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## Preparation of chhana whey beverage blended with strawberry (*Fragaria ananassa*) Juice

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### Abstract

The present investigation was undertaken to prepare chhana whey beverage blended with strawberry (*Fragaria ananassa*) juice. The chhana whey beverage was prepared with different combinations of chhana whey and strawberry juice viz. 100:00 (T<sub>1</sub>), 98:2 (T<sub>2</sub>), 96:4 (T<sub>3</sub>) and 94:6 (T<sub>4</sub>) with four treatments and four replications in completely randomized design (CRD). Sensory evaluation carried out by the five judges, showed that chhana whey beverage prepared by blending with 4 parts of strawberry juice (T<sub>3</sub>) had secured the highest score (93.38) and overall acceptability (8.70 out of 9 by hedonic scale). The data observed that total solids, solid-not-fat, ash, protein and acidity percentage of chhana whey beverage were increased with increase in level of strawberry juice, while moisture and fat percentage were decreased with the increase in level of strawberry juice. The ash was non-significantly affected. The cost of production chhana whey beverage (T<sub>3</sub>) was Rs. 31.50 per lit which was superiorly accepted by the panel of judges. Hence, it may be concluded that best quality chhana whey beverage can be prepared by using 4 parts of strawberry juice and 96 parts of Chhana whey with 8% sugar.

**Keywords:** Chhana whey, strawberry juice, sensory attributes, cost structure

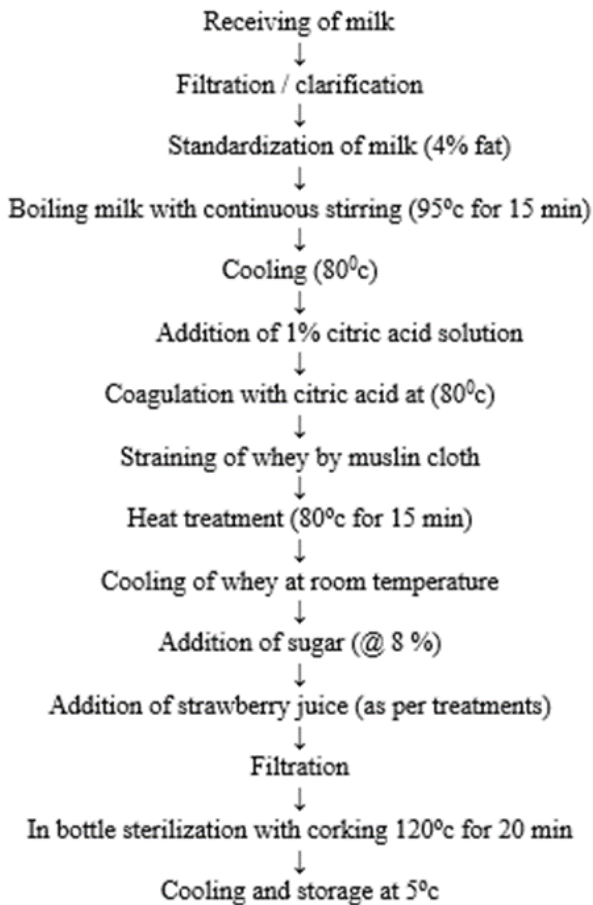
### Introduction

Whey, the greenish translucent liquid is obtained during the manufacture of cheese, casein, chhana, paneer, chakka and co-precipitates and has been viewed until recently as one of major disposal problem of the dairy industry. Due to the presence of significant amount of organic matter (6-7% total solids) in the form of protein, lactose, fat, minerals and water-soluble vitamins, its disposal causes environmental pollution. The biological oxygen demand of whey is very high (40,000 mg/Kg or more), constituting a major economic burden to be dispose of as a waste material (Goel *et al.* 1996) [13]. Whey beverages include wide range of products obtained by mixing of native, sweet or acid whey, deproteinized whey and whey powder with different additives like tropical fruits (but also other fruits like apples, pears, strawberries, cranberries), crops and their products (mainly bran), isolates of vegetables proteins, CO<sub>2</sub>, chocolates, cocoa and vanilla extracts which are healthful for human being.

