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Preparation of fruit flavoured milk by using pineapple juice

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Abstract
In the new millennium we are witnessing the upward trend in nutritional and health awareness which has increased the consumer demand for functional food. Keeping this in view industry is forced to bring milk products in the market with acceptable sensory characteristics. The present investigation was made with an attempt to develop fruit flavoured milk by partial addition with different level of pineapple juice. Evaluate the effect on microbial quality by addition of pineapple juice. For control flavoured milk was standardized to 100 gm milk, 8 gm sugar, 2-3 drop pineapple flavour essence & lemon yellow colour. (T_1) 97.5 gm milk 8 gm sugar. 2.5ml pineapple juice, lemon yellow colour. (T_2) 95 gm milk. 8 gm sugar, 5 ml pineapple juice, and lemon yellow colour. (T_3) 92.5 gm milk, 8 gm sugar, 7.5 ml pineapple juice, and lemon yellow colour of different treatments and control samples of fruit flavoured milk. Physico-chemical analysis fat, total solids, acidity, was done for estimating nutritional content Safety and Organoleptic characteristics like (flavour and taste, body and texture, colour and appearance, overall acceptability) tested by trained panelist using 9 point hedonic scale. The treatments containing (T) 2.5% level pineapple juice scored the highest value. Microbiological analysis was carried out to assess the shelf life of the best treatments. The results revealed less than 100/ml (standard value) negative SPC & coli form test when compared with the IS standards. Thus as product acceptability judged by Organoleptic evaluation and therapeutic value is concern, the treatment can be rated as T_1>To>T_2>T_3.

Keywords: Flavoured milk, pineapple juice

Introduction
Flavored milk is a sweetened dairy drink made with milk, sugar, colorings and artificial or natural flavorings. Flavored milk is often pasteurized using ultra-high-temperature (UHT) treatment, which gives it a longer shelf-life than plain milk. Pre-mixed flavored milk is sold in the refrigerated dairy case alongside other milk products.

In India, there is a growing awareness of the important of dairy industry and the merit of hygienically packed milk and dairy products are increasingly realized. Here, during greater part of the year, atmospheric temperature is very and hence cause a very serious problem of storing food article especially milk and milk products for any appreciable length of time under atmospheric conditions. So a suitable method of processing that would enhance the shelf life of food material and enable it to be.

The conventional methods of processing such as boiling and pasteurization, while making milk safe for human consumption, do not appreciably increase its keeping quality. This is all the more true when the milk is to be stored at room temperature after the processing. India is no. 1 in the world in milk production with 74 million tons annually. Out of this, some part is converted to various products while there is utilized as market milk. If there is a provision to store this milk for some more time, it would be of much economical importance for the industry.

According to prevention of food adulteration act (PFA), 1954, the term sterilization, when used in association with milk means heating milk continuously to a temperature range of 134-150 °C for 3 second or 5 °C for 15 min or equivalent approved temperature time combination to ensure preservation at room temperature for a period not less than 15 days from the date of temperature. The specific advantages of over boiling and pasteurization are: Unlike pasteurization and boiling in sterilization no refrigeration is required during processing, storage and distribution. This would result in an overall economy in processing storage and distribution. Since the self life of flavoured milk even when stored at atmospheric conditions is higher than that of milk processed by any other commercial method, dairies can conveniently

adopt to less frequent deliveries of milk and thus cut down the cost of delivery.

Since domestic refrigeration is rare in India, where the atmospheric temperature is high, sterilization of milk is a possible solution to keep milk for longer periods.

Flavoured milks are milks to which some flavours have been added. Flavoured milks to containing fruit juice is termed as fruit flavoured milk. Addition of fruit juice increases nutritive value, palatability and natural flavor. Being sweetened and flavoured it may be also preferred by those consumers who don't take milk because of its natural flavor. Flavoured milk, as a cold drink is becoming popular these days.

According to PFA Act (1954) the minimum fat and solids not fat for flavoured milk should be same as the class of milk from which it has been prepared and it shall give negative phosphatase test.

India utilizes hardly 4.9% of the annual production of 18-20 million tones of fruits more over spoilage during transport and storage alone is reported to be over 20%. Hence India does not use its fruit production economically and effectively. To reduce this large waste of nutritional values of fruits, use of fresh fruits /fruit juice in dairy industry seems to be a viable alternative.

