



DEVELOPMENT & SENSORY CHARACTERISTICS OF VALUE ADDED PRODUCTS USING BOVINE COLOSTRUM

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ABSTRACT:

Colostrum benefits are wide spread and for good reason. This study deals with standardization & palatability evaluation of recipes prepared with bovine colostrum (BC). Four experimental (E) recipes namely, kalakand (K), palak paneer (PP), chocolate split (CS) & vegetable pizza (VP) were prepared & compared with control (C) recipes for sensory & nutritional quality. Six human panelists were used to conduct sensory testing. BCK was well accepted for appearance, colour & texture whereas flavour & taste of BCK received significantly lower mean scores than CK ($t=3.69, 2.83$ & 3.06 , respectively). BCPP was as highly accepted for its colour, flavour, taste & overall acceptability as that of CPP ($t=0.83, 0.16, 1.16$ & 1.84 , respectively). BCCS scored identical to CCS for appearance, colour & taste ($9.66, 10$ & 9.88 , respectively). With higher mean score for colour as compared to CVP, BCVP was equally accepted for all other sensory attributes. All BC products prepared from bovine colostrum were energy dense & rich source of high biological value protein & well accepted for their sensory attributes. Being a very good source of protein, energy, micronutrients as well as immune and health factors, natural bovine colostrum can be incorporated in different food products. Naturally available surplus bovine colostrum can be exploited commercially.

Keywords: Bovine colostrum, palatability, sensory attributes, protein, energy.

INTRODUCTION:

Milk and milk products are known to the human being from the time immemorial. Bovine colostrum, also known as "*Gold Liquid*" is powerful, nutrient-rich "first milk" a mother produces just after giving birth to her calf. Providing a supercharged blend of vital proteins, antibodies, antioxidants, immunoglobulin, growth factors, vitamins, minerals, enzymes and amino acids - colostrum is literally Mother Nature's very first, life sustaining super food.

Colostrum milk is the thick, sticky and yellowish pre-milk liquid produced from the mammary glands of a cow during the first 24 to 48 hours after giving birth to a calf.

Each drop contains the promise of life---immunoglobulin, growth factors, antibodies, vitamins, minerals, enzymes, amino acids, and other special substances designed to "prime" the body to face a lifetime of invasion by various microorganisms and environmental toxins bent on destruction (Foley, J. A. and Otterby, D. E. 1978).

Complete bovine colostrum contains numerous amounts of proteins. These proteins can have significant health benefits for humans. The casein found in the milk fat of true colostrum serves a very important purpose. In the stomach, it breaks down into absorbable peptides and amino acids. These peptides and amino acids create a cottage cheese-like curd that is used to create new

muscle protein in the stomach. Bovine colostrum contains 20-30 % milk fat. Bovine colostrum contains 10-15 % lactose (Levieux, D. and Ollier, A., 1999).

Colostrum stimulates and modulates immune response. Research has shown that colostrum has powerful natural immune and growth factors that bring the body to a state of homeostasis---a powerful but balance state of health and well being. No other health food product can make that claim (Gapper, L. W. et al., 2007). For this reason, many users rely on this product to reinforce their body during cold and flu season.....building up immune system in times of stress.

Bovine colostrum is not normally consumed as part of the human diet. Surplus colostrum if not thrown can serve as a source of nutrient pack food for humans. Research on development & palatability evaluation of commonly consumed recipes prepared using bovine colostrum is rare. Hence, present study was conducted to prepare value added products using bovine colostrum.

METHODOLOGY:

Experimental (E) recipes were prepared using bovine colostrum and compared with control (C) recipes. Four recipes namely kalakand (K), palak paneer (PP), chocolate split (CS) and vegetable pizza (VP) were prepared.

CK, CPP & CS were prepared using cow milk paneer whereas VP was prepared using regular cheese.

Experimental recipes were compared for their sensory attributes with control recipes.

Raw fresh bovine colostrum was collected from animal farms.

Tables 1, 2, 3 & 4 show proportion of ingredients for K, PP, CS & VP, respectively.

Sensory Evaluation: The sensory evaluation was carried out by six judges in three trials. Various sensory attributes were judged by human panelists. The assessment involves appearance, colour, texture, flavor, taste and overall acceptability by using score cards.

Nutritive Value of Recipes: Nutritive value of each recipe was calculated using food composition tables (Gopalan et al., 2007). Nutritive value of bovine colostrum was referred from Kleinsmith (2001).

Statistical Analysis: Scores were collected and means were derived. Comparisons were done using student's 't' test. A level of significance at both 5 % and 1 % level was considered to draw conclusions.

RESULTS AND DISCUSSION:

Sensory Evaluation of Recipes: Tables 5, 6, 7 & 8 show results of palatability evaluation of K, PP, CS & VP, respectively.

No significant differences were observed between CK & EK for appearance, colour and texture ($t=1.50$, 0.72 and 1.65 , respectively). However, mean scores received for appearance, colour & texture of EK were found to be lower than those of CK. EK prepared from BC was found to be more granular in texture as compared to CK. This might be attributed to early coagulation of bovine colostrum as soon as heat was applied.

