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Saurabh Prakash
Division of Dairy Technology, National Dairy Research Institute, Karnal, Haryana, India

Upendra Singh
S.G. Institute of Dairy Technology, Bihar Agricultural University, Patna, Bihar, India

Rajni Kant
Agricultural and Food Engineering Department, Indian Institute of Technology Kharagpur, West Bengal, Paschim Medinipur, India

Sonia Kumari
S.G. Institute of Dairy Technology, Bihar Agricultural University, Patna, Bihar, India

Ramesh Chandra
Department of Dairy Technology, Warner College of Food and Dairy Technology, SHUATS- Allahabad, Uttar Pradesh, India

Correspondence
Rajni Kant
Agricultural and Food Engineering Department, Indian Institute of Technology Kharagpur, West Bengal, Paschim Medinipur, India

Effect of different type of coagulant, fat level, kneading temperature, addition of semolina, cooking time, sugar syrup and their concentration for preparation of Balsahi from mixed milk

Saurabh Prakash, Upendra Singh, Rajni Kant, Sonia Kumari and Ramesh Chandra

Abstract
Effect of different milk ratio (buffalo milk: cow milk), such as, 80:20 and 85:15 of mixed milk on quality of chhana and balsahi were studied. Higher dilution caused slight reduction in flavour scores and balls developed sponginess with a tendency to flatten during cooking in sugar syrup. The addition of semolina at 12.0 percent produced slight hard, less spongy and most acceptable balsahi samples from appearance stand point. Concentration of sugar syrup i.e. 70%, balsahi samples cooked in 70 percent sugar syrup were preferred most because of their light brown colour, round shape, pleasant flavour and free from any surface crakes. A minimum cooking time of 45 min was recommended for manufacturing good quality balsahi as samples obtained on cooking for 30 min secured minimum scores for each sensory attribute except for flavour. Recommended technology for the production of Balsahi from buffalo milk are as followed standardization of milk with 85 part buffalo milk and 15 part cow milk and its heating to temperature 100^{o}C, with slow and continuous agitation at temperature around 85 ^{0}C, coagulation with 2.0 percent citric acid (pasteurized sour whey optional), draining, pressing for 15 min, grinding of chhana to a smooth paste, mixing of semolina (12.0% by weight of chhana) and cane sugar @8 percent of the weight of ground chhana, kneading to smooth paste, forming into round ball of 8.0 gram each and cooking in 70 percent sugar syrup for 45 min followed by soaking in 60.0 percent sugar syrup and packaging.

Keywords: Coagulant, concentration, temperature, cooking time

Introduction
Balsahi is one of the most popular sweetmeats of the North Bihar made from Chhana. Slowly, the product is increasing its popularity in other parts of the country (Saurabh Prakash *et al*. 2013) [1]. It is obtained after kneading Chhana in to small round balls and boiling them in clarified sugar syrup. The method of the Balsahi preparation is a secret technique of particular sweet-makers. They neither divulge the recipe composition nor the exact technique of manufacturing to others under the fear of competition. Thus, in absence of requisite information, the quality of product varies shop to shop. A good quality of Balsahi is usually prepared from buffalo milk Chhana having hard body and smooth texture with less water holding capacity. To commercialize the product of uniform quality there is an urgent need for standardizing the procedure of Balsahi production from mixed milk. Balsahi manufacture from buffalo milk has hard body and slight spongy texture due to combined chemical and physical changes taking place in casein micelle during acid coagulation of large structural aggregates of casein or curd in which fat and coagulation of milk and subsequent heating at relatively higher temperature. This involves formation of large structural aggregates of casein micelle of course loses part of its calcium and phosphate (Saurabh Prakash *et al*. 2013) [1-2].

Materials and Methods
The experiment "Studies on Technological and Quality aspects of Chhana based sweet Balsahi from Mixed Milk" was carried out in the Student's Training Dairy and Research Laboratory of Warner School of Food and Dairy Technology, Sam Higginbottom University of Agricultural Technology and Sciences, Allahabad, U.P. during M. Sc. Research work of first author (Kant *et al*. 2017) [3].