Strawberry (*Fragaria ananassa*) is one of the ancient and important table fruits in temperate countries. It is also grown on large scale in Maharashtra. It is liked for the cool refreshing juice and also valued for its medicinal properties. Strawberry juice contains a considerable amount of sugars, protein, fat, vitamins, polysaccharides, polyphenols and minerals mainly phosphorus, potassium, calcium, magnesium and contains valuable ingredients such as antioxidants. Therefore, it was planned to prepared chhana whey beverage blended with strawberry juice with the objectives to standardize the acceptance levels of strawberry juice with sensory, physico-chemical quality and cost structure.

### Materials and Methods

The preparation of chhana whey beverage blended with strawberry (*Fragaria ananassa*) juice was undertaken in the section of Animal Husbandry and Dairy science, College of Agriculture Nagpur, during 2018-19. Strawberry juice was added in chhana whey beverage at different levels, *i. e.* 0 (T<sub>1</sub>), 2 (T<sub>2</sub>), 4 (T<sub>3</sub>) and 6 (T<sub>4</sub>) part of chhana whey beverage with four replications and sugar was added @ 8% of chhana whey beverage in all treatments. The fat, total solids, S.N.F, acidity, protein, ash, pH and moisture of chhana whey beverage blended with strawberry juice were determined. The process flow chart for preparation of chhana whey beverage blended with strawberry juice is given below (fig 1).



**Fig 1:** Flow chart for preparation of chhana whey beverage blended with strawberry juice

**Table 1:** Overall average sensory score of chhana whey beverage as affected by different levels of strawberry juice.

Treatments	Flavour (45)	Body & texture (35)	Acidity (10)	Colour and appearance (10)	Total score (100)	overall acceptability (9) by hedonic scale
T <sub>1</sub>	36.99 <sup>d</sup>	27.98 <sup>d</sup>	6.16 <sup>d</sup>	6.42 <sup>d</sup>	77.55	7.98 <sup>d</sup>
T <sub>2</sub>	38.06 <sup>c</sup>	30.02 <sup>b</sup>	7.15 <sup>c</sup>	7.43 <sup>c</sup>	82.66	8.19 <sup>c</sup>
T <sub>3</sub>	43.07 <sup>a</sup>	32.71 <sup>a</sup>	8.79 <sup>a</sup>	8.81 <sup>a</sup>	93.38	8.70 <sup>a</sup>
T <sub>4</sub>	39.51 <sup>b</sup>	29.94 <sup>c</sup>	7.59 <sup>b</sup>	7.54 <sup>b</sup>	84.58	8.34 <sup>b</sup>
S.E.(m)	0.45	0.47	0.15	0.13	-	0.042
C.D. at 5%	1.35	1.42	0.45	0.39	-	0.0531

### B. Physico-chemical composition of Chhana whey beverage:

It indicated (Table 2) that significantly higher content of fat (0.48%), moisture (93.60%) and pH value (5.53) were observed in the chhana whey beverage prepared without addition of strawberry juice (T<sub>1</sub>). Similarly, higher content of total solids (6.55%), SNF (6.09%), acidity (0.27%) and protein (0.43%) were also observed in chhana whey beverage prepared with addition of 6 part strawberry juice (T<sub>4</sub>). The ash

The product was subjected to chemical analysis the fat (by Gerber's method, IS 1224, Part-II (1971), total solids (by gravimetric, IS- 1661, IS:1479, Part I), Solids not fat (ISI: Handbook of food analysis (part XI) 1981), acidity (IS:1479, Part I (1961), protein (by macro-kjeldahl method, IS: 1479Part II (1961), ash (A.O.A.C, 1995), pH (by digital pH meter) and moisture was determined by subtracting the total solid content from 100 in the sample.

The quality of chhana whey beverage was judged by sensory evaluation by offering the sample to the panel of 5 judges by score card method suggested by Pal and Gupta (1985) [10].

The experiment was laid out in completely randomized design (CRD) with 4 treatments and 4 replications. The data obtained were analyzed statistically according to method described by Snedecor and Cochran (1994) [16].

