

## Chemical composition of pineapple *chhana* whey beverage

ROHINI V. DARADE., J.N. KHEDKAR , SHITAL S. GHODKE AND D.M. CHOUDHARI

### ABSTRACT

The *chhana* whey beverage was prepared by using different levels of pineapple juice @ 0, 10, 20 and 30 per cent with 13 per cent sugar. The overall acceptability of *chhana* whey beverage prepared with 20 per cent pineapple juice level was significantly superior and more acceptable than other levels of pineapple juice. The chemical composition showed that in term of percentage, fat as well as moisture were decreased while, protein, total sugar, total solids, ash, titratable acidity were increased with increasing levels of pineapple juice in *chhana* whey beverage.

**KEY WORDS :** *Chhana*, Whey, Pineapple, Beverage

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### INTRODUCTION

*Chhana* is acid coagulated milk product produced as a base for *Sandesh*, *Rasogolla*, *Chhana Podo*, *Chhana murki*, etc. Therefore, large quantity of *chhana* whey would be available in dairy industries. It has been estimated that the whey production in India from organized sector was about 70 million litres (Bambha *et al.*, 1972). Whey is a serious source of environmental pollution in Indian dairy industries. Whey contains over half of the milk solids. *Chhana* whey contains most of the lactose, water soluble vitamins originally present in milk with little quantity of fat and proteins. Its Biological Oxygen Demand (BOD) is about 30,000 – 60,000 ppm which is on an average 200 times more as compared to domestic sewage (Singh *et al.*, 1994). Due to presence of high organic matter content in whey, its disposal process is a serious problem. Therefore, many dairy industries treat the whey before disposal which is very expensive (Gandhi, 1984).

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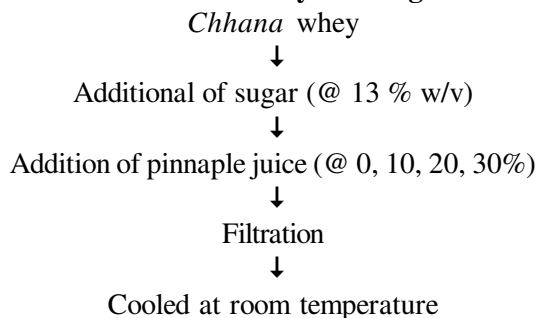
No proper attempts have so far been made particularly on small scale to exploit this byproduct. Considerable economic benefit can also be secured from prompt utilization of whey. By adding different fruit juices or pulps in whey, it can be converted into value added product. Thus, converting the whey into whey beverage will increase the profit of dairy industries. From the nutritional point of view, pineapple fruit is good source of vitamin A and B and is rich in vitamin C and calcium. It also contains phosphorus, iron, enzymes and bromine. The 3-methylpropionate esters comprise a significant fraction of the pineapple volatile components and have been adopted for use in pineapple flavours. Based on nutritional qualities of whey and pineapple, the present study was undertaken on production of pineapple whey beverage.

### MATERIALS AND METHODS

Good quality fresh cow milk was procured and then strained through muslin cloth. The fat content in milk ranged from 4.1 – 4.4 per cent. The milk was transferred to stainless steel vessel and heated to about 90°C. The vessel was then removed from the fire and cooled to 72°C. The coagulant *i.e.* citric acid solution @ 1.5 per cent was added slowly till complete coagulation of milk. Then the mass was poured over stretched piece of clean muslin cloth over another vessel to drain the whey. The clear drained whey was collected in the vessel. The yellowish green whey was then used for the preparation of whey

beverage. Fresh pineapple juice was obtained from the local market.

**Preparation of *chhana* whey beverage:**



**Treatment details:**

- T<sub>0</sub> : 100% *Chhana* whey + 00% pineapple juice,
  - T<sub>1</sub> : 90% *Chhana* whey + 10% pineapple juice,
  - T<sub>2</sub> : 80% *Chhana* whey + 20% pineapple juice
  - T<sub>3</sub> : 70% *Chhana* whey + 30% pineapple juice.
- Sugar level kept constant *i.e.* @ 13% (w/v) of final product.

The product so obtained was subjected to organoleptic evaluation by the panel of judges. It was evaluated for flavour, colour and appearance, consistency and overall acceptability on 9-point hedonic scale (Gupta, 1976 and BIS, 1971). Chemical composition *i.e.* moisture, total solids, fat, protein, ash and total sugar were estimated by adopting the standard procedure. The results obtained were analyzed by Randomized Block Design as per the method given by Panse and Sukhatme (1967) with four treatments and five replications.

**RESULTS AND DISCUSSION**

The results obtained from the present investigation are presented below:

**Overall acceptability:**

It is observed from Table 1 that, the mean score for overall acceptability for treatments T<sub>0</sub>, T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> were 8.19, 8.32, 8.66 and 7.99, respectively.

