



STUDIES ON CHEMICAL AND SENSORY EVALUATION OF WHEY BASED FRUIT BEVERAGE

*Landge B.D., **Yedatkar R. B., ***Satalkar R. P.

*Research Scholar, Department of Dairy Science, Yashwant Mahavidyalaya, Nanded

**HOD, Department of Dairy Science, Shivaji Mahavidyalaya, Udgir Dist-Latur

***PG Students, Department of Dairy Science, Yashwant Mahavidyalaya, Nanded

Abstract:

Whey as a by-product of the cheese industry is a source of biological and functional valuable proteins. Whey, a component of milk, is co-product of cheese-making and casein manufacture in the dairy industry. India's total milk production is 78 Million Metric Tons. It is utilized in following way. The fluid milk consumption of India account for about 45% of total milk production. The balance of 55% , is Converted into milk products like Ghee -28%, Dahi - 7.0%,Khoa-6.5%, Milk powder – 2.6%, Channa, Paneer-Cheese-2.0%,Cream-0.5%, Ice cream - 0.2%, and other milk produces 1.7%. At village level the surplus milk that has no market, so this milk is converted into the indigenous milk products like Ghee, Dahi, Channa, paneer, other food delicacies.

Key words: Ready to serve (RTS), whey, beverages, sensory evaluation, Fruit flavoured, Value addition

Introduction

India occupies a leading position in world milk production. In India, millions of small dairy farmers are spread over an area of 3.29 million square kilometers and inhabited by around 5.75 lakh villages. They deliver almost 78 million tons of milk annually. India's share in total world milk production in 2015-16 is 88.6 MMT. Whey is a potentially important source of many basic ingredients (minerals, vitamins, lactose) for traditional and innovative food products. The chemical composition, nutritional value, and sensory quality of whey-based products make them suitable for both normal nutrition and dietetic use. Whey is a whey resulting from the manufacture of *paneer*, *channa*, *chakka*, *cheese*, *casein*, etc.derived from the coagulation of milk mediated by acidic or proteolytic enzymes. It is the main by-product of the dairy industry. In the manufacture of these products, about 10-20% of the milk fraction is recovered as the desired end product and the remaining 80-90% of the liquid fraction is whey. It is considered a reliable source of many high-quality biologically active proteins, carbohydrates, and minerals. Whey components 45-50% total milk solids, 70% milk sugar (lactose), 20% milk protein, and 70-90% milk minerals and almost all

water-soluble vitamins present in milk (Horton, 1995) [6]. Whey is a source of calcium, phosphorus, and essential amino acids. The presence of all these ingredients makes whey a highly nutritious product (Savarana et al., 2005).

Materials and Methods:

The procurement of ingredients is classified into two groups. Dairy ingredients and non-dairy ingredients.

MILK:

Throughout this investigation, Shivamrut homogenized. Pasteurized milk is used for the preparation of *channa*. It was tested with 3.0% fat and 8.5% SNF. It was free from off-flavor sediment and had normal quality.

Non Dairy Ingredients

Citric acid: Citric acid taken from our college laboratory. Citric Acid used as coagulant citric acid used in the preparation of *channa* by Weight of milk@2%.

Mango: the present project work used the “Malgoba” variety of mango pulp. Mangoes used were fresh, clean and well ripened they were easily available in the Local market having. Uniform ripening and fruit size as evidenced by color Index. The taste was sweet and slightly sour. The overall quality of the mangoes was good.

Kiwi fruit: Kiwi fruit purchased from the local market of Udgir were fresh, clean, and well-ripened it was easily available in the local market having uniform ripening and fruit size as evidenced by color index. The taste was sweet and slightly sour. The overall quality of the Kiwi fruit was good.

Sugar (cane sugar): Sugar was used as a sweetening agent in whey beverages for a sweet taste. The calculated amount of sugar was used in the present work. Sugar gives a sweet taste to the whey beverage and also as a natural preservative. It was purchased from local market.

Ascorbic Acid:

It was used in whey beverages as an antioxidant Agent it prevents and Controls the oxidation reaction which directly affects the quality. It was taken from our college laboratory.

Stabilizer:

Sodium alginate was used in the stabilization purpose Sodium alginate. The experiment was conducted at laboratory. Level of ingredients and their combination for preparation of whey beverage. The sugar and Mango pulp are varying quantities. The quantities of these ingredients were taken on the basis of pulp of whey.