Raw Materials
All the raw materials were collected from the local market of Allahabad. Potable water was used for preparing the product. It was ensured that the materials used were free from any kind of infestation. The quantity of materials required for preparation of Balsahi has been given:

Buffalo Milk: Fresh buffalo milk having fat, 6.0- 8.2% and total solids, 9.6- 10.2% was obtained from local market at Allahabad.

Cow Milk: Fresh cow milk having fat, 3.5-4.0% and total solids, 8.5-9.0% was obtained from local market at Allahabad.

Sugar: Refined cane Sugar conforming to Indian standard specification IS: 1151 (1969) [8] was procured from local market at Allahabad.

Suji: Suji was procured from local market at Allahabad.

Chemicals: All the chemicals used in the investigation were of 'AR' grade.

Preparation of Chhana
Chhana by traditional process was prepared by the method described by (Kudu & De 1972) [4] with some modifications. For each trial of chhana preparation, 800 g of different percent of fat & SNF of buffalo milk and 200g of different percent of fat and SNF was taken in a beaker of 2 litres capacity and heated at 100 ^{0}C on an LPG stove for 1 min. The milk was then cooled to different temperatures (85, and 80 ^{0}C) and coagulant (2.0% citric acid) added in a thin continuous stream with medium stirring to lower the pH to different levels (5.2 and 5.4). Left the coagulated mass in the whey for 2-3 min. then cool the coagulated mass to room temperature by adding the normal tap water. The whey was then drained from the coagulated mass by passing through a piece of muslin cloth that was hanged for 15-20 min, squeezed and holds it for another 10 min.

Preparation of Balsahi
Balsahi was prepared from chhana essentially using the method given by some sweet maker with some modifications (Saurabh Prakash *et al*. 2013) [1-2]. Chhana was taken on working table and broken it into smaller pieces. Added 12% suji and 15% sugar to the broken mass and kneaded to homogeneous and smooth dough, which was then, shaped into round balls of size about 8-10 gm weights. Balls were rolled on palms for 1 min. Care was taken to avoid cracks on the surface. On the other hand 70% concentrated sugar solution was prepared by mixing sugar and calculated amount of water and heated up to boiling point. The impurities were removed by addition of a little amount of raw milk and filtered by muslin cloth. At the boiling temperature chhana balls were poured into sugar syrup 70% for cooking for different cooking time (40 and 45 min). During cooking a small amount of water was continuously added to maintain its concentration. During cooking the balls first settle at the bottom of the pan after a few minutes they start floating on the surface of the cooking syrup. After that it was kept for complete cooking for a period of 40 and 45 min. Then the balls were transferred in a soaking sugar solution of 60% concentration. The product acquired the desired sugar concentration when the equilibrium was reached between the sugar syrup concentration inside and outside of the balls. This stage was obtained in 1-2 h at room temperature. After complete soaking, balsahi was stored at or below 8 ^{0}C.

Results and Discussion
Effect of kind of coagulant: Citric acid and sour whey are among the most commonly used coagulants for chhana making. However, a considerable amount of homemade chhana in West Bengal is reported to be produced using calcium lactate as coagulant (Chakravarti, 1982) [5]. A comparative study was, therefore, conducted to find out the suitability of common coagulants for production of chhana suitable for balsahi making. The results in Table 1. Showed that the type of coagulants had marked influence on the quality of chhana and whey. Milk coagulated with 2.0 percent solution of sour whey at room temperature produced softer and smoother chhana samples as compared with those produced with citric acid. The penetration value of sour whey chhana was also much higher in comparison with chhana samples prepared from citric acid (170). The yield of chhana from sour whey was maximum (25.45%) and citric acid (25.02%). Higher yield of chhana in case of sour whey was obtained because of higher retention of moisture and low fat loss in whey as compared with the use of citric acid coagulants. The flavour of citric acid chhana was slightly sweet and nutty while that from sour whey was slightly acidic.

