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Study on sensory qualities of designed colostrum cake prepared with sweet potato pulp

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Abstract
Colostrum is a traditional food having its health benefits to the human. The availability of natural colostrum is limited hence to satisfying craving for colostrum the designed colostrum cake was prepared by blending egg-white, skim milk powder, jackfruit pulp, and other ingredients. The trials were carried out in two phases. In phase-I, six different mixes were prepared to optimize the level of skim milk powder and sweet potato pulp to be used for the preparation of the designed colostrum cake. Based on sensory evaluation as basis, the most acceptable level was chosen. An investigation was carried out to determine the different quality parameters of designed colostrum cake prepared by partial replacement of SMP with sweet potato pulp and blended with processed jackfruit pulp. The attempts have been made to study effect of different levels of sweet potato pulp on colostrum cake. After organoleptic evaluation carried out by trained panelist using 9-point hedonic scale the highest score was recorded by T_2 i.e. at 17.5 percent level of skim milk powder and 7.5 percent level of sweet potato pulp. Lowest score was observed by T_4 i.e. 12.5 percent skim milk powder and 12.5 percent sweet potato pulp.

Keywords: Designed colostrum cake, skim milk powder, sweet potato pulp, white of egg, sensory evaluation

Introduction
Colostrum is first thick yellow milky secretions drawn from the udder of the mammals for about 3 to 5 days after parturition. It is rich in protein due to higher levels of immunoglobulin's and casein. It is prepared by addition of little quantity of normal milk, sugar with some condiments as flavoring agents *viz*. cardamom, nutmeg. It is good source of essential growth nutrients that influences the growth, development immune system of new born calf. It contain total solids (24-28%), fat (6-7%), protein (14-16%), casein (4.8%), albumin (6.0%), total immunoglobulin (42-90 mg/mL) and lactose (2-3%).

The sweet potato has enormous potential as a food crop and ranks top among those grown in underdeveloped nations in terms of edible energy produced per unit area per unit time. Sweet potatoes are good source of vitamins, minerals and dietary fibers. Among the most crucial are vitamins B2, C and E as well as antioxidants like beta-carotene. It also goes by the names Poor Man's Energy Food and Famine Relief Crop (Bengal Famine, 1942).

By considering the nutritional significance and economical importance of colostrums also the other ingredients it becomes essential to find out and check organoleptic qualities of designed colostrum cake. At the same time, it will give good market to the preserved food product which is ultimately going to help farming community engaged in sweet potato and jackfruit production, preservation and also dairy production. Today, there has been increasing trend to value addition of dairy products.

The value added dairy products are more profitable and in some extent their shelf life is also increases. Normally availability of colostrum is irregular hence designed colostrum cake can help to fulfill our cravings in off season with same nutritive quality. In addition with jackfruit pulp it enhances its flavor and palatability.

Material and Methods
The study entitled "Preparation of designed colostrum cake by partial replacement of SMP with sweet potato pulp and blended with processed jackfruit pulp" was carried out at the Department of Animal Husbandry and Dairy Science, College of Agriculture, Dapoli, Dist-Ratnagiri during the academic year 2021-22 to 2022-23.

Fresh cow milk was obtained from the instructional dairy farm of the College of Agriculture, Dapoli. Ingredients like skim milk powder, gelatin, eggs, sweet potato, sugar and processed jackfruit pulp were purchased from the local market at Dapoli. The sensory evaluation was carried out on the basis of Nine - point hedonic scale by panel of not less than eight semi trained judges.

Preparation of sweet potato pulp

Fully matured sweet potatoes were selected. The sweet potato was washed with running tap water to remove dirt and dust. Cooked it for 5-10 minute on medium flame. Then sweet potatoes were peeled and mashed with the help of a masher. Fine paste obtained was used for designed colostrum cake preparation at different levels.