The average score for treatments T<sub>0</sub>, T<sub>1</sub> and T<sub>2</sub> were more than T<sub>3</sub>. The overall acceptability of *chhana* whey beverage was significantly affected by addition of pineapple juice in whey beverage preparation. *Chhana* whey beverage with 20 per cent pineapple juice in treatment T<sub>2</sub> was significantly superior in respect of acceptability of overall treatments. *Chhana* whey beverages prepared under all treatments were acceptable as score was more than 7. *Chhana* whey beverage with treatment T<sub>2</sub> obtained highest score and significantly superior due to its flavour, colour

and appearance and consistency. The good colour, peculiar flavour and proper consistency observed in this *chhana* whey beverage was appreciated by the panel of five judges. It indicates that blending of beverage with pineapple juice more than 20 per cent (T<sub>2</sub>) level decreases the score of overall acceptability which might be due to high intensity of flavour, dark colour and consistency. The results obtained were in agreement with Yalcin *et al.* (1994). They reported that 20 per cent mango juice into whey had highly acceptable taste and overall acceptability. The results obtained were not exactly in agreement with Saravanakumar and Manimegalai (2003) but somewhat near to it. they reported that 10 per cent pineapple juice into whey had highly acceptable taste and overall acceptability. The 20 per cent mango juice whey beverage was adjudged as best for final comparison (Prasad *et al.*, 2001) and the similar results were obtained in the present investigation.

**Table 1 : Sensory evaluation of pineapple whey beverage**

Treatments	Sensory attributes			
	Scores			
	Colour and Appearance	Consistency	Flavour	Overall acceptability
T <sub>0</sub>	8.20	8.27	8.12	8.19
T <sub>1</sub>	8.36	8.33	8.27	8.32
T <sub>2</sub>	8.70	8.65	8.62	8.66
T <sub>3</sub>	8.02	8.00	8.03	7.99
Result	sig	sig	sig	sig
SE (+)	0.03	0.06	0.04	0.03
CD at (5%)	0.10	0.18	0.12	0.10

The average chemical composition of *chhana* whey utilized for whey beverage preparation were as fat 0.48 per cent, protein 0.43 per cent, lactose 5.06 per cent, ash 0.54 per cent, total solids 6.52 per cent and moisture 93.48 per cent (Table 2).

**Table 2: Chemical composition of *chhana* whey**

Constituents per cent					
Fat	Protein	Lactose	Ash	Total solids	Moisture
0.48	0.43	5.06	0.54	6.52	93.48

The pineapple juice contained 85.40 per cent moisture, 0.13 per cent fat, 0.62 per cent protein, 0.58 per cent ash, 13.27 per cent total sugar, 0.49 per cent acidity and 14.60 per cent total solids (Table 3).

**Table 3: Chemical composition of pineapple juice (%)**

Constituents per cent					
Fat	Protein	Total sugar	Ash	Total solids	Moisture
0.13	0.62	13.27	0.58	14.60	85.40

**Chemical composition of *chhana* whey beverage:**

*Chhana* whey beverage prepared under different treatments were analyzed for fat, protein, total sugar, ash, total solids, moisture and acidity (Table 4).

**Table 4: Chemical composition of *chhana* whey beverage**

Treatments	Composition per cent						
	Fat	Protein	Total sugar	Ash	Total solids	Moisture	Acidity
T <sub>0</sub>	0.48	0.42	13.51	0.56	15.38	84.62	0.43
T <sub>1</sub>	0.44	0.54	16.12	0.58	17.68	82.32	0.46
T <sub>2</sub>	0.33	0.58	16.59	0.61	18.11	81.89	0.49
T <sub>3</sub>	0.24	0.61	17.60	0.65	19.08	80.92	0.52
Result	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.
SE (+)	0.015	0.009	0.004	0.003	0.004	0.004	0.003
CD at (5%)	0.044	0.028	0.012	0.009	0.012	0.012	0.010

**Fat:**

It is observed from Table 4 that, the mean fat percentage was 0.48, 0.44, 0.33 and 0.24 in treatments T<sub>0</sub>, T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub>, respectively. It indicates that, fat content in *chhana* whey beverage was highest in treatment T<sub>0</sub>. Fat content in *chhana* whey beverage decreased as the proportion of pineapple juice in the whey beverage increased. This might be due to low fat content in pineapple juice (0.13%). The fat content in treatment T<sub>0</sub> *i.e.* control was the highest among all other treatments (0.48 per cent) and lowest fat content observed in T<sub>3</sub> (0.24 per cent). The results of present investigation are similar to the Kesarkar *et al.* (2004). They reported fat content in whey beverage as 0.32 per cent.

