

Preparation of softy ice-cream from safflower milk blended with buffalo milk

B.C. ANDHARE, G.R. PATIL AND S.G. NARWADE

● ABSTRACT ●

Softy ice-cream prepared from buffalo milk blended with safflower milk has a good market potential particularly for the vulnerable people and for people suffering from various heart ailments. Trials have been conducted to prepare softy ice-cream from safflower milk blended with buffalo milk with most economic alternative. Softy ice-cream was prepared from different proportions of buffalo milk and safflower milk 100:0 (T₀), 75:25 (T₁), 50:50 (T₂), 25:75 (T₃) and 0:100 (T₄). The sensory score for overall acceptability of softy ice-cream of treatments T₀, T₁, T₂, T₃ and T₄ were 8.87, 8.44, 7.92, 7.25 and 6.51, respectively. Resistance of melting of softy ice-cream increased as increase in the proportion of safflower milk in the blend. Quality softy ice-cream was prepared from T₂ (50:50) treatment. On an average T₂ treatment contained 10 per cent fat, 3.24 per cent protein, 1.18 per cent ash and 23.72 per cent total carbohydrates. Cost of production of 1 lit. softy ice-cream was higher in softy ice-cream prepared from buffalo milk (Rs.54.90) compared to softy ice-cream prepared from safflower milk and buffalo milk 50:50 blend (Rs.49.24).

KEY WORDS : Soft, Ice-cream, Safflower milk

Andhare, B.C., Patil, G.R. and Narwade, S.G. (2010). Preparation of softy ice-cream from safflower milk blended with buffalo milk, *Internat. J. Proc. & Post Harvest Technol.*, 1 (2) : 87-92.

● INTRODUCTION ●

In-spite of all efforts to restrict population growth, the population is expected to cross 1000 million and that may create the deficiency in per capita consumption of milk. So it is necessary to utilize milk substitute to fill up the gap. The substitute milk must be more or less similar to cow milk and low in cost. Generally soybean, safflower, groundnut, coconut have been used for preparation of milk and milk products substitutes. Mhaske (1997) prepared safflower milk from safflower seed was similar to cow milk and was low in cost. The composition of safflower milk was as follows.

– Fat	-	4.55 per cent
– Protein	-	2.30 per cent
– Carbohydrates	-	2.21 per cent
– Ash	-	0.62 per cent
– Total solids	-	9.68 per cent

This milk seems to be possible alternative. Amongst oil seed, the safflower has assumed much prominence. It is rich in polyunsaturated fatty acids and have been shown

Correspondence to:

B.C. ANDHARE, College of Agriculture, Marathwada Agricultural University, PARBHANI (M.S.) INDIA

Authors' affiliations:

G.R. PATIL AND S.G. NARWADE, College of Agriculture, Marathwada Agricultural University, PARBHANI (M.S.) INDIA

to prevent increase in serum cholesterol. So the product prepared from safflower milk would prove to be very useful to the people who are suffering from heart problems.

Everybody seems crazy about this new ice-cream called as soft serve ice-cream. Softy nourishes as it refreshes. It is both a food and refreshment. It stimulates the psychic stimulus which is recognised as an important aid to digestion. Ice-cream is an excellent source of food energy. The energy value of ice-cream is very high. It is, therefore, very desirable food item for growing children's and persons who not to put on weight.

● MATERIALS AND METHODS ●

During the course of present investigation on the studies on preparation of softy ice-cream from safflower milk, blended with buffalo milk, the material used and methods employed are delineated hereunder.

Materials:

1) Buffalo milk, 2) Safflower seed, 3) Sugar, 4) Cream, 5) Carboxy methyl cellulose (CMC), 6) Vanilla, 7) Sodium chloride, 8) Sodium hexametaphosphate, 9) Skimmed milk powder

Preparation of safflower milk:

The safflower milk was prepared as per the method

given by Mhaske (1997). Two hundred grams of safflower seeds were weighed washed with hot water and then blended in mixer. Final seed to water ratio was maintained as 1:3, so as to have consistency and fat per cent as that in buffalo milk. The milk was then filtered to remove seed coat. To improve its heat stability sodium hexametaphosphate was added @ 0.2 per cent. Common salt @ 0.05 per cent and (sugar @ 0.2 per cent) was added to enhance its taste and acceptability. The milk was then brought to boil and the milk obtained had cream colour and nutty flavour.

Blending of safflower milk and buffalo milk:

For the preparation of softy ice-cream, following blends of buffalo milk and safflower milk was studied.