Table 1: Effect of coagulation on the quality of chhana and whey

Quality attributes	Types of coagulant	
	Citric acid	Sour whey
Chhana moisture (%)	57.21-58.53	60.73-62.01
	(57.87 ± 0.44)	(61.37 ± 0.47)
Penetration value (0.1 mm at 30±1 ^{0}C)	167-175	171-193
	(170.03 ± 3.0)	(182 ± 7.57)
Yields (%)	24.72-25.30	24.83-25.98
	(25.02 ± 0.21)	(25.45 ± 0.38)
Recovery of milk solids (%)	64.30-65.58	64.83-66.31
	(64.83 ± 0.33)	(65.53 ± 0.32)
Amount of coagulant needed	3.16-3.50	3.50-4.00
	(3.32 ± 0.11)	(3.73 ± 0.02)
Whey pH	5.19-5.24	5.21-5.26
	(5.20 ± 0.01)	(5.22 ± 0.01)
Fat (%)	0.25-0.45	0.33-0.49
	(0.35 ± 0.05)	(0.41 ± 0.04)
Total solids (%)	6.08-6.31	5.78-6.14
	(6.17 ± 0.08)	(5.96 ± 0.09)

The sensory quality of sweet prepared from the above samples is presented in Table 2. The samples of sweet prepared from chhana obtained from citric acid and sour whey were hard, less spongy and had optimum chewiness. Increase in voluminosity of chhana balls during cooking was also found to be satisfactory.

Table 2: Effect of coagulant on the sensory quality of balsahi

Quality attributes	Types of coagulants	
	Citric acid	Sour whey
Flavour (Max 9.0)	7.00-8.50 (7.70±0.08)	7.50-8.50 (8.00±0.06)
Body & Texture (Max 9.0)	7.00-8.00 (7.66±0.06)	7.00-8.00 (7.86±0.05)
Overall Acceptability (Max 90.)	7.50-8.50 (7.95±0.07)	8.00-8.50 (8.21±0.06)
Sensory comments	hard & less spongy, smooth surface with uniform pore size	hard, smooth and slightly spongy with uniform pore size

The samples of sweet prepared from sour whey and citric acid score maximum ratings for body and texture (8.35 and 8.15), respectively. Balsahi also scored highest in overall acceptability, when it was made using citric acid as coagulant compared to sweet made from sour whey chhana. The ANOVA for sensory scores (Table 3.) indicated that the type of coagulants exerted significant influence on flavour, body and texture, and overall acceptability of balsahi.

Table 3: ANOVA for the effect of type of coagulants on the sensory quality of balsahi

Sources of variation	Difference	Mean sum of squares		
		Flavour	Body & Texture	Overall acceptability
Between replicates	3	0.31	0.04	0.12
Between treatments(T)	2	7.10^{++}	12.33^{++}	9.37^{++}
Between Judges (J)	6	0.11	0.33	0.03
Between TXJ	12	0.27	0.18	0.09
Error	60	0.15	0.19	0.27
Total	83			

$^{++}$Significant at 1.0 percent level.

Citric acid produced a good quality balsahi. Yet this coagulant was required in relatively high quantity to achieve complete coagulation, which would increase the cost of chhana production.