**Protein:**

The average protein content in *chhana* whey beverage ranged from 0.42 to 0.61 per cent. The mean protein content in *chhana* whey beverages was 0.42, 0.54, 0.58 and 0.61 per cent in treatment T<sub>0</sub>, T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub>, respectively. The *chhana* whey beverage with 30 per cent pineapple juice (T<sub>3</sub>) had highest protein content (0.61 %) while, *chhana* whey beverage prepared with 0 per cent pineapple juice (T<sub>0</sub>) had lowest (0.42 %) protein content. Protein content in pineapple juice was 0.61 per cent due to this protein content in juice *chhana* whey beverage recorded more protein percentage with an increasing level of pineapple juice. Similar results were observed by D'yanchenko and Solis (1984). They recorded protein content of whey beverage as 0.65 per cent.

**Total sugar:**

The mean total sugar content in *chhana* whey beverage was 13.51, 16.12, 16.59 and 17.60 per cent in

treatments T<sub>0</sub>, T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub>, respectively. The highest total sugar content of *chhana* whey beverage was noticed in treatment T<sub>3</sub> with 30 per cent pineapple juice level and lowest was observed in treatment T<sub>0</sub> *i.e.* control. The total sugar content in *chhana* whey beverage significantly increased with increase in the different levels of pineapple juice. This might be due to high per cent of total sugar content in pineapple juice. The results obtained in the present investigation are contradictory to Jelen *et al.* (1987). They observed total sugar content on an average in the range of 10.0 to 13.05 per cent. Kesarkar *et al.* (2004) recorded total sugar content in whey beverage as 17.58 per cent which is closely related to results obtained in above study.

**Ash:**

The mean ash content in *chhana* whey beverages was 0.56, 0.58, 0.61 and 0.65 per cent in treatment T<sub>0</sub>, T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub>, respectively. The ash content in *chhana* whey beverage was highest in treatment T<sub>3</sub> (0.65 per cent) and lowest ash content observed *i.e.* 0.56 in treatment T<sub>0</sub>. It indicates that, as the level of pineapple juice increased in *chhana* whey beverage the ash content increased. The results of present investigation are similar to Dordevic *et al.* (1982). They observed ash content in range of 0.42-0.46 per cent. Kesarkar *et al.* (2004) reported ash content in whey beverage as 0.47 per cent which is similar to the result of present investigation. The results of present investigation are similar to Suresha and Jayprakash (2004). They observed ash content in whey beverage as 0.55 per cent.

**Total solids:**

The total solids content in *chhana* whey beverage ranged from 15.38 to 19.08 per cent. The average total solids content were 15.38, 17.68, 18.11 and 19.08 per cent in treatment T<sub>0</sub>, T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub>, respectively. Highest level of total solids was noticed in treatment T<sub>3</sub> *i.e.* 19.08 per cent and the lowest level of total solids was noticed in T<sub>0</sub> treatment *i.e.* 15.38 per cent. As the level of pineapple juice increased the total solids in whey beverage was increased. Total solids content in whey beverage was affected by addition of different levels of pineapple juice *i.e.* increase in the total solids percentage. The results obtained are similar to the Kesarkar *et al.* (2004). They reported total solids content in whey beverage as 18.68 per cent.

**Moisture:**

The average moisture content in *chhana* whey

beverages was 84.62, 82.32, 81.89 and 80.92 in treatments T<sub>0</sub>, T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub>, respectively. The highest moisture was noticed in treatment T<sub>0</sub> (control) *i.e.* 84.62 per cent and lowest moisture was in treatment T<sub>3</sub> (80.92) per cent. It indicates that, the moisture content in whey beverage significantly decreased with increase in different levels of pineapple juice. The results obtained in present investigation are in agreement with Jelen *et al.* (1987) *i.e.* moisture content of whey beverage was in range of 84.19 to 85.12 per cent.

#### **Titratable acidity:**

The mean score for titratable acidity of *chhana* whey beverage was 0.43, 0.46, 0.49 and 0.52 per cent in treatments T<sub>0</sub>, T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub>, respectively. The highest percentage of titratable acidity was noticed in treatment T<sub>3</sub> (0.52 per cent) and lowest percentage of acidity was observed in treatment T<sub>0</sub> (control) *i.e.* 0.43 per cent. This might be due to the high acidity of pineapple juice. As the level of pineapple juice increased the titratable acidity of whey beverage increased. The results obtained in the present investigation are in agreement with Kesarkar *et al.* (2004). They observed that the titratable acidity content in *chhana* whey beverage as 0.66 per cent.

#### **Conclusion:**

The overall acceptability of *chhana* whey beverage prepared with 20 per cent pineapple juice level was significantly superior and more acceptable than other levels of pineapple juice. The chemical composition showed that in term of percentage, fat as well as moisture decreased while, protein, total sugar, total solids, ash, titratable acidity increased with increasing levels of pineapple juice in *chhana* whey.

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