

## SUBSTITUTION OF BUTTERMILK POWDER IN ICE CREAM\*

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Ice cream and other frozen dairy products are very popular throughout the world. Out of 68 million tonnes annual production of milk in India, nearly 1% is being utilized for the manufacture of ice cream. Ice cream is generally prepared by using milk and milk ingredients, resulting in increase of production cost. Replacing the costly dairy ingredients with that of less costly ingredients will be of great help to the ice cream makers to boost up the sales. In India, 200 million kilograms of butter milk powder is being produced and this can be a valuable substitute for replacing milk solids not fat (MSNF) in ice cream. An attempt was made to prepare ice cream by substituting BMP at different level and comparing with regular ice cream for their acceptance.

### Materials and Methods

Milk and cream was obtained from the University dairy plant. Skim milk powder testing 5% moisture and 95% solubility was purchased locally. Sodium alginate was used as stabilizer. Commercially available good quality cane sugar were used.

The guideline prescribed in IS 5839 (1970) and flow chart given by Sukumar De (1980) was followed in the preparation of regular ice cream and experimental ice cream as given hereunder.

- MB<sub>0</sub> - taken as control ice cream
- MB<sub>1</sub> - With 25% of substitution of butter milk powder
- MB<sub>2</sub> - With 50% of substitution of butter milk powder
- MB<sub>3</sub> - ~~With 75%~~ of substitution of butter milk powder
- MB<sub>4</sub> - With 100% of substitution of butter milk powder

Titrate acidity was estimated as per ISI Procedure IS 1479 (1960). Specific gravity and percentage of overrun were calculated by formula given by Sommer (1951). Melt down time (min.) of ice cream was estimated by taking 100 gm of ice cream, placing it on glass piece rested on a funnel, and allowing it to completely melt. Viscosity of mix was estimated by the formula recommended by Plummer (1979).

Organoleptic quality of the different categories of ice cream was assessed by a panel of five judges using the score card adopted by ADSA.

The experimental data were subjected to statistical analysis as per Snedecor and Cochran (1967).

### Results and Discussion

From the data presented in the Table 1,

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**Table 1 Physico-chemical properties of ice cream**

Type of Mix	Titratable	Specific	Viscosity	Melt down	Over run	Organo-leptic score
MBO (Control)	0.18 ± 0.003	1.1044 ± 0.003	42.77 ± 0.021	43.83 ± 0.477	27 + 0.518	96.6
MB1 (25%)	0.18 ± 0.002	1.1045 ± 0.003	43.238 ± 0.075	43.3 ± 0.494	31.5 ± 0.681	90.6
MB2 (50%)	0.18 ± 0.002	1.1045 ± 0.0035	43.53 ± 0.043	43.1 ± 0.401	38.1 ± 0.705	87.4
MB3 (75%)	0.19 ± 0.003	1.1046 ± 0.0025	43.66 ± 0.033	43.8 ± 0.477	38.6 ± 0.501	80.1
MB4 (100%)	0.19 ± 0.002	1.1048 ± 0.0036	43.86 ± 0.033	43.3 ± 0.494	44.6 ± 0.762	80.0
FValue	0.9375 <sup>NS</sup>	2.32 <sup>NS</sup>	22.92 <sup>**</sup>	1.376 <sup>NS</sup>	112 <sup>**</sup>	

Mean value with similar superscripts do not differ significantly ( $P < 0.01$ )

NS - Not significant

the titratable acidity, expressed as lactic acid, of the ice cream mix with increasing level of butter milk solids ranged from  $0.18 \pm 0.02$  to  $0.19 \pm 0.02$ . This indicate that change in level of substitution of milk solids by butter milk solids had no influence on titratable acidity. This is because of use of fresh butter milk solids. These findings are in accordance with the observation of Arbuekle (1972).

It was also noted that mean specific gravity of different categories of ice cream mix ranged from  $1.1045 \pm 0.003$  to  $1.1048 \pm 0.0036$  and substitution of butter milk powder was not significantly different from each other. These results are in agreement with the observation of Hanumantha Rao (1986).

Results indicated that replacing milk solids not fat with butter milk powder caused a slight but insignificant increase in the mix viscosity. The viscosity values of ice cream mixes

containing different levels of butter milk powder ranged from  $43.28 \pm 0.075$  to  $43.86 \pm 0.033$ .

It was also observed that over run increased proportionally to increase of the replacement of milk solids not fat by butter milk powder. The over run of ice cream ranged from  $31.5 \pm 0.681$  to  $44.6 \pm 0.762$ . This may be due to increase in amount of incorporated air. Butter milk solids had a beneficial effect on the whipping ability of the mix presumably due to their content of phospholipids. These results are in agreement with Vadickova and Forman (1984) and Hanumantha Rao (1986).

The mean melt down values of different categories of ice cream ranged from  $43.3 \pm 0.404$  to  $43.3 \pm 0.434$ . On analysis of variance, the level of substitution of butter milk powder had no significant effect on the melt down of the ice cream samples (Hanumantha Rao, 1986).

The increase in butter milk solid contents of ice cream mixes resulted in slight decrease in the score of flavour of resulting ice cream but the score for body and texture increased to some extent. The mean value of organoleptic assessment score of different categories of ice creams ranged from 80 to 90.6. Observations on organoleptic score of ice cream with replacement of 25% of butter milk powder for MSNF was rated to have identical organoleptic qualities with that of control ice creams.

### Summary

The effect of butter milk powders on some preparations of the resultant ice creams was studied.

Titrateable acidity and specific gravity of ice cream mixes containing butter milk solids were almost same as the control. Viscosity values of ice cream mix were significantly affected when butter milk powder was used. Over run as well as body and texture of the resulting ice cream could be improved through the use of butter milk solids. Melting resistance of ice cream containing butter milk solids was nearly the same as the control.

It is suggested that ice cream with partial replacement of 25% butter milk powder for MSNF could be rated as identical organoleptic quality with that of control ice cream.

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