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### TO STUDIES ON DEVELOPMENT OF LOW COST NUTRITIONAL BEVERAGE FROM WHEY

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**Abstract:** Whey is obtained from dairy industries. It is generally disposed into sewage which creates major problem of pollution besides the loss of valuable nutrients and valuable proteins. To develop a soft beverage from paneer whey and banana pulp which pasteurized at different temperatures and timings for estimating its shelf-life? In the preparation of beverages the volume of banana pulp (17.5%), sugar (9.7%) and paneer whey (72.8%) were kept constant while the pasteurization temperatures and timings were varied from 60°C-70°C for 15-35 minutes. The prepared beverages were evaluated for their physico- chemical properties and organoleptic qualities every 15 days till 45 days. Effect of different storage periods on the mean sensory sources of whey-banana beverage was significant and significantly changes were observed in total sugars, reducing sugars, non-reducing sugars and vitamin C during the storage period. However, whey-banana beverages pasteurized at 70°C for 35 minutes was found to be best in terms of sensory quality after 45 days and pH, acidity, protein, total sugars and reducing sugars found to be high than that of the other samples.

**Keywords:** Whey, pulp, pasteurization, Whey beverage, Storage.



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## INTRODUCTION

Whey is that portion of milk which is obtained after the coagulation of milk protein casein with some coagulating agent. The coagulating agent may be citric acid lactic acid added as the pure chemical reagents or produced by the action of microorganisms when allowed to grow in the milk. It contains about half of the milk solids, most of the lactose about one fifth of the proteins, most of the vitamins and minerals. About 3 million tonnes of whey produced in India containing about 2 lakh tonnes of valuable milk nutrients. Disposal of whey possesses a serious problem of environmental pollution due to the presence of high organic matter. Biological oxygen demand (BOD) of whey varies from 39,000 to 48,000 ppm, which is roughly 200 times more as treat the whey before disposal, which is found to be uneconomical. Obviously, development of any process for its economical utilization would be of great benefit to the dairy industry. At this stage, product diversification using whey as a infrastructure replacer of water without much change in the existing infrastructure is quite feasible. Market demand for beverages is growing all over the world and India is no exception to it. Whey beverages have been recognized as a genuine thirst quencher, light, refreshing, healthful and nutritious. Whey based fruits beverages are more suitable for health as compared to other drinks. Whey and its biological components have proven its effects in treatments of service chronic diseases like cancer, cardiovascular, HIV etc. As it is nutritionally too rich it can also be used in beverages infant Geriatric and Atheletic food. Additional of banana which adds excellent nutritive value, flavour and meditational properties and show great potential for processing into valuable products. It is useful in survey, digestion and cough. The fruit is available in plenty during the season of production which causes glut in the market. In addition to this fruit are highly perishable in a nature and there is a lot of spoilage in rainy season banana due to insect and rain. So the fruit is available at a very remunerative price during the season of processing.

## MATERIALS AND METHODS:-

### Preparation of Whey:

Paneer whey was utilized for the development of whey based banana beverage. The paneer whey was obtained during the manufacture of paneer. Milk was heated at 80°C and milk was coagulating using 9% citric acid solution as coagulant. To precipitate proteins whey was heated to 80°C at pH 4 and then was filtered and stored under refrigerated condition until use.

### Preparation of Banana Pulp:

Put all the banana's in the water path and selected those banana's which were half dipped the water. Then we cut the selected fruits in small pieces. After this we weight the fruits and then added water in the ratio (1:1). We then put it in the mixer and mixed it well. Then we got the banana pulp, to which we finally refined by passing it through the muslin cloth. Finally we collected the clear banana pulp.

### Product Development:

Whey (72.8%) was heated to dissolve sugar (10%) thereafter, banana pulp (17.5%) was thoroughly mixed with the above mixture and then finally we added sugar (9.7%), SO (including potassium Meta bi sulphite 100 ppm) (1.5%) preservative, sodium alginate (1%) stabilizer. Heat the mixture at 80°C for 15 minutes. After this the whole mixture was filtered, after this the beverage was filled into glass bottles which were sterilized at 121°C for 10 minutes, then sealed. Then we did pasteurized at 63°C for 15 minutes, 25 minutes, 35 minutes for control and 60°C for 15 minutes, 25 minutes, 35 minutes : 65°C for 15 minutes, 25 minutes, 35 minutes; 70°C for 15 minutes, 25 minutes, 35 minutes, for treatments.

### Microbial Analysis:

Microbial analysis was done by pour plate method (Robert Koch. In this technique, successive dilution of the inoculums (serially diluting the sample) were added into sterile Petri plates to which was poured melted and cooled (42-45C) Nutrient agar medium (NAM) and thoroughly mixed by rotating the plates which was then allowed to solidify. After incubation (37°C for 24 h.), the plates were examined for the presence of individual colonies growing throughout the medium. The pure colonies which were of different size, shape and colour. Different type of colony was transferred by streak plate method onto fresh NAM plate for further study.

