served on very large scale in cold drink shops, bars and restaurants during summer in almost every state in India. The fermented milk products are prepared by the action of micro-organisms by adding starter culture which modify the substrates biochemically and organoleptically in to edible products and are thus, generally palatable, safe and nutritious (Compbell-Platt, 1994).

India's milk output during the year 2012 – 13 reached the level of 128 million tonnes, providing per capita availability of 290 g per day. About 50 per cent of this

milks is converted into variety of indigenous products like *Dahi*, *Shrikhand*, *Chhana*, *Paneer*, *Makkhan*, *Ghee*, *Khoa* and *Khoa* based sweets, etc. Out of this, nearly 7 per cent milk is converted into *dahi* which is the base for preparation of fermented milk products (Bhasin, 2009).

Observing the inclination of *Lassi* manufacturers towards preparing fruit *Lassi*, it seems necessary to study the effect of fruit additives on microbial status of *Lassi* as these micro floras and especially the lactic acid bacteria play a crucial role in imparting pleasant flavour and therapeutic value to *Lassi*. The investigation will explore the possibility of incorporating strawberry pulp in *Lassi*.

The strawberry's (*Fragaria* spp.) anti-bacterial properties have been used to protect against typhoid epidermises. This property is due to the presence of a variety of plant nutrients, bioflavonoids. It is a good laxative; it stimulates digestion and is an energy giving food. Besides, it is an all season fruit. Therefore, it is planned to study the effect of addition of strawberry pulp on sensory, chemical and microbial status of *Lassi* with special reference to lactic acid bacteria.

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The objectives laid down for present research work are as follows :

- Preparation of *Lassi* by using various levels of strawberry pulp.
- To study the sensory, chemical and microbial quality of strawberry *Lassi*.
- To estimate the cost of preparation of strawberry *Lassi*.

MATERIAL AND METHODS

Sample of cow milk was obtained from the herd maintained at the cattle project of University. LF-40 starter culture was used for making of *dahi* in the laboratory. Distilled water was used for preparation of *Lassi* throughout the study period. Level of water and sugar were kept constant for 10 and 8 per cent, respectively (Fig. A).

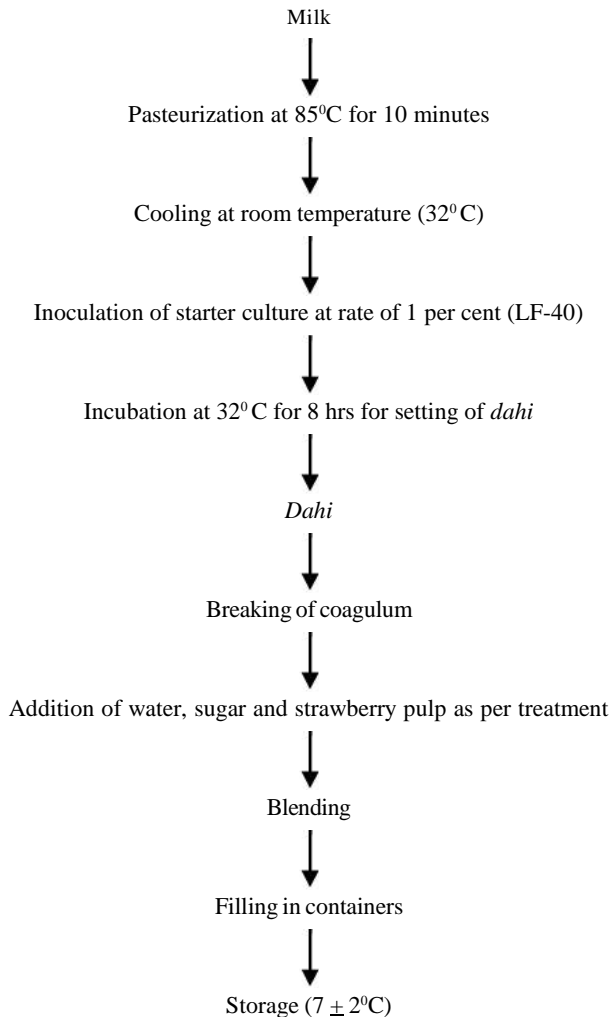


Fig. A: Flow chart for preparation of strawberry *Lassi*

Sensory evaluation of *Lassi* :