Effect of fat level: The buffalo milk samples were standardized to 4.5 and 5.0 percent fat by the addition of cow milk and coagulated at 85 ^{0}C using 2.0 percent citric acid solution (30 ^{0}C). Table 4. shows the effect of fat percentage of milk on the quality of chhana and whey. It may be noticed that at 4.5 percent fat level, although the moisture content in chhana was the highest (60%), the chhana was least soft. Chhana samples from low fat milk had coarse texture as compared to those obtained from other fat levels. Milk fat plays a significant role in contributing smooth texture to chhana rather than its moisture content. Chhana samples obtained from milk with higher fat carried lower moisture contents compared with chhana samples prepared from milk with 4.5 percent fat with corresponding increase in softness. Chhana samples obtained from 4.5 percent fat milk were judged as hard and coarse and those obtained from 5.0 percent milk fat was judged as semi hard and smooth. The yield of chhana and recovery of milk solids increased with increasing fat levels in milk. These findings are similar to those of (Kundu and De 1972) [4]. The fat and total solids percentage in whey increased with increasing fat in milk.

Table 4: Effect of fat percentage of mixed milk on the quality of chhana and whey

Quality attributes	Fat percent in milk	
	4.5	5.0
Chhana moisture (%)	59.13-60.22	56.81-58.73
	(59.37±0.37)	(57.37±0.55)
Yields (%)	22.33-23.12	23.43-25.72
	(22.12±0.56)	(24.57±0.71)
Recovery of milk solids (%)	61.12-63.33	63.02-66.10
	(62.66±0.37)	(64.37±1.06)
Body & Texture	Slightly hard and coarse	Soft and smooth
Whey pH	5.21-5.33	5.17-5.32
	(5.24±0.02)	(5.32±0.04)
Whey fat (%)	0.30-0.46	0.43-0.55
	(0.38±0.04)	(0.49±0.03)
Total solids (%) in whey	5.82-6.22	5.83-6.12
	(6.00±0.09)	(5.98±0.06)

Balsahi made from 5.0 percent fat milk scores maximum (7.50-8.50) for flavour (Table 5.) as compared to one made from 4.50 (score 7.0-8.0) fat milk. The body and texture score for balsahi samples prepared from 4.50 percent fat milk was maximum followed by 5.0 percent fat milk. Balsahi samples prepared from 4.50 percent fat milk were hard, slightly spongy and succulent with uniform pore size and smooth surface. The balls also maintained their round shape during

cooking. Balsahi samples obtained from 5.0 percent fat milk, though semi hard and succulent, had uneven pores with minor crack on the surface. These samples showed tendency to flatten during cooking. The overall acceptability of balsahi samples obtained from 4.50 percent milk was also maximum (7.5-8.5) followed by 5.0 percent fat milk for which the overall acceptability scores were 6.5 to 8.5, 6.5 to 8.0 and 6.0 to 7.0, respectively.

Table 5: Effect of fat level in mixed milk on sensory attributes of balsahi

Quality attributes	Fat percent of milk	
	5.0	**4.50**
Flavour (Max 9.0)	7.0-8.0	7.5-8.5
	(7.45±0.23)	(8.03±0.23)
Body & Texture (Max 9.0)	6.5-8.0	7.5-8.5
	(7.45±0.43)	(8.11±0.07)
Overall acceptability (Max 9.0)	6.5-8.0	7.5-8.5
	(7.61±0.08)	(8.20±0.06)
Sensory comments	Slightly soft, fibres strong, less chewy, uniform pores	Hard, chewy, uniform pores

The ANOVA for sensory scores for balsahi indicated that fat content in mixed milk significantly affected its flavour, body and texture, and overall acceptability (Table 6).

Table 6: ANOVA for the effect of fat level in milk on sensory characteristics of balsahi

Source of variation	Difference	Mean sum of squares		
		Flavour	**Body & Texture**	**Overall acceptability**
Between replicates	3	0.001	0.04	0.006
Between treatments(T)	3	5.43^{++}	5.57^{++}	2.67^{++}
Between judges (J)	6	0.19	0.05	0.59
Between TXJ	18	0.12	0.10	0.30
Error	81	0.20	0.15	0.22
Total	111			

$^{++}$Significant at 1.0 percent level.

