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## Studies on sensory properties of lassi blended with apple (*Malus pumila*) powder

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### Abstract

The *lassi* was prepared by blending 2, 4 and 6 percent of apple powder in buffalo milk aimed, to study sensory properties of *lassi* blended with apple powder. The sensory score with respect to colour and appearance, flavour, taste, consistency and overall acceptability showed that addition of 6 percent apple powder decreased taste (7.75, 8.00, 8.50 and 8.25) and overall acceptability (8.00, 8.25, 8.50 and 7.75) score as compare to 2 and 4 percent apple powder. However, addition of apple powder resulted in increased score for colour and appearance (8.00, 8.00, 8.50 and 8.75), flavour (7.25, 8.00, 8.25 and 8.50) and consistency (7.50, 7.75, 8.25 and 8.50).

**Keywords:** Lassi, apple powder, sensory properties

### Introduction

Fermented milk products provide and preserve vast quantities of nutrients in a wide diversity of flavours, aromas and textures which enrich the diet of human beings. The prime function of fermentation is to extend shelf life, with additional advantages such as improving the taste of milk, biological value, enhancing the digestibility of the product (Kumar *et al.*, 2018) [6]. *Lassi* also called as *chhas* or *matha*, refers to desi *buttermilk*, which is the byproduct obtained when churning curdled whole milk with crude indigenous devices for production of desi *butter* (*makkhan*). *Lassi* is a major source of calcium. We need sufficient calcium to keep our bones healthy and thus drinking *lassi* can help bones being strong and healthy. *Lassi* contains lactobacillus species which helps in digestion and lubricates the digestive tracts and smoothens the entire cycle of processing and it is additionally a superb source of Probiotics which guarantees appropriate prosperity of health (Saha *et al.*, 2021) [7]. Several studies have shown that consuming apples are associated with a lower risk of cancer and cardiovascular disease. Quercetin is identified as the key compound responsible for these health benefits. Additionally, quercetin, peritin, and naringenin contribute to reducing asthma risk, while apple pectin and apple phenolics work together to lower cholesterol levels.

### Materials and Methods

The present study was conducted during 2023-2024 in the Department of Animal Husbandry and Dairy Science, College of Agriculture, Latur, Vasanttrao Naik Marathwada Krishi Vidyapeeth, Parbhani under the title "Studies on Buffalo Milk *Lassi* Blended with Apple (*Malus pumila*) powder.

### Materials

#### Collection of Buffalo milk

Buffalo milk (6% fat and 9% SNF) was procured from local market of Latur city (Natural Milk Pvt. Ltd., Latur).

#### Collection of Apple Powder

Apple powder was purchased from Annapurna Agro Export plot number 17-bharadpur Manawar Dhar, 454446 (M.P.) India.

### Microbial Culture

The standard culture (NCDC-167) from National Dairy Research Institute, Karnal (Haryana) was used for preparation of dahi @ 2 percent.

### Starter culture, its maintenance and propagation

Sterilized skim milk was used to maintain the standard freeze-dried dahi culture, which comprises *Lactococcus lactis* and *Streptococcus thermophilus*. 100 ml of fresh skim milk was transferred into 250 ml conical flasks and covered with non absorbent cotton plugs. The flasks were sterilized for 15 minutes at 15 psi pressure in autoclave. Sterilized skim milk was inoculated with active starter @ 1.5 percent under laminar air flow chamber to propagate the culture. After 12 hours of incubation at 37 °C, the flasks were kept at refrigerated temperature at 5 to 7 °C. At weekly intervals culture propagation was repeated in order to use active culture.

### Sugar

Good quality, clean, crystalline, cane sugar was purchased from local market of Latur city.

### Methods

#### Preparation of *lassi* blended with apple (*Malus pumila*) powder

##### Treatment combination

*Lassi* blended with apple powder was prepared using 15 percent sugar by weight of dahi and apple powder as per the treatment combination as follows.

T<sub>1</sub> - 100 parts of dahi (Control)

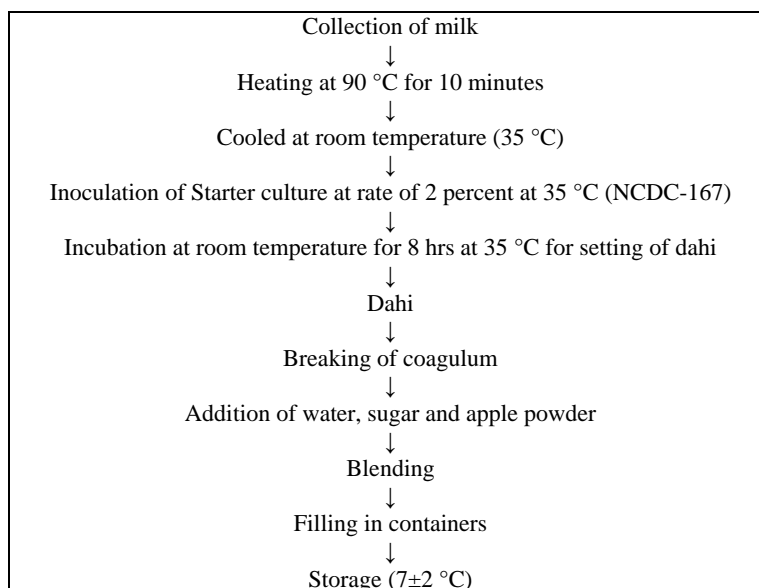
T<sub>2</sub> - 98 parts of dahi and 2 parts of apple powder