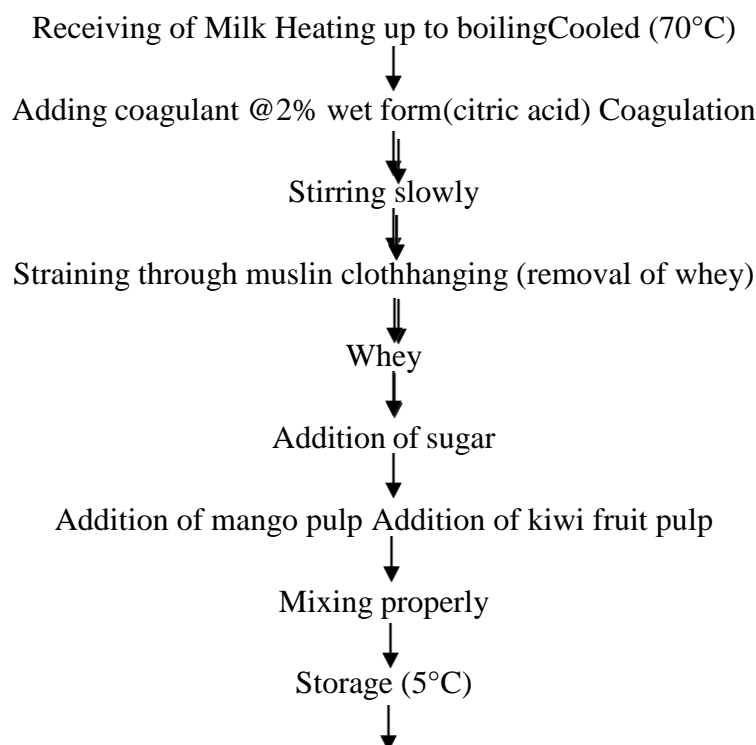
T1 80% Whey +9% Sugar +10% Mango pulp +1% Kiwi fruit pulp.

T2 70% Whey +9% Sugar +20% Mango pulp +1% Kiwi fruit pulp.

T3 60% Whey +9% Sugar +30% Mango pulp +1% Kiwi fruit pulp.

Chemical Composition of Samples:

Sample	Fat %	Protein %	Ash %
T1	1.1	0.44	0.6
T2	1.2	0.58	0.5
T3	1.4	0.58	0.4

Preparation of whey beverage**Flow Diagram of whey beverage by adding of mango and kiwi fruit Pulp****Preparation of Mango Pulp:**

In this present work mango pulp was must prepared in the laboratory. In market many variety of mangos were available but during present work we have used “Malgoba” mangowhich is easily available in the Udgir local market. The mangoes was clean, fresh, and free from any off –flavor. It was fully ripened mango selected firstly washed with clean water and then it was Surface dried. Mango cut into two halves and the stone was removed. The pulp was scooped out and collected in another container. The scooped pulp is then passed through a blender. Then collect mango pulp together from a blender which is used in preparation of the present whey beverage.

Preparation of kiwi fruit pulp:

In The present work kiwi fruit pulp was used. It was prepared in the laboratory. But present work we have used kiwi fruit which is easily available in the Udgir local market. The kiwi fruit was clean, fresh, and free from any off–flavor. It was fully ripened kiwi fruit selected firstly washed with clean water and then it was surface dried. Kiwi fruit cut into two halves. The pulp was scooped out and collected in another container.

The scooped pulp is then passed through a blender. Now collect kiwi fruit Pulp from the blender which is used in the preparation of the present whey beverage.

Detail of manufacturing procedure: The detailed manufacturing process of the mango Whey beverage.

Receiving of whey: The given whey had collected from the preparation of channa. The given whey has good color and was free from any objectionable flavor. Whey was taken in different preparation in a stainless steel vessel.

Clarification of Whey: The whey was classified by precipitating of the whey protein by heat or Chemical treatments separately.

Heat treatment: This was attempted heating whey at 90⁰C for 10 min at pre-adjusted P^H4.5 by using citric acid. It was then added to room temp. And kept for 5 to 6 hours to allow the precipitation protein to settle down.

Filtration: The whey was filtrated through a double-folded muslin cloth to remove the precipitated protein and other extraneous matter, if any.

Adding sugar: The sugar get mixed completely predetermined quantities in the different Quantities of whey. According to the treatments fixed

Adding mango pulp: Mango pulp mixed with completely predetermined quantities of mango pulp and whey. We are taken in a container. It was mixed vigorously till the total mass of Mango Pulp and whey get mixed homogeneously. The adding mango Pulp in different proportions. Like T1, T2, and T3.