Table 1: Treatments of Different levels of skim milk powder and sweet potato pulp for designed colostrum cake

Treatments	T_0	T_1	T_2	T_3	T_4
Ingredients (%)					
Cow milk	50	50	50	50	50
White of egg	25	25	25	25	25
Skim milk powder	25	20	17.5	15	12.5
Sweet potato pulp	-	05	7.5	10	12.5
Total	100	100	100	100	100

Sugar @ 20% and gelatin @ 0.25% (w/w) was used

Receiving of Cow whole milk
↓
Pre-heating (37 °C for 5 min) and Filtration
↓
Addition of SMP and Sweet potato pulp as per treatments.
↓
Addition of white of egg @ 25% (w/w)
↓
Addition of sweetening agent and stabilizer
(Sugar @ 20% and gelatin @ 0.25%) (w/w)
↓
Blending or mixing to obtain colostrum cake mix
↓
Steaming (25-30 min.)
↓
Designed colostrum cake.

Flow Diagram for Designed colostrum cake

Sensory analysis

Sensory evaluation was performed in the laboratory under environmental conditions. The product was evaluated for sensory characteristics, *viz*. colour and appearance, body and texture, flavour and Overall acceptability using 9 points hedonic scale as per IS: 6273 (Part- II), 1971. More than eight semi trained judges carried out sensory of the product on the basis on nine - point hedonic scale.

Result and Discussion

Colour and appearance

Table 2 indicate that the finding regarding colour and appearance of designed colostrum cake was affected by various levels of skim milk powder and sweet potato pulp.

Table 2: Mean score of designed colostrum cake for colour and appearance (Out of nine)

	R1	R2	R3	R4	R5	R6	Total	Mean
T_0	7.8	7.8	6.7	7.8	7.6	7.6	45.30	7.55b
T_1	7.5	7.2	7.5	7.8	7.1	7.5	44.60	7.43b
T_2	8.2	8.5	8.3	8.2	8.1	8.5	49.80	8.30a
T_3	7.8	7.4	7.6	7.8	7.5	7.5	45.60	7.60b
T_4	7.6	7.3	7.3	7.5	7.6	7.9	45.20	7.53b
Total	38.9	38.2	37.4	39.1	37.9	39	230.50	7.68

ANOVA Table

SV	DF	SS	MSS	Fcal	Ftab 5%	F tab 1%	Result
Tr	4	2.94	0.735	10.43046	2.75871	4.17742	SIG
Er	25	1.761667	0.0704667				
Total	29	4.701667					

S. E.	CD @ 5%	CD @ 1%
0.108	0.316	0.427

The designed colostrums cake mix prepare by using 17.5 percent skim milk powder and 7.5 percent of sweet potato pulp (T_2) scored highest score (8.30) followed by T_3. The least score was obtained in case of treatment T_1 (7.43). The results are statistically significant at 1% level of significance. Treatment T_2 is statistically differs from all other treatments. Whereas other treatments are at par with each other respectively.

Body and texture

The data regarding designed colostrum cake for body and texture character is tabulated in Table 3

Table 3: Mean sensory score of designed colostrum cake for body and texture (out of nine)

	R1	R2	R3	R4	R5	R6	Total	Mean
T_0	7.7	7.6	7	7.7	7.9	7	44.90	7.48b
T_1	7.6	7	7.8	7.6	6.9	7.8	44.70	7.45b
T_2	8.7	8.3	8.6	8.7	8.5	8.6	51.40	8.57a
T_3	7.9	8.6	8	7.9	7.4	8	47.80	7.97ab
T_4	7.3	7.2	7.6	7.4	7.2	7.9	44.60	7.43c
Total	39.2	38.7	39	39.3	37.9	39.3	233.40	7.78

ANOVA Table

SV	DF	SS	MSS	Fcal	Ftab 5%	F tab 1%	Result
Tr	4	5.824667	1.4561667	13.174	2.75871	4.17742	Sig
Er	25	2.763333	0.1105333				
Total	29	8.588					

S. E.	CD @ 5%	CD @ 1%
0.136	0.395	0.535

In case of body and texture the colostrum cake mix prepare with 17.5 percent skim milk powder and 7.5 percent of sweet potato pulp i.e. T_2 received highest score (8.57) among the other treatments. Whereas T_4 secured least score (7.43) prepared with 12.5 percent Skim milk powder and 12.5 percent sweet potato pulp. The results are statistically significant at 1% level of significance.