T<sub>3</sub> - 96 parts of dahi and 4 parts of apple powder

T<sub>4</sub> - 94 parts of dahi and 6 parts of apple powder

#### Procedure for preparation of *lassi* blended with apple (*Malus pumila*) powder

The *lassi* was prepared as per the procedure given by De (2018) [2]. Buffalo milk (3% Fat and 6% Solid Not Fat) was heated at 90 °C for 10 min. then cooled at 37 °C and inoculated with starter culture @ 2 percent and incubated at 35 °C in incubator for 8 hours. Dahi prepared was broken and added with 15 percent sugar plus 20 percent water on weight basis and apple powder as per treatment combination and blended well with hand blender and stored at refrigerated temperature 7±2 °C.



Flow chart for preparation of *lassi* blended with apple (*Malus pumila*)

### Results and Discussion

Sensory evaluation of control and *lassi* blended with apple powder was carried out by semi-trained panel of 5 judges using 9-point hedonic scale. The sensory attributes such as colour and appearance, flavour, taste, consistency and overall acceptability was studied and data obtained were analysed by using Completely Randomized Block Design (CRD). The scores given by judges for different sensory

parameters were recorded and subsequently discussed as follows.

#### Colour and appearance score of *lassi* blended with apple powder

The mean score for colour and appearance of *lassi* blended with apple powder are given in Table 1

**Table 1:** Colour and appearance score of *lassi* blended with apple powder

Replication Treatment	R <sub>1</sub>	R <sub>2</sub>	R <sub>3</sub>	R <sub>4</sub>	Mean
T <sub>1</sub>	7.0	8.0	9.0	8.0	8.00
T <sub>2</sub>	8.0	8.0	9.0	7.0	8.00
T <sub>3</sub>	9.0	9.0	8.0	8.0	8.50
T <sub>4</sub>	8.0	9.0	9.0	9.0	8.75
S.E. ± 0.346 C.D at 5% 1.066					

The values differ non-significantly ( $p>0.05$ )

The colour and appearance score for control and *lassi* blended with apple powder T<sub>2</sub>, T<sub>3</sub> and T<sub>4</sub> are 8, 8, 8.50 and 8.75, respectively. The results indicated that addition of apple powder in *lassi* increased colour and appearance score non-significantly towards higher level of addition of apple powder in *lassi*. The colour and appearance score for T<sub>4</sub> (8.75) was highest and differ non significantly from T<sub>1</sub> (8), T<sub>2</sub> (8) and T<sub>3</sub> (8.50). The non-significant difference in colour and appearance score among the treatment and control was due to light tan colour of apple powder. However, at higher concentration T<sub>3</sub> and T<sub>4</sub> colour and appearance was appealing due to tan colour of *lassi*.

The results of present study are similar with Kedaree *et al.* (2021 b) [5] who reported that addition of apple powder in *kulfi* at 2.5 percent increased colour and appearance score 7.73 as compared to control (7.52)

### Flavour score of *lassi* blended with apple powder

The mean flavour score for *lassi* blended with apple powder are presented in Table 2

**Table 2:** Flavour score of *lassi* blended with apple powder

Replication Treatment	R <sub>1</sub>	R <sub>2</sub>	R <sub>3</sub>	R <sub>4</sub>	Mean
T <sub>1</sub>	7.0	7.0	8.0	7.0	7.25
T <sub>2</sub>	7.0	8.0	9.0	8.0	8.00
T <sub>3</sub>	8.0	8.0	9.0	8.0	8.25
T <sub>4</sub>	8.0	8.0	9.0	9.0	8.50
S.E. ± 0.3062 C.D at 5% 0.943					

The values differ non-significantly ( $p>0.05$ )

The flavour score for control (T<sub>1</sub>) and *lassi* blended with apple powder T<sub>2</sub>, T<sub>3</sub> and T<sub>4</sub> are 7.25, 8.00, 8.25 and 8.50, respectively. The results indicated that addition of apple powder in *lassi* increased flavour score non-significantly towards higher level of addition of apple powder in *lassi*. The results of present study are similar with Kedaree *et al.* (2021 b) [5] who reported that addition of apple powder in *lassi* at 2, 4, 6 and 8 percent increased flavour score at 4 percent level of apple powder (8.52) than control T<sub>0</sub> (7.4)