Adding Kiwi Fruit pulp: Kiwi Fruit pulp mixed completely predetermined quantities of Kiwi Fruit pulp and whey. We are taken in a container. It was mixed vigorously till the total mass of Kiwi Fruit pulp and whey get mixed homogeneously. The adding Kiwi Fruit Pulp in different proportion. Like T1, T2, and T3.

Adding Ingredient: To this homogeneous mixture mango pulp and whey with other ingredient such as ascorbic acid, stabilizer.

Mixing: The prepared mixture was taken into a mixer pot for the formation of Homogenous mixture. The entire mass was mixed well by blending in the Grinder

Bottle filling: The prepared mixture was poured in a sterilized bottle by using hand filling Method. The capacity of the bottle was 150 ml. Bottles were capped with Crown capping. Then the bottle was inverted into two to three times to check for any Leakages during packaging.

Pasteurization: The bottle pasteurization method has been used. Water was heated at boiling temperature (100 C) than bottle was dipped into the boiling water for at last 30 min.

Cooling: After the pasteurization of bottle it was cooled at room temperature.

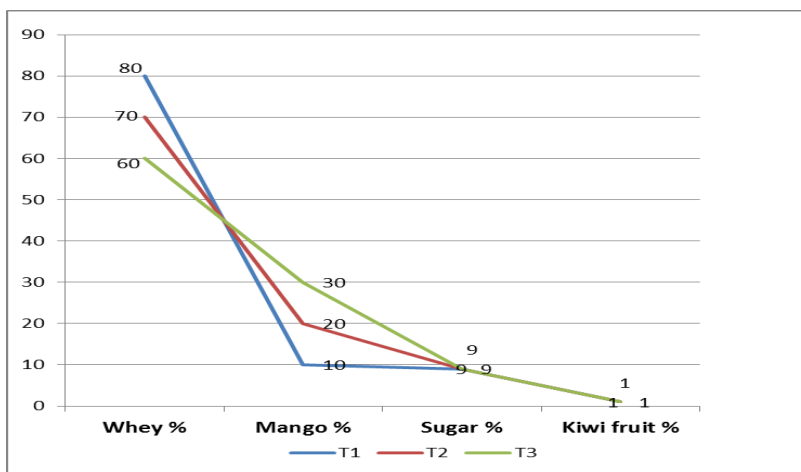
Cold storage: After the cooling of bottle it was stored in refrigerated condition at list below 7⁰C.

RESULT AND DISCUSSION:

The present investigation has been conducted to find out the feasibility of utilization of whey for the preparation of whey beverages it is expected to find ready-to-accept products. In the preparation of whey beverage, sugar, mango, and kiwi fruit pulp were used in different proportions. The proportion of above ingredients were changed till the most satisfactory combination was obtained. Which gave maximum acceptability. After several preparations 3 samples each with different formulations were finalized and presented before the panel of judges for sensory evaluation the samples were labeled T1, T2, and T3. It has the following types of ingredients. In all the samples sugar was constant on the whey basis of the mango pulp and whey quantity varied.

Table 1: Quantities of whey mango, sugar and kiwi fruit pulp.

Sample No.	Whey	Mango	Sugar	Kiwi fruit
T1	80%	10%	9%	1%
T2	70%	20%	9%	1%
T3	60%	30%	9%	1%



For Sensory evaluation 3 samples were selected the sensory evaluation was carried out with the help of a panel of 5 judges. The sensory evaluation Based on the 5 parameters i.e. appearance, smell, color, taste, and overall acceptability was performed to taste their acceptability on a 5-point hedonic scale. The scores obtained from each treatment were studied. The superiority of the sample was calculated based on simple means of the score obtained

Table 1.2: Effect level of mango pulp and kiwi fruit pulp on the sensory quality of beverage.

Attributes

Samples	Smell	Color	Taste	Appearance	Overall acceptability
T0	8.4	8.0	8.7	8.4	7.6
T1	6.0	6.2	5.6	6.8	6.4
T2	7.2	7.2	7.4	7.1	7.3
T3	8.42	8.0	8.2	8.5	8.1

