

RESEARCH PAPER

Composition and economics of custard apple milk shake

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ABSTRACT

An attempt was made to study the chemical composition of custard apple milk shake prepared from buffalo milk blended with different levels of custard apple pulp with most economic alternative. Proximate analysis of the product indicated the increase trend of total sugar and total solids contents as the proportion of custard apple pulp increased in the milk shake. Fat and protein contents of the milk shake decreased with addition of custard apple pulp in the blend. The milk shake of treatment T_1 was most acceptable. The cost of production of custard apple milk shake for treatments T_0 , T_1 , T_2 and T_3 was Rs. 24.98, 30.65, 33.49 and 36.32, respectively. The production cost of treatment T_1 (30.65) was comparatively less than treatment T_2 (33.49) and T_3 (36.32). The advantage of custard apple pulp is that it is cheaper compared to other fruit pulps and easily available in season and make good potential value added milk product.

Key words : Buffalo milk, Custard apple pulp, Composition, Cost of production, Milk shake.

Though from time immemorial, the life of an individual begins with milk and this association continues for whole life, recent advancement in science has resulted in exploitation of several virtue of milk and its product. Today, milk constituents individually and collectively find several applications in cosmetics, pharmaceuticals and value added food industries.

The organized dairy industry handles less than 15 per cent of total milk production; rest of milk is sold as fresh, non-pasteurized milk through unorganized channel (Tripathy, 2006). Thus, the conversion of milk into various milk products has become the golden mean between supply and demand of milk.

Fruits being rich in minerals, vitamins and other nutrients and easily accessible, they are of great benefit to man. Among the various species, custard apple (*Annona squamosa*) is most important fruit. In India, area under custard apple is 44616 ha and Maharashtra covers 4990 ha of land with an average production of 20479 tonnes (Sontakke, 2003), maximum of it goes to the local market and part of it goes as waste due to shorter shelf-life of the fruit.

Custard apple is much relished by people due to its edible, soft, juicy, sugary granular and mildly flavoured pulp. It is also a good source of vitamin A and C. Its calorific value ranges from 822 to 1050 kcal per kg as compared with 741 kcal per kg of mango (Rao, 1974).

The custard apple pulp is easy to digest and it can be eaten easily by children and people of all ages. The fruit are tonic, enriches blood, increases muscular strength and cooling sedative to the heart and relieves vomiting

(Kirtikar and Basu, 1955). So attempt, therefore, was made to study chemical composition of custard apple milk shake with most economic alternative.

MATERIALS AND METHODS

Buffalo milk required for study was procured from University Dairy Farm. Custard apple of Balanagar variety required for preparation of milk shake was obtained from local market. The pulp was extracted by custard apple fruit and stored at 15-20°C temperature in refrigerator. Sodium alginate was used as stabilizer. Custard apple milk shake was prepared as per the method described by Sharma and Gupta (1978) with slight modification.

Treatments details:

Custard apple milk shake prepared from following blends of buffalo milk and custard apple pulp was studied.

T_0 –100% parts of buffalo milk (control), T_1 –90 parts of buffalo milk + 10 parts of custard apple pulp, T_2 –85 parts of buffalo milk + 15 parts of custard apple pulp and T_3 –80 parts of buffalo milk + 20 parts of custard apple pulp

Chemical analysis:

Fat content of custard apple milk shake was determined as per Gerber's method described in ISI (1958), Protein content by A.O.A.C. (1965), Total sugar by ISI (1981), Total solids, ash and titratable acidity by ISI (1961), pH was measured using digital pH meter.

Cost of production:

The various constituents required for preparation of custard apple milk shake was rated on the basis of prevailing market price (2006-2007) and cost per liter of custard apple milk shake was worked out. The cost towards fuel cost, miscellaneous cost and the labour charges @ 5 per cent of total cost were also taken into consideration for preparation of one lit. of product.

Statistical analysis:

The results obtained during the course of investigation were subjected to statistical analysis by using Completely Randomized Design (CRD) as described by Panse and Sukhatme (1967).

RESULTS AND DISCUSSION

The results obtained from the present investigation are summarized below :

Chemical composition:

Chemical composition of custard apple milk shake prepared from different blends of buffalo milk and custard apple pulp was studied and is presented in Table 1.

Fat content:

The mean fat content of treatments T_0 , T_1 , T_2 and T_3 was 3.95, 3.58, 3.35 and 3.12 per cent, respectively. Treatment T_1 (3.58) was significantly different from treatment T_0 (3.95). The data show that as the incorporation of custard apple pulp increased the fat content in the finished product decreased. This might be due to less fat content in custard apple pulp compared to buffalo milk.

Protein content:

The mean protein content of treatment T_0 , T_1 , T_2 and T_3 was 3.84, 3.40, 3.15 and 2.92 per cent, respectively. Treatment T_0 (3.84) was significantly superior over the rest of the treatments for protein content in custard apple milk shake. It was observed that as the proportion of custard apple pulp in the blend increased there was decrease in the protein content, which might be due to

less protein content in custard apple pulp compared to buffalo milk.

