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Research Article

Goat Milk Ice Cream: A Value Added Milk Product for Livelihood

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ABSTRACT
The effort has been made in the present investigation to make the marketable product from goat milk by value addition techniques. The ice cream was prepared from goat milk admixed with different levels of cow milk (25 and 50 %) and whole goat milk. Ice cream from 100 per cent cow milk is used as control. Non significant differences in chemical composition and fat content were recorded. The organoleptic quality of the ice cream prepared from goat milk was superior in respect in body and texture, colour etc. over the control. The overall acceptability was the highest (8.17) in ice cream prepared from 75 per cent goat milk and 25 per cent cow milk. The cost of preparation of goat milk ice cream was same as cow milk ice cream but due to higher over run of goat milk ice cream is more economical than whole cow milk. Thus it is concluded that the acceptable quality of ice cream can be prepared by using 75 per cent goat milk and 25 per cent cow milk.

Key Words: Goat milk, Ice cream

INTRODUCTION

Goat contributes about 3 per cent in total milk production of the country. However the goat milk has no specified market and price structure. Generally the goat milk is utilized for home consumption by the goat keepers and used to some extent for blending the cow milk. The goat milk has typical flavour which people don't like and hence the market for goat milk is not developed. If the value added product is prepared from goat milk, it can become an additional source of income to the goat keepers which will enhance their livelihood. In the present investigation an attempt has been made to study the possibilities of preparation of ice cream by admixing goat milk with cow milk to the maximum extent by maintaining acceptable sensory qualities.

MATERIALS AND METHODS

In experimental trials four treatments were laid down by using different percentage of goat milk and cow milk. The other constituent of basic mix were kept uniform in all the treatments viz., fat (10 per cent), total solids (36 per cent), sugar (15 per cent) and guar gum (0.3 per cent).

The treatments were as under:

T_0 : Control, 100 per cent cow milk with 4 per cent fat

T_1 : 100 per cent goat milk with 4 per cent fat

T_2 : 50 per cent goat milk and 50 per cent cow milk

T_3 : 75 per cent goat milk and 25 per cent cow milk

The ice cream was prepared by using algebraic method described by Eckles *et al.*, (1951). The mixes were pasteurized at 68^0C for 30 min in water bath. The mixes were cooled to a temperature at 35^0c. The mix vessel was kept in a deep freezer to bring down the temperature to about 4^0c for ageing. Freezing operation was carried out by using alfa laval machine. After the mix attained the desired consistency the containers (cups) were filled and kept for hardening for 12-16 hrs. The treatments were replicated 5 times.

The Fat content in ice cream was determined by Modified Gerber method given by Chatterjee (1976), total solid was as per IS:2802 (1964) and SNF was estimated by difference in TS and Fat content of ice cream. The protein content were estimated by Semi-micro Kjeldhal method as per the procedure laid by Menefee and Overman (1940).Total sugar was estimated by procedure given in IS:2802 (1964), acidity was determined as per the method suggested by Ranganna (1977) and organoleptic qualities of ice cream were examined by panel of Judges on 9 point Hedonic scale (Amerine et al. 1965). The statistical analysis was done by using randomized block design as suggested by Snedecor and Cocharan (1961).

RESULTS AND DISCUSSION

The chemical composition and quality parameters of ice cream prepared from different levels of goat milk are depicted in table 1 and 2, respectively. The fat content of ice cream prepared from different levels of goat milk did not differ significantly and was in the range of 10.62 to 10.66 per cent. This was due to standardization of fat in both the milk and cream. The mean total solid content in all samples of ice cream was nearly similar. The effect of

Table 1. Chemical composition of ice cream prepared by different level of Goat milk

S. No.	Chemical Composition (%)	Treatments					
		T_0	T_1	T_2	T_3	S.E.	CD at 5 %
1.	Fat	10.62	10.65	10.66	10.63	0.019	N.S.
2.	Total solids	36.42	36.43	36.45	36.48	0.027	N.S.
3.	SNF	25.80	25.78	25.79	25.80	0.022	N.S.
4.	Protein	4.20	4.42	4.26	4.35	0.003	0.009
5.	Total sugar	21.50	21.42	21.47	21.51	0.053	N.S.
6.	Acidity	0.16	0.16	0.15	0.16	0.002	N.S.

Table 2. Quality parameters of the ice cream prepared by different levels of goat milk

S. No.	Parameters	Treatments					
		T_0	T_1	T_2	T_3	S.E.	CD at 5 %
1.	Over run (%)	83.17	97.67	87.38	90.65	0.524	1.616
2.	Melting time (min.)	16.49	12.04	14.22	13.14	0.078	0.247
3.	Organoleptic qualities						
a.	Flavour	8.34	7.74	8.08	7.90	0.073	0.226
b.	Body and texture	8.14	8.38	8.22	8.34	0.051	0.156
c.	Colour and appearance	7.68	8.34	8.14	8.28	0.060	0.185
d.	Overall acceptability	8.04	8.14	8.14	8.17	0.034	N.S.

different levels of goat milk was non significant on total solids, SNF, total sugar and acidity.

The SNF was in the range of 25.78 (T_1) to 25.80 (T_0 and T_3) per cent. The total sugar content was in the range of 21.42 (T_1) to 21.51 (T_3) per cent. The acidity was 0.16 per cent in all the treatment except T_2 where it was 0.15 per cent.

The protein content in ice cream significantly ($P < 0.05$) increased with increase in level of goat milk and was the highest in T_1 (4.42 %) and the lowest in T_0 (4.20 %). This is due to the fact that goat milk generally contains more protein than cow milk and this might have persisted even after processing of all the mixes during preparation of ice cream. These findings are in close agreement with those reported by Hyde and Rotwell (1973) and Koushik (1983). The overrun per cent also increased with increase in level of goat milk and the highest over run was found in T_1 and the lowest was in T_0. These differences might be due to the variation in physico-chemical characteristics of cow and goat milk i.e. similar fat globule size and less clumping character of goat milk. Different levels of goat milk had significant ($P < 0.05$) effect on melting down characteristics. This might be due to differences in milk protein stability.

The organoleptic qualities, evaluated with the help of 9 point hedonic scale indicated that except flavour the ice cream prepared from 75 per cent goat milk and 100 per cent goat milk is superior in all other parameters.

It can be concluded from the present study that upto 75% goat milk can be used to prepare ice cream without affecting the chemical and sensory qualities significantly. Secondly the overrun in goat milk ice cream was more than the cow milk ice cream which adds in profit level.

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