Nutritional value of Toned milk per 100 ml

Composition	Per 100 ml
Fat	3g
SNF	8.5g
Protein	3.4g
Lactose	4.9g
Vitamin A	46 mg
Thiamin B1	0.044mg
Riboflavin B2	0.183mg
Vitamin D	2IU
Choline	14.3 mg
Ash	0.7g
Water	88.32g

Nutritional value of Pineapple juice per 100 ml

Composition	Per 100 ml
Fat lipid	0.12g
Protein	0.54g
Lactose	13.12g
Ash	0.22g
SNF	13.88g
Vitamin B1	0.079mg
Vitamin B2	0.32mg
Vitamin C	47.8mg
Water	86g

Justification

Flavoured milk is a nutrient-rich beverage providing the same a essential nutrients as unflavoured milk, including calcium, potassium, phosphorus, protein, Vitamin A, D and B12, riboflavin and liacin. These nutrients play important role in bone development and maintenance and overall nutrient adequacy throughout childhood and adulthood.

It helps to improving bone health and improvement of diet quality.

It helps to reduce the risk of osteoporosis disease.

It helps to reduce the risk of hypertension.

It helps to reduce the risk of obesity.

It helps to reduce the risk of metabolic syndrome.

Flavoured milks are a good alternative to the development of new products which combines new taste and improvement in the quality of nutrition.

Review of literature

Kern and Harper (1954) [14] conducted by chromatographic analysis is revealed presence of butyric, propionic, acetic and pyruvic acid, which contributed considerably to the increase in titratable acidity of sterilized milk. The relative proportion of these acids was affected by the degree of heat treatment. Kadaba (1958) [15] observed the electrophoretic properties of casein of sterilized milk and found that breakdown of casein depends on the temperature of preheating, homogenization and storage. Preheating 140^0F caused an increase in non-casein and non-protein nitrogen and resulted in the appearance of a new electrophoretic component. Preheating to 180^0 F caused a similar but less severe breakdown. Visible sedimentation of cream plug formation was observed in sterilized milk prepared after preheating to 180^0 F but not when the milk was preheated to 140 degree F. Burton *et al.*, (1960) [5] reported that in sterilized milk the most common changes were those of colour and flavour. He showed that increased heat treatments resulted in a decrease in the reflectance of shorter wave light so that the mil took on brown colour. Pino and Chiofalo (1965) [17] studied the viscosity and surface tension of sterilized milk on one year storage and reported that correlation coefficient between viscosity and surface tension varied in sign insignificant between the 4 seasons. Handrick and Moor (1965) [13] Found that pasteurized and uprized milks were very sensitive to the light of a xenon lamp. Although sterilized milk was more resistant than pasteurized milk, irradiation for 4 hours with only 25000 lux caused a slight off flavour which become pronounced after 6 months. Farag and Moneib (1974) [8] The addition of 3.5 % date syrup to skim milk increased the acidity, TS. Sugar and soluble protein N of the final product. In bottle sterilization of the prepared drinks, decreased the pH, and the contents of reducing and non reducing sugars. Sterilization had no clear effect on other constituents. During storage, the non-reducing sugar of sterilized drinks decreased gradually with a increase in reducing sugar contents. Changes in the other constituents were slight. Farag (1974) [8] Addition of fruit syrups caused increase in sugar, total solids and energy value but a decrease in pH of the milk, both before and after sterilization. Sterilization caused a slight decrease in sugar contents pH and energy value. No coagulation or sediment occurred in the bottles stored at room temperature for several weeks. Mobeib *et at.*, (1974) The addition of 5% and 7.5% orange and mandarin syrups or synthetic flavouring agents namely, pineapple, orange straw berry, cocoa and banana at 0.15-0.4% had a negligible effect on the heat stability of milk. The addition of 5 or 7.5 % date syrup or reconstituted milk decreased the heat stability of buffalo's skim milk. Farag (1975) [8] The addition of orange or mandarin syrup to buffaloes skim milk increased the reducing and non reducing sugar and total solid. Contents and viscosity of the final products. In bottle sterilization of the prepared drinks reduced their pH, TS, sugar and total and soluble nitrogen contents. While slightly increasing their viscosities pH was decreased slightly. Changes in the composition of the sterilized drinks were followed during storage at room temperature for 90 days. An increase in the reducing sugar and on-protein nitrogen and a decrease in non reducing sugar and total nitrogen of the prepared drinks was observed during storage.