It was concluded that balsahi sample prepared from mixed milk with 4.50 percent fat, got maximum sensory scores and also retain the round shape of balsahi during cooking. High fat mixed milk was not found suitable for balsahi making because the balls tends to flatten during cooking and cost of production also become higher. It is, therefore, recommended that for balsahi making mixed milk should first be standardized to 4.50 percent fat. All the subsequent studies were, therefore, conducted on mixed milk standardized to 4.50 percent fat.

Effect of dilution of Buffalo milk with cow milk: The influences of diluting mixed milk with cow milk on the quality of balsahi are shown in Table 7.

Table 7: Effect of cow milk addition in buffalo milk on the quality of balsahi

Quality attributes	Percent addition of cow milk(w/w)		
	Control	**20**	**25**
Flavour (Max 9.0)	7.0-8.0	7.0-8.0	7.0-7.5
	(7.63±0.20)	(7.50±0.17)	(7.25±0.12)
Body & Texture (Max 9.0)	8.0-8.5	8.0-9.0	7.0-8.0
	(8.37±0.11)	(8.5±0.18)	(7.62±0.21)
Overall acceptability (Max 9.0)	8.0-8.5	8.0-9.0	7.5-8.0
	(8.25±0.12)	(8.37±0.12)	(7.75±0.12)
Sensory comments	Uniform surface, fairly soft & spongy	Uniform surface, quite soft, spongy	Slight surface crack, very soft and less spongy

It would be noticed that no much improvement in the sensory characteristics of balsahi, especially in the body and texture, and overall acceptability, were observed beyond 20 percent dilution. Higher dilution caused slight reduction in flavour scores and balls developed slight surface cracks with a tendency to flatten during cooking in sugar syrup. The ANOVA for the effect of dilution on sensory quality of balsahi showed a significant effect of dilution at 1.0 percent level for all the two parameters.

Table 8: ANOVA for the effect of dilution of buffalo milk on the sensory quality of balsahi

Sources of variation	Difference	Mean sum of square		
		Flavour	**Body & Texture**	**Overall acceptability**
Between replicates	3	0.016	0.011	0.036
Between treatments (T)	3	2.108^{++}	5.336^{++}	4.960^{++}
Between judges (J)	4	0.042	0.083	0.028
Interaction TXJ	12	0.090	0.068	0.057
Error	57	0.091	0.020	0.027
Total	79			

Effect of kneading temperature: In this investigation a coagulation temperature of 85 ^{0}C was found to be optimum for production of quality chhana from mixed milk. Temperature of kneading of chhana is likely to play some role on the textural quality of balsahi. Kneading temperature viz., room (30±2 ^{0}C) temperature were finally selected in the present study. Cooling chhana prior to kneading may alter the textural behavior during cooking. The effects of kneading temperature of chhana on the quality of balsahi are presented in Table 10.

Table 9: Effects of kneading temperatures of chhana on the sensory characteristics of balsahi

Sensory attributes	Kneading temperature
	30±2 ^{0}C
Flavour (Max 9.0)	7.5-9.0
	(8.51±0.08)
Body & Texture (Max 9.0)	7.5-9.0
	(8.37±0.08)
Appearance (Max 9.0)	7.5-9.0
	(8.14±0.08)
Overall acceptability (Max 9.0)	7.0-9.0
	(8.32±0.12)
Sensory comments	Soft, spongy, uniform pores, smooth surface

It was observed that samples of balsahi prepared by kneading of chhana at 30 ^{0}C was preferred by the judges Though, balsahi samples were hard less spongy, uniform pores and developed smooth surface, samples prepared at 30^{0}C were judged to be good quality in terms of sponginess and other textural attributes. The respective average sensory scores for flavour, body and texture, appearance and overall acceptability of balsahi made by kneading at 30 ^{0}C were 8.51, 8.37, 8.14 and 8.32 respectively. It may be of interest to know if deep frozen chhana received from long storage and distant transportation would in any way affect the texture of balsahi. The effect of kneading temperature of chhana on sensory quality of balsahi indicated that temperatures had significant effect on the textural attributes (Table 9).