Lassi samples prepared under this study were evaluated sensorily by the panel of six semi-trained judges adopting 9 point Hedonic scale. A score card given by Dharampal and Gupta (1985) with slight modification (Ashwani, 1992) was used for sensory evaluation of *Lassi*.

Chemical analysis of *Lassi* :

The *Lassi* samples were analyzed for chemical parameters by adopting standard procedure given below. Fat was determined by Gerber method as per procedure stated in IS: 1224 (Part-I), 1977. Nitrogen content was determined by semi-micro Kjeldhal method as described by Menefee and Overman (1940). This was multiplied by 6.38 to get per cent protein. Acidity of *Lassi* samples were determined as per procedure stated in IS: 1479 (Part I) 1960. pH of *Lassi* determined by using digital pH meter following the procedure stated in IS: 1479 (Part-II) 1961. Lactose was determined as per Lane-Eynon's method given in IS: 1479 (Part-II) 1961. Total sugar of *Lassi* samples was determined as per procedure of Lane and Eynon method (1923) modified by Ranganna (1977). Total solids were determined as per procedure of gravimetric method given in IS: 1166 (Part II), 1986. Ash content was estimated as per procedure given in IS: 1479 (Part II), 1961.

Microbial analysis of *Lassi* :

In all treatment samples of *Lassi* and one control sample of *Lassi* were analyzed for different microbial parameters such as lactic acid bacteria count, yeast and mould count and coliform count by adopting standard procedure as listed below.

Lactic acid bacteria (LAB) :

The *Streptococci* count and *Lactobacilli* count of *Lassi* sample was determined using Lactose Purple Agar (LPA) and MRS Agar media, respectively by pour plate technique suggested by Prajapati (1997)

Yeast and mould :

The yeast and mould count of *Lassi* sample were taken as per described in IS: 5403 (1969) using Potato Dextrose Agar (PDA).

Coliform :

The coliform count of *Lassi* samples was determined

as per procedure described in IS:5550 (1970) using McConkey's Agar.

Statistical design :

The research data was tabulated carefully and statistically analyzed by using Completely Randomized Design (CRD) test as described by Snedecor and Cochran (1967).

Treatment combinations :

- T₀ : control sample
- T₁ : control sample + 2.5 per cent strawberry pulp,
- T₂ : control sample + 5 per cent strawberry pulp,
- T₃ : control sample + 7.5 per cent strawberry pulp.

Cost estimation of manufacturing *Lassi* :

The cost estimation (Rs./kg) of the product was worked out by taking into account the prevailing market rates of the ingredients as well as other charges used for preparation of strawberry *Lassi*.

RESULTS AND DISCUSSION

The results of the present study as well as relevant discussions have been presented under following sub heads and Table 1 to 3.

Chemical composition of strawberry pulp :

Strawberry pulp used for preparation *Lassi* was analyzed for chemical parameters. The average values

Table 1 : Chemical evaluation of strawberry *Lassi*

Treatments	Fat (%)	Protein (%)	Lactose (%)	Ash (%)	Total sugar (per cent)	Total solid (%)	Acidity (% LA)	pH
T ₀	3.25 ^d	3.64 ^a	3.73 ^b	0.73 ^b	13.92 ^d	25.17 ^d	1.02 ^c	4.31 ^a
T ₁	3.21 ^c	3.68 ^b	3.75 ^b	0.75 ^b	14.73 ^c	26.17 ^c	0.98 ^b	4.28 ^a
T ₂	3.11 ^b	3.73 ^c	3.79 ^a	0.82 ^a	15.50 ^b	27.05 ^b	0.92 ^a	4.17 ^b
T ₃	3.05 ^a	3.78 ^d	3.82 ^a	0.85 ^a	16.29 ^a	27.88 ^a	0.90 ^a	4.13 ^c
S.E. (±)	0.011	0.017	0.010	1.29	0.016	0.014	0.011	0.011
C.D. (P=0.05)	0.033	0.033	0.032	0.03	0.049	0.044	0.035	0.030
Result	Significant	Significant	Significant	Significant	Significant	Significant	Significant	Significant