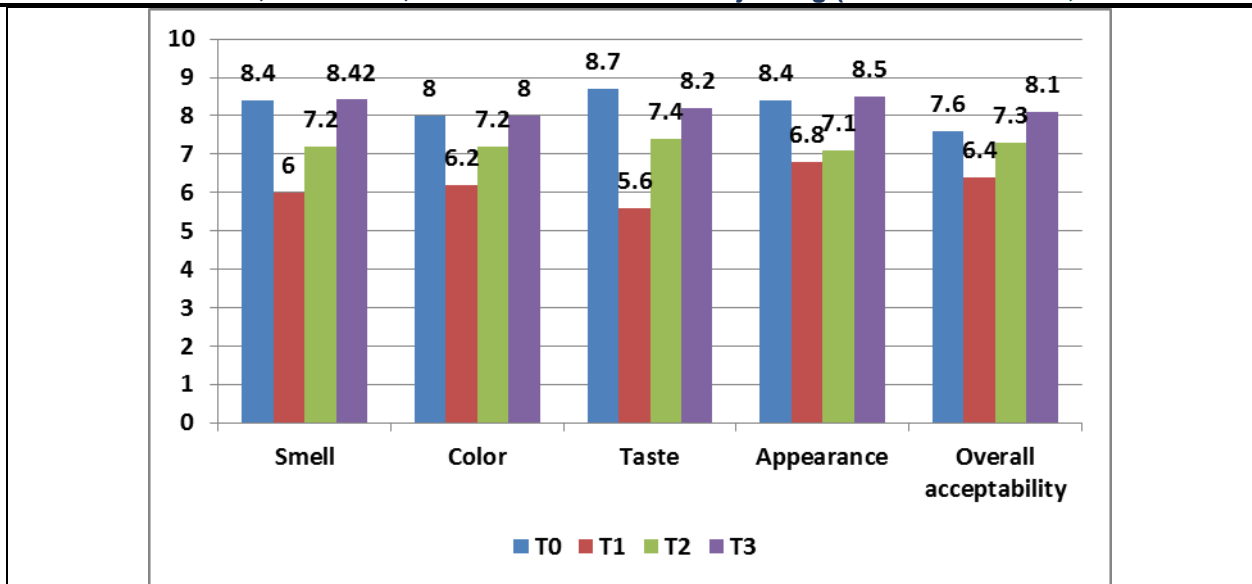
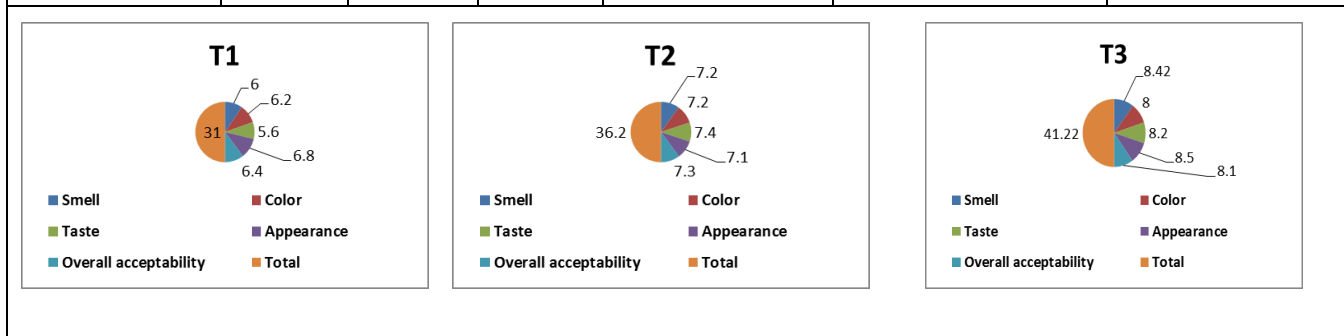


Table.No.1.3 Mean Score recorded by different parameter

Treatment	Smell	Color	Taste	Appearance	Overall acceptability	Total
T1	6.0	6.2	5.6	6.8	6.4	31
T2	7.2	7.2	7.4	7.1	7.3	36.2
T3	8.42	8.0	8.2	8.5	8.1	41.22



All three samples that were finalized for sensory evaluation, namely T1,T2,T3 had mango pulp Content is increasing order i.e.10%,20%,30% and whey content in decreasing order i.e.80%,70%,60%, respectively. The table 1.3 reveals the score given by judges for the parameter of three Samples According to panel of judges samples T3 which had 30% mango pulp and 60% whey was preferred the most where as sample T1 had 10% mango pulp and 80% whey had poorest in flavor, Color, Consistency, taste and smell hence T2 received maximum score of 36.2 whereas T1 received the minimum score of 31 as mentioned in table no.1.3.