Effect of addition of semolina: In order to improve the texture quality of balsahi from mixed milk, the samples were prepared using two different level of semolina viz. 8.0 and 12.0 percent by weight of chhana. All the samples were subjected to sensory evaluation and comments enlisted. The results have been presented in Table 10.

Table 10: Effect of addition of semolina in the sensory characteristics of balsahi

Quality attributes	Percent addition of semolina by weight of chhana	
	8.0	**12.0**
Flavour (max 9.0)	7.0-8.5	7.0-8.5
	(8.05 $\pm$ 0.09)	(8.13 $\pm$ 0.10)
Body & Texture (Max 9.0)	7.0-8.5	8.0-9.0
	(7.86 $\pm$ 0.09)	(8.44 $\pm$ 0.08)
Appearance (Max 9.0)	7.5-8.5	8.0-8.5
	(8.11 $\pm$ 0.06)	(8.33 $\pm$ 0.42)
Overall acceptability (Max 9.0)	7.0-8.5	8.0-9.0
	(7.95 $\pm$ 0.09)	(8.37 $\pm$ 0.06)
Sensory comments	Fairly soft, spongy, smooth	hard, less spongy, smooth surface

The maximum sensory scores to all the sensory attributes were assigned to balsahi samples prepared with 12.0 percent semolina. These samples on an average scored 8.37 (liked very much to like extremely) and those prepared from 8.0 percent, scored 7.95. The samples prepared from 12.0 percent semolina were hard, less spongy and most acceptable from appearance stand point. The samples with 8.0 percent semolina were criticized for softness and very smooth surface, which can be an uncommon characteristic. Although, all the samples prepared from two levels of semolina were acceptable to the panelists, inter-sample difference was significant. The ANOVA of the sensory scores (Table 11) would reveal that the levels of addition of semolina had significant effect on body and texture, appearance and overall acceptability of balsahi. Addition of semolina in any of the three levels caused no significant effect on flavour of the product. Variations due to replicates, judge and interaction between judges and treatment were not significant.

Table 11: ANOVA for the effect of addition of semolina on the sensory characteristics of balsahi

Sources of variation	Mean sum of square				
	Difference	**Flavour**	**Body & Texture**	**Appearance**	**Overall acceptability**
Between replicates	2	0.305	0.012	0.205	0.201
Between temperature (T)	2	0.133	0.158^{++}	13.142^{++}	2.094^{++}
Between judges (J)	4	0.221	0.066	0.130	0.048
Interaction TXJ	8	0.278	0.239	0.110	0.051
Error	28	0.091	0.075	0.044	0.090
Total	44				

$^{++}$Significant at 1.0 percent level

On the basis of above findings, it may be concluded that the addition of 12.0 percent semolina, by weight of chhana is suitable for production of good quality balsahi from mixed milk.

Effect of sugar syrup concentration during cooking: A large variation in the sugar syrup concentration used by the traders for cooking of balsahi was observed during the survey. This investigation was conducted to find out an optimum concentration of sugar syrup for cooking that would produce

the best sweet from mixed milk. Balsahi samples were cooked for 45 min in the syrup having 70 percent sugar concentrations and the samples were subjected to sensory evaluation.

Table 12: Effect of the sugar syrup concentration (cooking) on sensory characteristics of balsahi

Quality attributes	percent sugar syrup concentration
	70
Flavour (Max 9.0)	7.5-9.0
	(8.12± 0.10)
Body & Texture (Max 9.0)	7.5-9.0
	(8.07± 0.10)
Appearance (Max 9.0)	7.5-8.0
	(7.81± 0.04)
Overall Acceptability (Max 9.0)	7.5-9.0
	(8.03± 0.10)
Sensory comments	Slightly brown, uniform surface with hard crust, less spongy

Balsahi sample cooked in 70 percent sugar syrup was rated superior because of the deployment of its own brown colour and product had no surface crakes, a hard surface crust was formed. The product was also less spongy. Hardening of surface could be caused by the elevation of boiling temperature because of increased sugar concentration. The overall acceptability of balsahi ranged between 7.5 and 9.0. The concentration of sugar syrup used for cooking balsahi balls significantly affected flavour, body and texture, appearance and overall acceptability scores. For cow milk chum-chum, a syrup concentration of between 60 and 70 percent has been recommended by (Goel 1970) [6] and (Bhattacharya et.al. 2006) [7].