Total sugar content:

The total sugar content of treatments T_0 , T_1 , T_2 and T_3 were 14.03, 15.73, 16.45 and 17.38 per cent, respectively. The sugar content was lowest in treatment T_0 (14.03) and highest in treatment T_3 (17.38). It was observed that as the proportion of custard apple pulp in the blend increased and there was increase in the sugar content of custard apple milk shake, this might be due to more total sugar content in custard apple pulp.

Ash content:

The ash content in custard apple milk shake ranged from 0.75 to 0.81 per cent. The ash content of custard apple milk shake of treatment T_0 , T_1 , T_2 and T_3 were 0.79, 0.81, 0.78 and 0.75 per cent, respectively. The ash content of treatment T_1 was highest than rest of the treatments.

Total solid content:

The total solids content of treatment T_0 , T_1 , T_2 and T_3 were 22.57, 23.49, 23.76 and 24.26 per cent, respectively. The total solids content of custard apple milk shake was highest in T_3 (24.26) and lowest in T_1 (22.57). Treatment T_1 (23.49) was significantly different from treatment T_0 (22.57). There was increase in total solids content of custard apple milk shake with increase in level of custard apple pulp in the blend.

Acidity:

The mean acidity of custard apple milk shake for treatment T_0 , T_1 , T_2 and T_3 was 0.13, 0.14, 0.15 and 0.15 per cent, respectively. There were significant difference between treatment T_0 and T_1 for acidity. It was observed that the acidity of custard apple milk shake was increased with incorporation of custard apple pulp in the blend.

pH:

The pH of custard apple milk shake for treatment T_0 , T_1 , T_2 and T_3 was 6.56, 6.51, 6.45 and 6.41,

Table 1 : Chemical composition of custard apple milk shake

Sr. No	Treatments	Fat (%)	Protein (%)	Total sugar (%)	Ash (%)	Total solid (%)	Acidity (%)	pH (%)
1.	T_0	3.95	3.84	14.03	0.79	22.57	0.13	6.56
2.	T_1	3.58	3.40	15.73	0.81	23.49	0.14	6.51
3.	T_2	3.35	3.15	16.45	0.78	23.76	0.15	6.45
4.	T_3	3.12	2.92	17.38	0.75	24.26	0.15	6.41
	C.D. (P=0.05)	0.279	0.440	0.788	0.031	0.773	0.015	0.241

Table 2 : Cost of production of custard apple milk shake per liter

Sr. No.	Particulars	Rate (Rs.)	T ₀		T ₁		T ₂		T ₃	
			Qty.	Amt. (Rs.)	Qty.	Amt. (Rs.)	Qty.	Amt. (Rs.)	Qty.	Amt. (Rs.)
1.	Buffalo milk (lit.)	16.00	1.00	16.00	0.900	14.40	0.850	13.60	0.800	12.80
2.	Sugar(g)	18/kg	100	1.80	100	1.80	100	1.80	100	1.80
3.	Custard apple pulp(g)	70/kg	--	--	100	7.00	150	10.50	200	14.00
4.	Sodium alginate (g)	200/kg	4.00	0.80	4.00	0.80	4.00	0.80	4.00	0.80
5.	Fuel charges(kg)	302/cylinder (14.20 kg)	0.15	3.19	0.15	3.19	0.15	3.19	0.15	3.19
6.	Miscellaneous cost (Rs.)	--	--	2.00	--	2.00	--	2.00	--	2.00
7.	Labour charges (Rs.)	--	--	1.19	--	1.46	--	1.60	--	1.73
8.	Total cost/lit	--	--	24.98	--	30.65	--	33.49	--	36.32

respectively. The pH of custard apple milk shake was recorded highest in T₁ (6.56) and lowest in T₃ (6.41). It was observed that pH of custard apple milk shake decreased with increased proportion of custard apple pulp in milk shake.

These finding was supported by the results of Sharma and Gupta (1978), Kadav (2001) and Kashid (2005).

Cost of production:

Cost of production of custard apple milk shake is presented in Table 2. The cost of ingredients used in the preparation was rated as per the prevailing market price. The cost of production of custard apple milk shake (per liter) for treatment T₀, T₁, T₂ and T₃ was Rs. 24.98, 30.65, 33.49 and 36.32, respectively. Treatment T₀ (Rs.24.98) was lacking in custard apple pulp which has therapeutic and nutritive value. The cost of production of one liter custard apple milk shake from buffalo milk for treatment T₁ was Rs. 30.65, which increased to Rs. 33.49 (T₂) and Rs. 36.32 (T₃).

Conclusion:

It may be concluded that from the present study that the milk shake prepared from 90:10 (T₁) blends of buffalo milk and custard apple pulp was most economical than rest of the treatments. It was observed that there was increase in total solids and total sugar content of custard apple milk shake with increase in level of custard apple pulp in the blend. Custard apple milk shake has good potential to capture popularity due to its therapeutic and nutritive benefits.

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