Flavour

Table 4 indicate that the finding regarding flavor of designed colostrum cake was affected by various levels of skim milk powder and sweet potato pulp.

Table 4: Mean score of designed colostrum cake for flavor (9 point hedonic scale)

	R1	R2	R3	R4	R5	R6	Total	Mean
T_0	7.1	7.3	6.7	7.1	7.3	6.3	41.80	6.97c
T_1	7.5	7.6	7.5	7.5	7.6	7.6	45.30	7.55b
T_2	8.1	8.1	8.2	8.2	8.1	8.2	48.90	8.15a
T_3	7.4	7.3	7.6	7.4	7.3	7.8	44.80	7.47b
T_4	7.3	7.2	7.1	7.3	7.3	7.1	43.30	7.22bc
Total	37.4	37.5	37.1	37.5	37.6	37	224.10	7.47

ANOVA Table

SV	DF	SS	MSS	Fcal	Ftab 5%	F tab 1%	Result
Tr	4	4.718	1.1795	28.2177	2.75871	4.17742	SIG
Er	25	1.045	0.0418				
Total	29	5.763					

S. E.	CD @ 5%	CD @ 1%
0.083	0.243	0.329

As far as flavor is concerned, treatment T_2 i.e. colostrum mix prepared by using 17.5 percent skim milk powder and 7.5 percent sweet potato pulp secured highest score (8.15) followed by treatment T_1, T_3, and T_4, Whereas T_0 secured least score (6.97). The statistical interpretation reveals that treatment T_2 differ from all other treatments.

Overall acceptability

The information on designed colostrum cake's overall acceptability is shown in table 5, which demonstrates that treatment T_2 received the highest score and treatment T_0 the lowest.

Table 5: Mean sensory score of designed colostrum cake for overall acceptability (out of nine)

	R1	R2	R3	R4	R5	R6	Total	Mean
T_0	7.6	7.5	6.7	7.5	7.5	6.7	43.50	7.25b
T_1	7.6	7	7.6	7.6	7.5	7.6	44.90	7.48b
T_2	8.4	8.5	8.6	8.5	8.5	8.6	51.10	8.52a
T_3	7.5	7.5	7.9	7.5	7.5	7.9	45.80	7.63b
T_4	7.3	7.4	7.3	7.3	7.4	7.3	44.00	7.33b
Total	38.4	37.9	38.1	38.4	38.4	38.1	229.30	7.64

ANOVA Table

SV	DF	SS	MSS	Fcal	Ftab 5%	F tab 1%	Result
Tr	4	6.235333	1.5588333	26.72286	2.75871	4.17742	SIG
Er	25	1.458333	0.0583333				
Total	29	7.693667					

S. E.	CD @ 5%	CD @ 1%
0.099	0.287	0.389

The overall acceptability of a product is influenced by its colour and appearance, flavor, body and texture, with treatment T_2 receiving the best marks for each of these factors. It is hardly surprising that it received the highest rating for general acceptability as well. The most acceptable level of sweet potato pulp was observed in T_2 (8.52) with 7.5 percent sweet potato pulp, followed by T_3 i.e. designed colostrum cake with 10 percent sweet potato pulp (7.63), while lowest score was obtained by T_0 i.e. Designed colostrum cake without sweet potato pulp with overall acceptability score of 7.25.

Conclusion

Based on the results as shown in Table 2, it can be concluded that treatment T_2, which is a designed colostrum cake made from normal cow milk, egg white, skim milk powder, and sweet potato pulp in a proportion of 50, 25, 17.5 and 7.5, scored the highest point. As a result, it was chosen for further research in phase II.

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