- T₀ - 100 per cent buffalo milk
- T₁ - 75 per cent buffalo milk + 25 per cent safflower milk
- T₂ - 50 per cent buffalo milk + 50 per cent safflower milk
- T₃ - 25 per cent buffalo milk + 75 per cent safflower milk

T₄ - 100 per cent safflower milk

Preparation of softy ice-cream:

Preparation of Softy ice cream from buffalo milk belended with safflower milk:

Addition of sugar:

Good quality sugar was added @ 15 per cent of original milk

Addition of skim milk powder:

Good quality skim milk powder was added according to calculation.

Aging of the mix:

The mix was aged by holding at low temp. (*i.e.* below 5° C) for 3-4 hours before freezing.

Addition of vanilla flavour:

Addition of vanilla for improving the flavour of softy ice-cream, the vanilla flavour was added 8-10 drops in the final mix.

Freezing the mix:

After aging of mix, the freezing was done in hand freezer to the temperature of -4°C to -5°C.

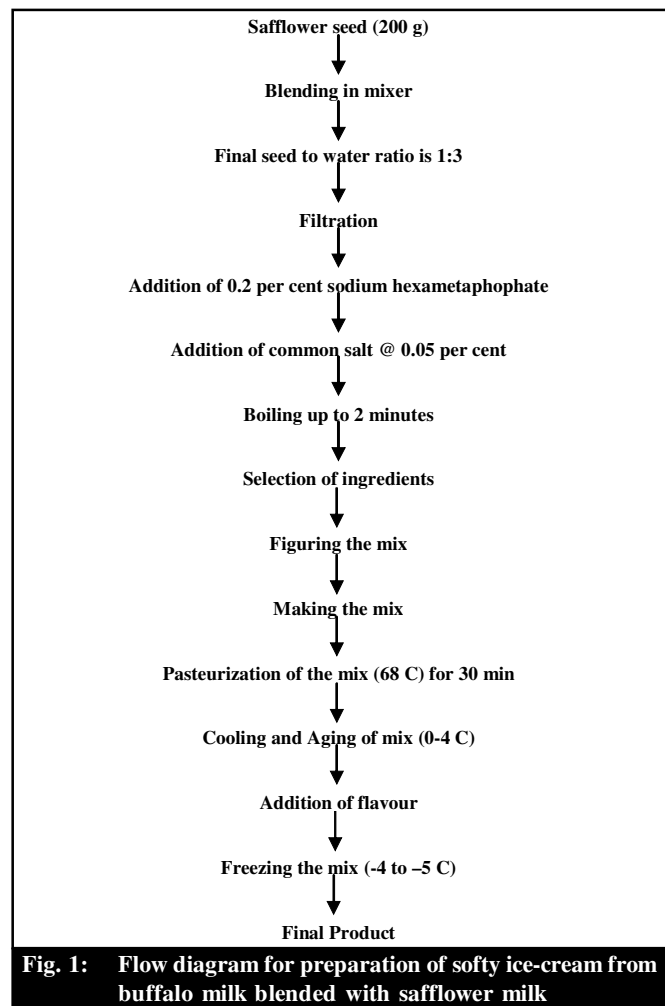


Table 1 : Showing the actual weights of ingredients taken for all treatment

Sr. No.	Ingradients	Treatments				
		T ₀	T ₁	T ₂	T ₃	T ₄
1.	Buffalo milk (ml)	680	510	340	165	--
2.	Safflower milk (ml)	--	170	340	495	652
3.	Cream (g)	132	133	134	137	140
4.	Skimmed milk powder (g)	32	37	45	46	52
5.	Stabilizer (g)	03	03	03	03	03
6.	Sugar (g)	150	150	150	150	150

Sensory evaluation of softy ice-cream:

Sensory evaluation of softy ice-cream, was carried out by a trained panel of judges selected from the staff of the Department of Animal Husbandry and Dairying, College of Agriculture, M.A.U., Parbhani. Judges were asked to evaluate the product by using a 9-point Hedonic scale.

The product was evaluated for flavour, colour and appearance, body and texture and overall acceptability.

Chemical analysis of soft serve ice-cream:

Determination of total solids:

The total solids content of soft serve ice-cream was

determined according the method given by ISI (1961).

Determination of fat:

The fat content of soft serve ice cream was determined by Gerber’s method, described by ISI (1971). The fat content was calculated by multiplying the reading by dilution factor.

Determination of protein:

The protein content was determined by estimation the nitrogen content by the method described in A.O.A.C. (1985).

The protein content was obtained by multiplying per cent nitrogen content of sample by a factor of 6.38.

Determination of ash:

The ash content of softy ice-cream was determined according to method of ISI (1981).

Determination of total carbohydrate:

The carbohydrate content was determined by subtracting the sum of protein, fat, ash and moisture content from 100.

Determination of overrun:

The overrun in ice-cream was calculated by the formula given by Arbuckle (1966).