Owing to its specific characteristic flavour, EK prepared using BC received significantly lower mean scores for its flavour as compared to CK. Statistically, difference was significant at both 5 % and 1 % levels ($t=3.69$).

Statistically, when taste of EK was compared with the taste of CK, difference was found to be significant at 5 % level but insignificant at 1 % level ($t=2.83$). Lower acceptability of EK was due to lower scores given by the judges to their flavour and taste ($t=3.60$).

Colour of EPP received higher mean score than CPP (9.77 and 9.55, respectively, Table 6). Identical scores were given by judges for appearance and texture of both

experimental and control palak paneer indicating that bovine colostrum paneer is an excellent option for making palak paneer. Mean scores received for flavour and taste of EPP did not show significant difference when compared with CPP (mean scores of 9.77 vs. 9.88 for flavour, $t=0.61$ & mean scores of 9.66 vs. 9.88 for taste, $t=1.16$, respectively). Results indicate that if mixed with ingredients like palak gravy enriched with garlic, ginger, onion, condiments & spices, bovine colostrum can be equally accepted as that of paneer since its characteristic flavour and taste are masked by palak paneer gravy and other ingredients like onion, garlic, ginger and tomato. EPP was highly accepted by the judges (Table 6).

Identical mean scores were received for appearance and colour of ECS & CCS (9.66 for appearance and 10 for colour, respectively, Table 8). Textural differences were noticed when ECS prepared using BC was compared with CCS ($t=2.42$) which was because of the rubbery texture of BC. Blending of BC with regular milk could be done to enhance textural attribute. Insignificant differences were noted between ECS & CCS for flavour, taste & acceptability ($t=0.88$, 0 & 0.64 , respectively, Table 7)

Identical scores were received for appearance of both CVP & EVP (9.88, $t=1.38$, Table 8). EVP was rated 'excellent' for its colourful appearance. Boiled & grated colostrum did not melt & vegetables spreaded on pizza base were not totally covered by it. Mean score for colour of EVP was found to be higher than that of CVP (mean scores: 9.77 and 9.55, respectively, $t=0.84$).

Bovine colostrum when grated and used as topping on the EVP did not melt even after baking & hence, received insignificantly lower mean score for texture (9.22) than that of CVP prepared with regular cheese (9.33, $t=0.31$, Table 8). Even though characteristic aroma and taste of regular cheese was missing in bovine colostrum, EVP was well accepted by judges for its flavour and taste. Differences between flavour and taste of CVP & EVP were found to be highly insignificant with minimal differences ($t=1.9$ for flavour and 1.18 for taste, respectively, Table 8). EVP was highly acceptable ($t=1.18$).

Nutritive Value of Recipes: Table 9 presents nutritive value of recipes. All experimental recipes prepared using BC were found high in energy value, especially kalakand (524 kcal/100g, Table 9). Bovine colostrum contains high biological value protein and is

an excellent choice for using in any recipe. Protein values of experimental recipes like PP, CS & VP were found to be two to three folds higher than control recipes. Fat content of experimental recipes prepared using BC was found to be higher than control recipes. Colostrum is a concentrated form of milk and it can be given to those who show hard time to consume full glass of milk.

CONCLUSION:

Bovine colostrum provides a high blend of vital proteins, antibodies, antioxidants, immunoglobulins, growth factors, vitamins, minerals, enzymes and amino acids. Colostrum is literally Mother

Nature’s very first life sustaining super food. Most of the people are not aware about nutritional fact of bovine colostrum and they waste a highly nutritious food because of less knowledge, fallacies and taboos.

Products prepared from bovine colostrum were well accepted for their sensory attributes. Use of condiments, spices & seasonings in savoury recipes enhanced the palatability of experimental recipes. Being rich in protein, fat & energy, abundantly available bovine colostrum can be incorporated in various recipes.

TABLE 1: PROPORTION OF INGREDIENTS FOR CONTROL AND EXPERIMENTAL KALAKAND

Name of Ingredients	KALAKAND	
	Control (g)	Experimental (g)
Cow’s Milk	1042	-
Colostrum	-	1028
Sugar	75	75
Citric Acid	0.5	0.5
Cardamom Powder	3.6	3.6
Pistachio Nuts	3.8	3.8
Almonds	10	10

TABLE 2: PROPORTION OF INGREDIENTS FOR CONTROL AND EXPERIMENTAL PALAK PANEER

Name of Ingredients	PALAK PANEER	
	Control (g)	Experimental (g)
Paneer	250	-
Boiled Set Colostrum	-	250
Spinach	500	500
Onion	36	36
Garlic	3	3
Ginger	18	18
Tomato Puree	145	145
Garam Masala	5	5
Oil	42.8	42.8
Salt	10	10