Lang (1980) reviewed honey milk, guava, mango, apple and U.H.T. milk based drink, (Flavoured Gellified Milk (F.G.M.) is widely consumed as a dessert and is made of pasteurized or sterilized milk, sucrose, flavouring materials (chocolate, vanilla, banana etc.) stabilizers, thickness and gellifying substances). Hamza and Chaffai (1990) [12] reported that Banana Gellified Milk (BGM) was processed under 4 operating conditions: cooking time (15-85 min), cooking temp. (65-95 °C), starchconc. (7-11gm) and carfageenanconc. (2-6gm). Proposed mathematical models showed that apparent viscosity was mainly affected by carrageenan concetration However, cooking temperature had greatest effect on yield stress. An optimized product was prepared reducing cooking time and temperature Carrageenan was optimized to 3.5gm. This provided the product with good texture & acceptable taste, confirmed by sensory evaluation.

Materials and Methods

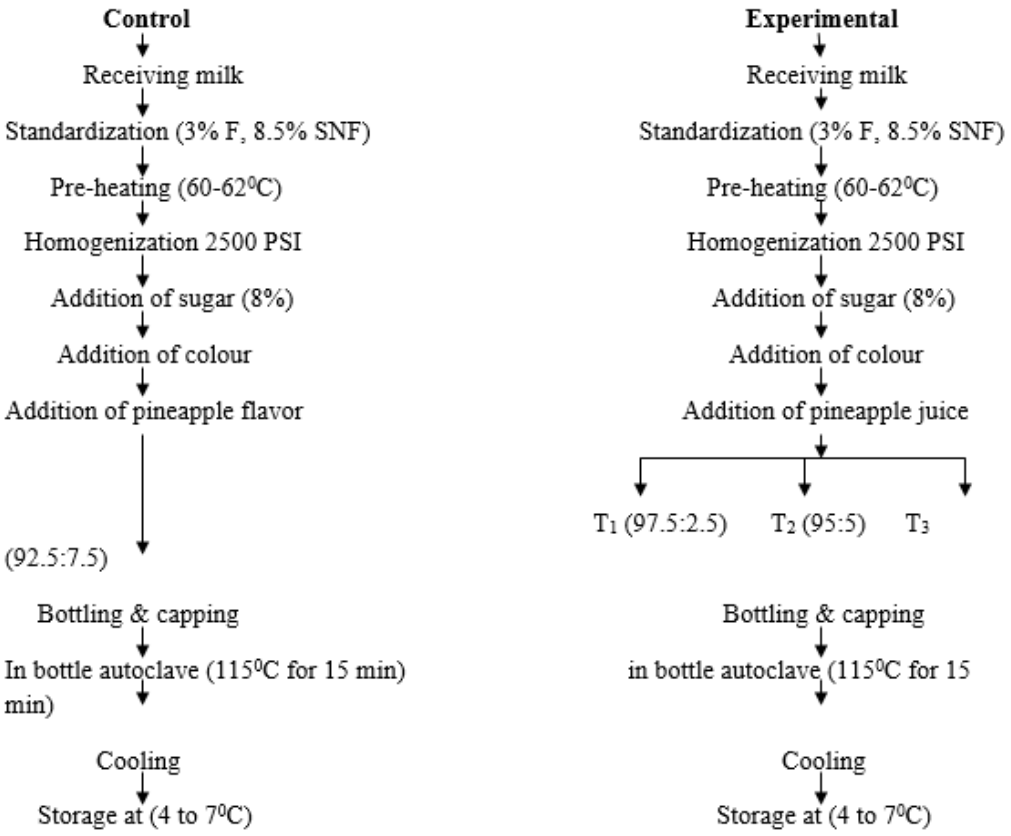
Procurement and collection of ingredients

- Milk was collected from local market of Prayagraj
- Sugar was collected from local market of Prayagraj
- Pineapple juice was collected from local market of Prayagraj
- Lemon yellow color was collected from local market of Prayagraj

Treatment combination ratio of Milk and Pineapple

Treatments	Milk (ml)	Pineapple Juice (ml)
T_0	100	0
T_1	97.5	2.5
T_2	95	5
T_3	92.5	7.5

Flow diagram of preparation of control and experimental fruit flavoured milk



Results and Discussion

The present study was based to evolve "Preparation of fruit flavoured milk by using pineapple juice" The data collected on different aspects were tabulated & analyzed statistically using the methods of analysis of variance & critical difference. The significant & non-significant differences observed have been analyzed critically within & between the treatment combinations.