Determination of melting resistance:

The melt down time of ice-cream was recorded by noting down the time taken for complete melting of 100g of ice-cream at room temperature (32-34°C) placed on a wire mesh resting on a funnel as described by Das *et al.* (1989).

Cost analysis:

The cost of manufacturing softy ice cream was worked out by considering, the cost of ingredient the cost of processing as described by De (1982).

Statistical analysis:

The results obtained during the course of investigation was subjected to statistical analysis by using randomized block design (Panse and Sukhatme, 1967).

RESULTS AND DISCUSSION

The results obtained during the course of present investigation “preparation of softy ice-cream from safflower milk blended with buffalo milk” have been delineated hereunder.

The softy ice-cream thus prepared was subjected to sensory evaluation, chemical composition and cost analysis.

Sensory evaluation of softy ice-cream:

The softy ice-cream samples prepared from different blends of safflower milk and buffalo milk were subjected to sensory evaluation for overall acceptability attributes by a panel of trained judges using a 9 point Hedonic scale.

Overall acceptability:

The overall acceptability scores of softy ice-cream as influenced by the proportion of buffalo milk and safflower milk has been given in Table 2. The overall acceptability scores of softy ice-cream ranged from 6.51 to 8.87.

It was observed (Table 2) that as the proportion of safflower milk increased in the softy ice-cream, the overall acceptability scores of softy ice-cream decreased significantly. The softy ice-cream manufactured from 100 per cent buffalo milk scored maximum points (8.87) followed by T₁, T₂, T₃ and T₄. The overall acceptability scores of softy ice-cream prepared from combination 75:25, buffalo milk : safflower milk (T₁) were at par with that of control (T₀). Mhaske (1997) while studying cow milk safflower milk blends also reported decline in the overall acceptability score with increasing proportion of safflower milk in the blend which was due to the decline in the colour and appearance, flavour and body and texture scores of blend. Lipsch (1986) showed that the ice-cream

Table 2 : Effect of different proportion of safflower milk on overall acceptability scores of softy ice-cream

Treatments	Proportion	Replication			Mean
		R I	R II	R III	
T ₀	100:00	9.00	8.66	9.00	8.87
T ₁	75:25	8.33	8.44	8.55	8.44
T ₂	50:50	7.55	8.22	8.00	7.92
T ₃	25:75	6.88	7.33	7.55	7.25
T ₄	00:100	5.66	7.11	6.77	6.51

S.E. ± = 0.195

C.D. (P=0.05)= 0.636

flavour is influenced by raw materials used and also by processing parameters.

From the forgoing paragraphs, it is clear that the softy ice-cream prepared from buffalo milk safflower milk blend of 75:25 had acceptability more or less similar to the softy ice-cream prepared from 100 per cent buffalo milk. The softy ice-cream prepared from buffalo milk safflower milk blend of 50:50 was also quite acceptable as it was rated in between like moderately and like very much for all the sensory attributes. Since the objective of the present study was to use the maximum level of safflower milk to manufacture acceptable softy ice-cream, the combination of 50:50 buffalo milk safflower milk can be recommended.

Chemical composition of softy ice-cream:

Chemical composition of the softy ice-cream prepared from buffalo milk blended with safflower milk with various proportions was studied and it is presented in Table 3.

Arbuckle (1966) reported the composition of vanilla ice-cream as fat 12 per cent, protein, 3.7 per cent, carbohydrate, 18.6 per cent and total solids, 34.5 per cent and that of vegetable fat frozen dessert 10 per cent fat, 4 per cent protein, 20.7 per cent carbohydrate and 34.7 per cent total solids. Ganc *et al.* (1988) reported that margarine was substituted for 30, 40, 50, 60, 70 of 100 per cent of the milk fat in ice-cream made with 10 per cent milk fat, 12 per cent SNF, 12 per cent sucrose, 5 per cent glucose, 0.3n per cent stabilizer and 0.1 per cent emulsifier. Sommer (1939) stated the following composition of mix fat, 12.5 per cent, serumosolids, 10 per cent, sugar 16 per cent,

gelatin, 0.25 to 0.50 per cent, egg yolk solids, 0.50 and total solids, 39.25 to 39.50 per cent. Jain (1962) reported that composition of ice-cream as fat 12 per cent, total solids 38 per cent, serum solids, 11 per cent, sugar, 14.5 per cent and stabilizer, 0.4 – 0.5 per cent.

Overrun:

The overrun as influenced by the proportion of safflower milk and buffalo milk has been given in Table 4.