TABLE 3: PROPORTION OF INGREDIENTS FOR CONTROL AND EXPERIMENTAL CHOCOLATE SPLIT

Name of Ingredients	CHOCOLATE SPLIT	
	Control (g)	Experimental (g)
Cocoa Powder	50	50
Milk Powder	200	200
Sugar	150	150
Unsalted Butter	80	80
Grated Paneer	200	-
Grated Boiled Colostrum	-	200
Powdered Sugar	20	20

TABLE 4: PROPORTION OF INGREDIENTS FOR CONTROL AND EXPERIMENTAL VEGETABLE PIZZA

Name of Ingredients	VEGETABLE PIZZA	
	Control (g)	Experimental (g)
Readymade Pizza Base	87.5	89
Tomato Puree	50	50
Onion Paste	24	24
Garlic	1	1
Ginger	5	5
Butter	15	15
Tomato Ketchup	15	15
Chilli Sauce	10	10
Shredded Cabbage	32	32
Capsicum	40	40
Carrot	20	20
Sweet Corn	10	10
Cheese	30	-
Boiled Set Colostrum	-	30
Dried Oregano	1	1
Salt	2	2

TABLE 5: MEAN PALATABILITY SCORES FOR CONTROL AND EXPERIMENTAL KALAKAND

Sr. No.	Sensory Characteristics	KALAKAND		t Values
		Control	Experimental	
1	Appearance	10	9.66	1.50
2	Colour	9.66	9.44	0.72
3	Texture	9.77	8.88	1.65
4	Flavour	9.88	8.66	3.69*
5	Taste	10	8.77	2.83**
6	Acceptability	10	8.99	3.06*

* - Significant at both 5 % and at 1 % levels.

** - Significant at 5 % level but insignificant at 1 % level.

t values without any mark indicate insignificant difference.

**TABLE 7: MEAN PALATABILITY SCORES FOR CONTROL
AND EXPERIMENTAL CHOCOLATE SPLIT**

Sr. No.	Sensory Characteristics	CHOCOLATE SPLIT		t Values
		Control	Experimental	
1	Appearance	9.66	9.66	0
2	Colour	10	10	0
3	Texture	10	9.66	2.42**
4	Flavour	9.88	9.66	0.88
5	Taste	9.88	9.88	0
6	Acceptability	9.88	9.77	0.64

** - Significant at 5 % level but insignificant at 1 % level.

t values without any mark indicate insignificant difference.

TABLE 8: MEAN PALATABILITY SCORES FOR CONTROL

**TABLE 6: MEAN PALATABILITY SCORES FOR CONTROL
AND EXPERIMENTAL VEGETABLE PIZZA
AND EXPERIMENTAL PALAK PANEER**

Sr. No.	Sensory Characteristics	VEGETABLE PIZZA AND EXPERIMENTAL PALAK PANEER		t Values
		Control	Experimental	
1	Appearance	9.88	9.88	1.38
2	Colour	9.55	9.77	0.84
3	Texture	9.88	9.88	0.31
4	Flavour	9.55	9.55	0.88
5	Taste	9.66	9.66	1.08
6	Acceptability	9.88	9.77	0.64
5	Taste	9.88	9.66	1.16
6	Acceptability	9.88	9.55	1.84

t values indicate insignificant difference at both 5% & 1% levels.

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TABLE 9: NUTRITIVE VALUE OF RECIPES (g/100g)

Recipes	Energy (kcal)	Carbohydrate (g)	Protein (g)	Fat (g)
KALAKAND				

Control	97	10.88	3.22	4.48
Experimental	524	20.69	57.15	23.64
PALAK PANEER				
Control	123	2.94	5.82	9.77
Experimental	187	5.87	16.57	10.82
CHOCOLATE SPLIT				
Control	428	38.68	14.02	24.09
Experimental	502	42.05	26.50	25.29
VEGETABLE PIZZA				
Control	153	20.77	4.55	5.78
Experimental	208	21.4	8.31	9.92

REFERENCES:

- ◆ Foley, J. A. and Otterby, D.E. 1978: Availability, Storage, Treatment, Composition and Feeding Value of Surplus Colostrum: A Review. *Journal of Dairy Science*, 61: 1033-1060.
- ◆ Gapper, L. W. Copestake, D. E. J. Otter, D. E. Indyk, H. K. 2007: Analysis of Bovine Immunoglobulin G in Milk, Colostrum and Dietary Supplements: A Review. *Analytical and Bio Analytical Chemistry*, 389: 93-109.
- ◆ Gopalan, C., Rama Shastri, B. V., Balasubramanian, S. C. 2007: Nutritive Value of Indian Foods. Revised and updated by Rao B. S. National Institute of Nutrition, Hyderabad. Pp. 24, 48, 52, 54, 57-58, 60, 62-63, 66, 69-72.
- ◆ Kleinsmith, A. The Composition of First Milk Bovine Colostrum. Citation from <http://www.exba.net/rss.php?Rss=>
- ◆ Levieux, D. and Ollier, A. 1999: Bovine Immunoglobulin G, Beta-Lactoglobulin, Alpha-lactalbumin and Serum Albumin in Colostrum and Milk during the Early Post Partum Period. *Journal of Dairy Research*, 66(3), 421-430.

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