**Streak Plate Method:**

The sample was streaked by triple streaking method with sterilized loop on NAM plates. The plates were then incubated at 37°C for 24 h. After 24 h isolated colonies were picked up randomly and subcultured on NAM plates for the isolation of pure culture.

**Chemical Analysis:**

Total acidity was calculated in terms of lactic acid for whey and citric acid for banana pulp by titrating against 0.1 N sodium hydroxide according to the AOAC method, whereas pH was measured directly using a micro processor based pH meter (century). Reducing sources, non-reducing sugars and total sugars were Ascorbic acid content of banana pulp and beverage was determined by the 2, 6 dichlorophenol indophenol titrimetric method pieces. After this we weight the fruits and then added (AOAC, 1995) Protein was determined by semi micr Kjeldahl method using Kjel -plus digestion and distillation system BIS.

**RESULT & DISCUSSION:-**

**Proximate analysis of whey and Banana pulp**

Parameter	Whey	Banana pulp
T.S.S (°Brix)	ND	15
Total Solids (%)	6.12	ND
Acidity (%)	0.18	0.22
Total sugar (%)	3.22	9.8
Reducing sugar (%)	ND	5.08
Ascorbic acid (mg/100g)	ND	24.0
Fat (%)	0.19	ND
SNF (%)	5.73	ND
Protein (%)	0.45	ND

The data on various physico-chemical characteristics of various whey-banana beverages are presented in Table 2. The pH of whey banana beverage varied from 3.83 to 4.20 and there was not much difference among the samples and pasteurization temperatures and timings did not affect the pH of beverage but during the storage period the pH of whey banana beverage was slightly decreased Ashish Kumar Singh and Nirankar Nath reported that pH of whey protein enriched Beal fruit juice beverage ranged from 3.93 to 3.95.

**Effect of storage on physico-chemical characteristics of whey based Banana RTS\*.**

Storage period (days)	Beverages	TSS (°Brix)	Acidity (g %)	Ascorbic acid (mg/100g)	Total sugar (g %)	Reducing sugar (g %)
0	C1	15.7	0.36	9.80	11.09	3.40
	C2	16.0	0.33	9.30	12.14	3.40
	C3	16.0	0.32	7.60	11.50	2.92
15	C1	15.7	0.37	9.74	11.00	3.45
	C2	16.0	0.33	9.26	11.90	3.43
	C3	16.0	0.33	7.53	11.20	2.97
30	C1	15.7	0.38	9.70	10.91	3.49
	C2	16.0	0.34	9.21	11.71	3.50
	C3	16.0	0.35	7.50	11.05	3.02

The total acidity of whey-banana beverage varied from 1.27 to 1.45 percent and pasteurization temperatures and timings did not affect the acidity but during the storage period the acidity of whey-banana beverage was slightly increased. Singh, A.K. Found and increase in acidity of banana R.T.S. and nectar during storage of four months. The protein of whey-banana beverage varied from 0.290 to 0.343 percent and pasteurization temperatures and timings did not affect the protein percentage of whey-banana beverage Wazir Singh developed a soft beverage from paneer whey and banana and the percentage of protein was 0.31%. Total sugar content of various treatments of whey-banana beverage ranged from 24.24 to 24.85 while reducing and non-reducing sugars ranged from 5.253 to 5.303% and 18.88 to 19.45% respectively. Pasteurization and storage for one and half months did not affect total sugars and increase in reducing sugars was significant. However, non-reducing sugars decreased non-significantly ( $P < 0.05$ ) during the storage period probably due to low hydrolysis of sucrose as shown by concomitant reduction in total sugars. Ascorbic acid ranged from 22.3 to 27.8 during the storage period. Storage of juices resulted in significant ( $P < 0.05$ ) losses of ascorbic acid. Total bacterial count and yeast and mould count of various treatments of whey-banana beverage was between 1047 to 1600/ml and 465 to 800/ml, which reduced to negligible level on pasteurization and remained stable during the entire storage period. The contamination of juice with bacteria may result from wide spread presence in the air as well as contamination from the extracting machine and utensils used.

### Conclusion

It can be concluded that whey can be found successful for the development of whey based Banana beverages with optimum sensory characteristics. The nutritious beverages with better storage life could be developed by addition of whey up to certain extent. Banana based whey beverage have excellent color, flavor and stability was estimated to be high which means that Banana pulp covered unpleasant taste of whey very successfully. An increase of both fruit and sucrose concentration might improve the characteristics of the blends. The sweetness of the product seems to be highly appreciated characteristic that must be related to the consumer habits.

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