Discussions

F.C. Shukla formed that the addition of fruit juice to make by product in manufacturing of beverages not only improves nutritional quality of beverage but also makes it more delicious.The maximum score for color was given to the sample T3 i.e. 8.42 which was neither to light too brighter it is like one suggested by C.N. Pagoda (1996). The sample T3 which preferred the most content 9% sugar the sugar of was a sweeter is also recommended by Potently (1993) a part form sweetener sugar contribute to flavor. Nutritive value of

fruit juice. There also used the 3 to 14% of sugar ready to serve beverages. The temperature of heating in range of 85-90°C which is acceptable with Nilkelie G. (1989) they any or citric acid i.e. 2% was in range suggested by Jayaprakash (1987). The clarification of whey was done at 100°C this is in accordance with Gandhi (1985) who prepared "acid whey". The citric acid was used in the Qty of 0.2% which was prescribed by Krishnanath (1998). According to FPO (1955) : are sulphur dioxide (including potassium meta bisulphate) and benzoic acid (including benzoates) Potassium metabisulphate has good preservatives action against moulds and pathogens and it inhibits benzoic acid antibacterial spectrum. CMC pondweed was used as a stabilizer @0.1% It is in accordance with Teles -1992

The usage of fruit pulp is recommended by Keshena (1998) The P11 of the whey beverage is in range of 4.0 it is in accordance by Khamoi (1998). The temperature of heating was in range of 85-90°C which is in accordance with Nektic (1984) who found out. The usage of sugar as a sweetener is also recommended (1993). The mango pulp used is in accordance with single (1994) The maximum score for color was given to be sample T3 which was neither too light nor bright it is liked one suggested pagote. Mango pulp was used to make the whey beverage under study its concentration ranged from 10% to 30%. The quantity was within the range specified by F.C. Shulka (2002) Sample recovering maximum score i.e.30% had mango pulp in the range mentioned F.C.Shukla thus the result match with his results. F.C. Shukla found that the addition of fruit juice. The main ingredient in the whey and mango pulp was used in whey pulp and sugar were recommended by (itzgarald 1988) Combination of paneer whey and mango pulp was used in whey beverage. It is similar to recommendation by of (sudhir singh1988). The method of preparation reveals similarity with the method used by S.K. Shukla and Sharma, Kaushia, Khamui, G.S. Rijorhia Mr.Gargrani. R.L. SuKumar De. The result of acceptability of beverage under investigation is in agreement with the result published by Shukla S.K. and Sharma, Kaushia, Khamui, G.S.Rijorhia Mr.sharma and Saran Kumar, Singh Sudhir, B.G. Ladkarni.

Summary

The present investigation was carried out to study the acceptance of whey in preparation of whey beverage using mango pulp and Kiwi Fruite Whey the byproduct obtained during preparation of *channa*, *cheese*, *paneer*, *shrikhand*, *casein*, etc, today near about 1 million tons annually produced as by-product which process about 70,000 tons of nutritious whey. This by-product also directly affects environmental pollution Whey is mostly drained away as a waste but it contains great unique nutritive value. Economical utilizations of the by-product are an essential prerequisite of profitable for Dairy and beverage industry Today whey is used in dairy industry for preparing the whey beverages. After several preparation of 3 sample i.e. T1 T2 and T3 each with different formulations was finalized for sensory evaluation on the basis of nine point hedonic scale. In preparation of whey beverage the quantity of sugar is constant. The mango pulp contained were in the increasing order T1 T2 and T3 whey was in decreasing order T1 T2 and T3. Respectively. According to the decrease by panel judges sample T3 had 30% mango pulp and 60% whey was preferred the most. The highest score concerning taste was recorded for sample T3 that is 8.2 T3 sample was more acceptable than another sample T1 and appearance characteristic of whey beverage recorded the height score 8.5 for T3

followed by T2 as 7.1 which was lower than sample T3 the highest score in respect to smell was the recorded was sample T3 that is 8.4 followed by sample T1 and T2 which had lower score. As regards to the color of whey beverage T3 scored highest i.e. 8.0 the sample T3 had best color than T1 and T2 sample received score which is almost lower i.e. 6.2 and 7.2 respectively. The overall acceptability whey beverage T3 had the highest i.e. 8.1 than the sample T1 and T2 had lower score that is 6.4 and 7.3 respectively.

Conclusion

According to panel of judges the sample T3 which contained 60% whey and 30% mango pulp was good in almost all parameters the judges preferred this formulation. Thus it can be seen that mango pulp can be incorporated to the level of 30% in whey beverage obtain a beverage with desirable physical and organoleptic quality.

Characteristics in whey beverages using the mango pulp and kiwi fruit pulp and sugar as a correct formulated forms which is not only improve flavor and taste but whey is nutritive content of the beverage. Thus the byproduct i.e. whey is usually wasted can be utilized effectively in the preparation of whey beverage as a value added beverage.

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