As can be seen from the Table 4 that overrun of softy ice-cream prepared from buffalo milk-safflower milk ranged from 14.50 per cent to 27.40 per cent. The overrun tended to increase with increasing level of safflower milk in blend. The maximum overrun was obtained from the softy ice-cream prepared from 100 per cent safflower milk (27.40 per cent) followed by T₃, T₂, T₁ and T₀. Saleem *et al.* (1989) reported that the per cent overrun in ice-cream prepared were negatively related to level of soy milk whereas Korde (1977) reported increased overrun in ice cream prepared from soy milk. Anonymous (1991) reported that various factors such as ingredients, homogenization, pasteurization, degree of aeration during freezing affect overrun in ice cream. Metwally (1994) reported lower overrun in ice-cream when red sweet potato was used in ice-cream.

Rate of melting:

The rate of melting as influenced by the proportion of safflower milk buffalo milk has been given Table 5.

As can be seen from the Table 5 that resistance of

Table 3 : Chemical composition of softy ice-cream prepared from various combinations (per cent)

Constituents	Proportion of buffalo milk : Safflower milk				
	100:00	75:25	50:50	25:75	00:100
Moisture	60.86	60.83	60.26	60.16	60.06
Fat	10.00	10.00	10.00	10.00	10.00
Protein	3.58	3.40	03.24	03.11	03.02
Ash	01.12	1.16	01.18	01.06	00.99
Total carbohydrates	24.44	24.73	24.09	23.72	23.42

Table 4 : Effect of different proportion of safflower milk on overrun of softy ice-cream

Sr. No.	Treatment proportion of buffalo milk : safflower milk	Overrun (per cent)
1.	T ₀ (100:00)	14.50
2.	T ₁ (75:25)	17.80
3.	T ₂ (50:50)	19.70
4.	T ₃ (25:75)	24.83
5.	T ₄ (00:100)	27.40

S.E. ± = 0.222
C.D. (P=0.05) = 0.721

Table 5 : Effect of different proportion of safflower milk on melting resistance of softy ice-cream

Sr. No.	Treatments	Melting time (min.)
1.	T ₀ (100:00)	31
2.	T ₁ (75:25)	37
3.	T ₂ (50:50)	44
4.	T ₃ (25:75)	57
5.	T ₄ (00:100)	69

S.E. ± = 0.2472
C.D. (P=0.05) = 0.8049

Table 6 : Cost of production of softy ice cream prepared entirely from buffalo milk and 50:50 buffalo milk and safflower milk blend

Particulars	Cost per kg or lit.	100:00		50:50	
		Qty	Amount (Rs.)	Qty	Amount (Rs.)
Buffalo milk	14	680 ml	9.50	340 ml	4.75
Safflower milk	2.06	-	-	340 ml	0.70
Sugar	16	150 gm	2.40	150 gm	2.40
SMP	110	32 gm	3.52	32 gm	3.52
Cream	150	132 gm	19.80	134 gm	20.10
Stabilizer	500	3 gm	1.50	3 gm	1.50
Ice	-	-	2.00	-	2.00
Salt	4	1 kg	4.00	1 kg	4.00
Fuel	-	-	3.00	-	3.00
Labour	-	-	2.00	-	2.00
Total			47.70		43.97

melting of softy ice-cream prepared from different blends of buffalo milk safflower milk increased significantly ($P < 0.01$) as an increase in the proportion of safflower milk in the blend. Ganc *et al.* (1988) reported increased melting resistance of ice-cream when milk fat was substituted with vegetable fat (margarine). Das *et al.* (1989) reported that incremental quantities of potato pulp in ice-cream increased melting time. Saleem *et al.* (1989) reported that partial substitution with soy milk improved melting quality at 25°C. Sivaram Krishnan *et al.* (1994) reported that the partial substitution of milk fat with vegetable oils in softy ice-cream increase the melting resistance.

Cost of production:

The cost of production of softy ice-cream prepared entirely from buffalo milk and softy ice-cream prepared from 50:50 buffalo milk-safflower milk was calculated and is presented in Table 6.

Based on the experimental trails, the approximate quantities of ingredients required for preparing 1 lit ice cream was found out and the cost was calculated on the basis of market price. The cost for fuel can be seen from the Table 6 that the cost of production of 1 lit. of ice-cream from buffalo milk was considerably higher (Rs. 47.70) as compared to the cost of production of ice-cream from 50:50 buffalo milk safflower milk blend Rs. 43.97. Gabriel and Rao (1986) proved that cost of production of different levels of groundnut protein isolate was reduced be 10-53 per cent at 50 per cent blend. Sivaram Krishan *et al.* (1994) reported that production cost of ice-cream prepared from partial substitution of milk fat with vegetable oils in softy ice-cream were reduced. Das *et al.* (1989)

outlined that production cost of ice-cream made by incorporation of different levels of potato pulp with reduction of 8.5 per cent in the cost of production.

Conclusion:

The cost of production was 8.9 per cent lower cost than the conventional ice-cream. Since this product had considerably lower cost and good acceptability, it could have a good market potential particularly for the vulnerable people and for people suffering from various heart ailments.

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