The results obtained from the analysis are presented in this chapter under the following headings:

- Physico-chemical characteristics of fruit flavoured milk.
- Organoleptic characteristics of fruit flavoured milk.
- Microbiological characteristics of fruit flavoured milk.
- Cost of production of fruit flavoured milk.

The different parameters of control and experimental fruit flavoured milk

Parameters	Treatments			
	T_0	T_1	T_2	T_3
Chemical Analysis				
Fat	2.94	2.86	2.76	2.66
Total solids	18.72	21.22	22.44	22.57

Acidity	0.230	0.243	0.259	0.266
Microbiological analysis				
SPC × 10^{-3} (colony forming unit /gm)	14.80	18.40	21.60	23.40
Coliform count	Nil	Nil	Nil	Nil
Organoleptic Score (9- point hedonic scale)				
Color and Appearance	8.3	7.88	7.62	7.58
Flavor & Taste	7.6	8.08	7.44	7.76
Consistency	7.84	7.24	7.30	7.06
Overall acceptability	8.02	8.26	7.98	7.82
Cost analysis				
Cost in Rs./kg	38.00	37.61	39.50	41.40

Summary & Conclusion

Physico-chemical parameters

Fat: The highest mean of fat percentage was recorded in the fruit flavoured milk sample of T0 (2.94), T1 (2.86), T2 (2.76), T3 (2.66). The different in these values of Fat percent T0-T1, T0-T2, T0-T3, T1-T3, T2-T3 were significant and T1-T2 were significant.

Total Solids: The highest mean of total solids percentage was recorded in the fruit flavoured milk sample of T3 (22.57), T2 (22.44), T1 (21.22), T0 (18.72). followed by and The differences in these values of total solid percent T0-T1, T0-T2, T0-T3, T1-T2, T1-13, T2-T3 were significant.

Lactic acid: The highest mean of Lactic acid percentage was recorded in fruit flavoured milk sample of T3 (0.266), followed by T2 (0.259), T1 (0.243), T0 (0.230). The differences in these values of acidity percent T0-T1, T0-T2, T0-T3, T1-T2, T1-T3 & T2-T3 were significant.

Organoleptic parameters

Colour & Appearance: The highest mean of colour & Appearance score recorded in fruit flavoured milk sample of T0 (8.3), followed by T1 (7.88), T2 (7.62) & T3 (7.58). The differences in these values of colour & appearance score, T0-T1, T0-T3, T1-T2, T1-T3, T2-T3 were significant T0-T2 were significant.

Flavour & Taste: The highest mean of flavour & taste score was recorded in the fruit flavoured milk sample of T1 (8.08) followed by T3 (7.76), T0 (7.6) and T2 (7.44). The differences in these values of flavour & taste score, T1-T2 and T2-T3 were significant and To-T1, T0-T2, T0-T3 & T1-T3 were significant.

Consistency: The highest mean of consistency score was recorded in the fruit flavoured milk sample of to (7.84) followed by T2 (7.3), Ti (7.24) and Ti (7.06). The differences in these values of consistency score, T1-T2 and T2-T3 were significant and T0-T1, T0-T2, T0-T3 & T1-T3 were significant.

Overall acceptability: The highest mean of Overall acceptability score was recorded in the fruit flavoured milk sample of T1, (8.26) followed by T0 (8.02), T2 (7.98) and T3 (7.82). The differences in these values of Overall acceptability score, T1-T2 and T2-T3 were significant and T0-T1, T0-T2, T0-T2 & T1-T3 were significant.

Microbiological parameters

SPC: The highest mean of SPC percentage was recorded in fruit flavoured milk sample of T3 (23.40), followed by T2 (21.60), T1 (18.40), T0 (14.40). The differences in these values of acidity percent T0-T1, T0-T2, T0-T3, T1-T2, T1-T3 & T2-T3 were significant.

Coliform: The coliform count in control and experimental sample were found to be absent.

Conclusion

In the experimental results obtained during the present investigation, it may be concluded that the flavoured milk can be successfully prepared by using milk +8% sugar, colour and pineapple juice (2.5 %, 5 % & 7.5%) flavored milk made with pineapple juice of treatment (T1) was best in chemical characteristics (maximum fat, total solid) and (T1) received highest score in organoleptic evaluation (colour & appearance, flavour & taste, consistency and overall acceptability). (T0) was best in microbial characteristics low SPC & (nil coliform).

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