### Taste score of *lassi* blended with apple powder

The mean taste score for *lassi* blended with apple powder are given in Table 3

**Table 3:** Taste score of *lassi* blended with apple powder

Replication Treatment	R <sub>1</sub>	R <sub>2</sub>	R <sub>3</sub>	R <sub>4</sub>	Mean
T <sub>1</sub>	8.0	8.0	8.0	7.0	7.75
T <sub>2</sub>	8.0	8.0	8.0	8.0	8.00
T <sub>3</sub>	8.0	9.0	9.0	8.0	8.50
T <sub>4</sub>	7.0	8.0	9.0	9.0	8.25
S.E. ± 0.306 C.D at 5% 0.943					

The values differ non-significantly ( $p>0.05$ )

The taste score for control (T<sub>1</sub>) and *lassi* blended with apple powder T<sub>2</sub>, T<sub>3</sub> and T<sub>4</sub> are 7.75, 8, 8.50 and 8.25, respectively. The results indicated that addition of apple powder in *lassi* increased taste score non-significantly up to T<sub>3</sub> then decreased. The taste score for T<sub>3</sub> (8.50) was highest and differ non-significantly from T<sub>1</sub>, T<sub>2</sub> as well as T<sub>4</sub>. Decrease in taste score of *lassi* at higher concentration of apple powder was due increase in acidity. The results of present study are in agreement with results obtained by Dudhate *et al.* (2023) [3] who reported that addition of pear pulp in *lassi* at 10, 20, 30 and 40 percent significantly

increased taste score from T<sub>1</sub> (7.75) to T<sub>4</sub> (8.6) and further decreased from T<sub>4</sub> (8.6) to T<sub>5</sub> (8.5).

### Consistency score of *lassi* blended with apple powder

The mean consistency score for *lassi* blended with apple powder are presented in Table 4

**Table 4:** Consistency score of *lassi* blended with apple powder

Replication Treatment	R <sub>1</sub>	R <sub>2</sub>	R <sub>3</sub>	R <sub>4</sub>	Mean
T <sub>1</sub>	7.0	7.0	8.0	8.0	7.50 <sup>b</sup>
T <sub>2</sub>	8.0	8.0	8.0	7.0	7.75 <sup>ab</sup>
T <sub>3</sub>	8.0	8.0	8.0	9.0	8.25 <sup>ab</sup>
T <sub>4</sub>	9.0	8.0	9.0	8.0	8.50 <sup>a</sup>
S.E. ± 0.2700 C.D at 5% 0.832					

The values differ non-significantly ( $p>0.05$ )

The consistency score for control (T<sub>1</sub>) and *lassi* blended with apple powder T<sub>2</sub>, T<sub>3</sub> and T<sub>4</sub> are 7.50, 7.75, 8.25 and 8.50 respectively. The results indicated that addition of apple powder in *lassi* increased consistency score non-significantly towards higher level of addition of apple powder in *lassi*. However, addition of apple powder at 6 percent level increase consistency significantly than control. The results of present study are in agreement with results of Kedaree *et al.* (2021 a) [4] who reported that addition of apple powder in *lassi* at 2, 4, 6 and 8 percent increased consistency score at 2 percent (8.54) than control (7.65).

### Overall acceptability score of *lassi* blended with apple powder

The mean overall acceptability score of *lassi* blended with apple powder are given in Table 5

**Table 5:** Overall acceptability score of *lassi* blended with apple powder

Replication Treatment	R <sub>1</sub>	R <sub>2</sub>	R <sub>3</sub>	R <sub>4</sub>	Mean
T <sub>1</sub>	9.0	7.0	8.0	8.0	8.00
T <sub>2</sub>	9.0	8.0	8.0	8.0	8.25
T <sub>3</sub>	8.0	8.0	9.0	9.0	8.50
T <sub>4</sub>	7.0	7.0	8.0	9.0	7.75
S.E. ± 0.368 C.D at 5% 1.134					

The values differ non-significantly ( $p>0.05$ )

The overall acceptability score for control and *lassi* blended with apple powder T<sub>2</sub>, T<sub>3</sub> and T<sub>4</sub> are 8.00, 8.25, 8.50 and 7.75 respectively. The results indicated that addition of apple powder in *lassi* increased overall acceptability score up to treatment T<sub>3</sub> further decreased. The overall acceptability score was highest for treatment T<sub>3</sub> (8.50) and differ non-significantly from T<sub>1</sub> and T<sub>2</sub>. However, Overall acceptability score of T<sub>4</sub> was lowest among all treatment as well as control. Decrease in overall acceptability was due to increase in acidity of *lassi*.

The results of present study are similar with findings of Kedaree *et al.* (2021 a) [4] who reported that addition of apple powder in *lassi* increased overall acceptability score up to treatment T<sub>2</sub> (8.58) and differ significantly from other treatments.

### Conclusions

From present investigation it was observed that sensory parameters such as colour and appearance, flavour and consistency had positive effect on *lassi*. However, addition of 6 percent apple powder decreased taste and overall

acceptability score as compared to control. From the results of sensory score it could be concluded that 4 percent apple powder could be added in lassi without affecting taste and overall acceptability.

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