Effect of cooking time: In the foregoing section (4.3.3), it was observed that the balsahi balls cooked in 70 percent sugar syrup for 30 min carried raw flavour. It is possible that cooking time played significant role in flavour production. A systematic study of cooking time was therefore, conducted using sugar syrup of 70 percent concentration. Cooking of balsahi balls in the syrup was done for two duration viz., 30 and 45 minutes of temperature ranging from 110^0C to 115^0C.

Table 13: Effect of duration of cooking on sensory characteristics of balsahi

Sensory attributes	Duration of cooking (in min)	
	30	45
Flavour (Max 9.0)	7.5-8.5	7.5-9.0
	(8.13± 0.07)	(8.30 ± 0.10)
Body & Texture (Max 9.0)	7.5-9.0	7.0-8.5
	(8.35± 0.09)	(8.04 ± 0.09)
Appearance (Max 9.0)	7.5-8.5	7.0-8.0
	(8.26± 0.06)	(7.52 ± 0.06)
Overall acceptability (Max 9.0)	7.5-9.0	7.0-8.5
	(8.31 ± 0.10)	(8.05 ± 0.09)
Sensory comments	White, soft and spongy with pleasant aroma	Slightly brown, semi hard, less spongy and pleasant flavour

Balsahi samples obtained by cooking for 30 min secured maximum scores for each sensory attribute except for flavour. However, 45 min duration of cooking contributed to maximum rating for flavour (8.30), although it imparted slightly brown discoloration and cooked flavour to the product. The statistical analysis of variance (Table 14) indicates that time of cooking had significant effect on flavour body and texture, appearance and overall acceptability scores of the product.

Table 14: ANOVA for the effect of duration of cooking on the sensory characteristics of balsahi

Sources of variation	Mean sum of square				
	Difference	Flavour	Body & Texture	Appearance	Overall acceptability
Between replicates	2	0.049	0.578	0.001	0.171
Between temperature (T)	3	11.192^{++}	5.241^{++}	3.480^{++}	22.139^{++}
Between Judges (J)	4	0.201	0.028	0.073	0.063
Interaction (TXJ)	12	0.139	0.144	0.079	0.154
Error	38	0.053	0.081	0.053	0.154
Total	59				

$^{++}$ Significant at 1.0 percent level

Conclusion

Effect of different fat levels, such as, 4.5and 5.0% of mixed milk on quality of chhana and balsahi were studied. Balsahi sample prepared from mixed milk with 4.50 percent fat got maximum sensory scores and also retain the round shape of balsahi during cooking. Much improvement in the sensory characteristics of balsahi, especially in the body and texture, and overall acceptability, were observed 20 percent dilution of buffalo milk with cow milk. Higher dilution caused slight reduction in flavour scores and balls developed sponginess with a tendency to flatten during cooking in sugar syrup. Kneading temperature 30 °C studied in the present investigation, balsahi samples prepared at 30 °C were judged to be superior in terms of sponginess and other textural properties. The addition of semolina at12.0 percent produced slight hard, less spongy and most acceptable balsahi samples from appearance stand point. Concentration of sugar syrup i.e. 70%, balsahi samples cooked in 70 percent sugar syrup were preferred most because of their light brown colour, round shape, pleasant flavour and free from any surface crakes. A minimum cooking time of 45 min was recommended for manufacturing good quality balsahi as samples obtained on cooking for 30 min secured minimum scores for each sensory attribute except for flavour.

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