### Results and Discussion

#### A. Sensory evaluation of chhana whey beverage:

The data from Table 1 revealed that the mean score for flavour (43.07), body and texture (32.71), acidity (8.79%), colour and appearance (8.81%) and overall acceptability (8.70 out of 9 by hedonic scale) were higher in chhana whey beverage prepared with addition of 4 part strawberry juice (T<sub>3</sub>), while lowest score was obtained in chhana whey beverage prepared without addition of strawberry juice. It is observed that preference recorded by judges increased by addition of strawberry juice in chhana whey beverage then it is decreased. The higher preference recorded by judges for chhana whey beverage blended with 4 parts of strawberry juice (T<sub>3</sub>). The result of present investigation were near to Sanap (2004) [14], Rohini Darade (2011) [13] and Parmar (2017) [11] in different whey beverages.

was not significantly affected. The data was indicated that total solids, SNF, ash, protein and acidity content of chhana whey beverage were increased with increase in level of strawberry juice, while moisture and fat content were decreased with increase in level of strawberry juice. Similar results were reported by Kesarkar *et al.* (2004) [9] in paneer whey beverage, Shelar (2001) [15] in mango pulp beverage, Dyanchenko and Solis (1984) in fruits whey beverage and Aher (2007) [1] in sapota whey beverage.

**Table 2:** Overall average physico-chemical attributes of Chhana whey beverage prepared with different levels of strawberry juice (per cent).

Treatments	Fat	Total solids	Solids not fat	Moisture	Acidity	Protein	Ash	pH
T <sub>1</sub>	0.48 <sup>a</sup>	6.40 <sup>d</sup>	5.92 <sup>d</sup>	93.60 <sup>d</sup>	0.23 <sup>a</sup>	0.41 <sup>c</sup>	0.45	5.53 <sup>a</sup>
T <sub>2</sub>	0.47 <sup>b</sup>	6.45 <sup>c</sup>	5.98 <sup>c</sup>	93.55 <sup>c</sup>	0.24 <sup>b</sup>	0.41 <sup>c</sup>	0.45	5.35 <sup>b</sup>
T <sub>3</sub>	0.47 <sup>b</sup>	6.50 <sup>b</sup>	6.03 <sup>b</sup>	93.50 <sup>b</sup>	0.26 <sup>c</sup>	0.42 <sup>b</sup>	0.46	5.25 <sup>c</sup>
T <sub>4</sub>	0.46 <sup>c</sup>	6.55 <sup>a</sup>	6.09 <sup>a</sup>	93.45 <sup>a</sup>	0.27 <sup>d</sup>	0.43 <sup>a</sup>	0.47	5.18 <sup>d</sup>
S.E.(m) ±	0.004	0.008	0.005	0.008	0.008	0.005	0.015	0.07
C.D. at 5%	0.012	0.026	0.016	0.026	0.025	0.016	--	0.21

### C. Cost of production

Chhana whey beverage prepared with addition of strawberry juice at 0 (T<sub>1</sub>), 2.0 (T<sub>2</sub>), 4.0 (T<sub>3</sub>) and 6.0 (T<sub>4</sub>) per cent were as

Rs. 9.93, 20.70, 31.50 and 42.30, respectively. Lowest cost of production Rs. 9.93 per litre was calculated in case of chhana whey beverage prepared without addition of strawberry juice

(T<sub>1</sub>) and the highest cost of production was Rs. 42.30 per litre in case of chhana whey beverage prepared with addition of 6.0 per cent strawberry juice (T<sub>4</sub>). However, the cost of production of chhana whey beverage prepared with 4.0 per cent strawberry juice (T<sub>3</sub>) was found to be Rs. 31.50 per litre which is best treatment selected by judges by sensory evaluation. These results obtained are in agreement with the findings of Ranade (2003) <sup>[12]</sup> in chakka whey beverage.

### Conclusion

Hence, it may be concluded that best quality chhana whey beverage can be prepared by addition of 4 parts of strawberry juice and 96 parts of chhana whey with 8.0% sugar.

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