Table 2 : Sensory evaluation score of strawberry *Lassi*

Treatments	Colour and appearance	Flavour	Body and texture	Acidity
T ₀	7.56	7.12	7.38	7.19
T ₁	7.68	7.65	7.83	7.21
T ₂	8.02	7.90	8.09	7.24
T ₃	7.73	7.62	7.86	7.27
S.E. (±)	0.027	0.026	0.039	1.03
C.D. (P=0.05)	0.081	0.0079	0.12	0.03
Result	Significant	Significant	Significant	Significant

Table 3 : Lactic acid bacteria (LAB) count of *Lassi*

Lassi samples	Lactobacilli (X 10 ⁷ cfu /ml)
T ₀	4.33
T ₁	3.55
T ₂	3.35
T ₃	3.30

for protein, carbohydrates and ash content were found 0.67, 7.70 and 0.42 per cent, respectively.

Chemical evaluation of *Lassi* :

Fat content of strawberry pulp fortified *Lassi* ranges from 3.25 to 3.11 per cent. The higher fat content is observed control treatment. The fat content of *Lassi* samples is decreases as increase in the level of strawberry pulp. Protein content ranges from 3.64 to 3.78. Lactose content ranges from 3.73, to 3.82. Lactose content is increases as increase in the level strawberry pulp. Total sugar content ranges from 13.92 to 16.29. The ash content ranges from 0.73 to 0.85. Total solid content observed to be 25.7, 26.17 to 27.88 per cent. Acidity (% LA) ranges from 0.90 to 1.02 per cent. The pH values observed from 4.13 and 4.31 (Table 1).

Sensory evaluation of *Lassi* :

The highest sensory evaluation shown for colour and appearance, body and texture and flavour is for *Lassi* prepared by using 5 per cent strawberry pulp with the score 8.02, 8.09 and 7.90, respectively (Table 2).

Microbial evaluation of strawberry *Lassi* :

Lactic acid bacteria :

The mean lactobacilli count was observed to be 4.33×10^7 cfu/ml in T_0 and T_2 *Lassi* samples, respectively.

Yeast and mouldcount :

The *Lassi* samples were evaluated for yeast and mould count by pour plate technique. It was observed that both *Lassi* samples under study did not show presence of any yeast and mould growth.

Coliform count :

The presence of coliforms in milk and milk products is suggestive of unsanitary condition or practices followed during production, processing, handling and storage. Hence, the *Lassi* samples of present study were subjected to determination of coliform count. The dilutions (10^{-1} and 10^{-2}) were cultured on McConkey's agar by the pour plate technique where in coliforms were not detected in any of the *Lassi* samples, which is an indicative that the *Lassi* samples were free from coliforms and hence, safe for consumption.

Cost structure of strawberry *Lassi* :

All the ingredients required for preparation of *Lassi*

were rated as per prevailing market prices (2010–2011). The cost of production of strawberry *Lassi* was comparatively more or similar (Rs. 34.00 per kg) than control *Lassi* (Rs. 31.86 per kg). The cost for the sensorial superior combination T_2 (8 % sugar and 5 % strawberry pulp) could make a 200 ml serving at Rs. 6.80 which may be sufficiently lower with the value added and nutritionally enriched combination of strawberry pulp.

Conclusion :

It may be concluded that, the *Lassi* of good quality and with more acceptability we prepared having beneficial, value added and nutritionally enriched product.

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