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Study on the influence of incorporation of whey protein concentrate on the quality of *Chhana*

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Abstract
The present investigation was conducted to study the influence of incorporation of Whey Protein Concentrate (WPC) on the quality of *Chhana.* Experimental samples of *Chhana* were prepared by incorporating WPC at different rates viz.0.25 (C1), 0.50 (C2), 0.75 (C3), 1.00 (C4), 1.25 (C5) and 1.50 (C6) per cent (w/w) of the mixed milk. Control *Chhana* (CC) was prepared from mixed milk without addition of WPC. Addition of WPC at the different rates in mixed milk, didn't affect the legal requirements with respect to chemical composition. However, body & texture as well as overall acceptability score of CC, C1,C2, C3, and C4 were statistically at par (P>0.05) with each other. Whereas yield, TS recovery and fat recovery of sample C3 and C4 samples were statistically at par (P>0.05) with each other, but significantly (P≤0.05) higher than CC. Thus, it was decided to adopt experimental *Chhana* samples –C3 and C4, prepared from 0.75 per cent and 1.0 per cent WPC (w/w) of mixed milk respectively as optimized products, but as *Chhana* is intermediate products so among C3 and C4 sample most acceptable optimized product will depend upon the end use.

Keywords: mixed milk, *Chhana*, wpc, yield

Introduction
World Milk Day is observed throughout the world on June 1, with an aim to raise awareness about milk and its importance as a global food. Meanwhile, India has witnessed remarkable growth in its production and consumption of milk and dairy products in recent years and this trend is almost certain to continue. In 2016-17, the milk production in India was 165.4 million tones and 355 gms/day per capita availability (www.nddb.coop) [1]. It is estimated that about 50 to 55 per cent of the milk produced in India is processed by the traditional sector (halwais) for the production of various indigenous products using processes such as coagulation (heat and/or acid), desiccation and fermentation (Srinivasa *et al.,* 2017) [2]. Pattern of milk consumption in India indicates that around 6 per cent milk is converted into *Chhana* (Kumar *et al.,* 2015) [3], where *Chhana* is used extensively as the base and filler for many Indian delicacies namely, *rasogolla, sandesh, cham-cham, rasmalai, pantoa, rajbhog, Chhana-murki* and many more.

Traditionally, cow milk has been used exclusively for *Chhana* preparation by halwais due to its superior and most acceptable quality texture and colour suitable. But the production of cow milk is not satisfactory, especially in the month from July to November due to seasonal effect and the production goes to minimum level. The scarcity of cow milk hampers the production of sweet meat production, which contributes in the rise of prices. Most of the dairy in India receive the mixed milk throughout the year. Literature is available for preparation of *Chhana* from cow and buffalo milk, but little literature available for making *Chhana* from the mixed milk. So present investigation was conducted to study the influence of incorporation of Whey Protein Concentrate (WPC) on the quality of *Chhana.*

Materials and Methods
The present investigation was carried out in the Department of Dairy Technology, Sheth M. C. College of Dairy Science, Anand in 2016-2017. Fresh, raw, chilled, mixed milk (cow and buffalo) was obtained from Anubhav Dairy of Sheth M. C. College of Dairy Science, AAU, Anand and was used as the base material for preparation. The average fat per cent of the milk was 5.50 ± 0.05 per cent and the average MSNF content was 8.65±0.05 per cent. Raw mixed milk was preheated and separated at Anubhav Dairy, to obtain skim milk (0.10 per cent fat,

8.90 per cent MSNF) for carrying out both preliminary and experimental trials. The skim milk was pasteurized at 75°C for 15 s and stored at 4°C until used. WPC 80 was obtained from Charotar Casein Company, Firdosh Park, Barkosiya Road, Malharpura, Nadiad, Gujarat, India having a protein content of 80.30 per cent. Citric acid was supplied by Loba Chemie Pvt. Ltd, Mumbai and was used as a coagulant in *Chhana* making.

Preparation of *Chhana*

Control *Chhana* was prepared by the method given by David (2016) [4] with certain modifications. One and half lit of mixed milk was taken for each lot. It was filtered through muslin cloth. After filtration, mixed milk was standardized to 4.50±0.05 per cent fat and 8.50±0.05 percent MSNF with the help of skim milk using Pearson's Square method. Heating of standardized milk up to 95°C and allowed to cool to 75°C. To this, freshly prepared 0.50 per cent citric acid solution (75°C) was added as coagulant at the rate of 500 ml/lit. The coagulation was affected within one min by keeping the speed of stirring milk during addition of the coagulant at about 80 to 100 rpm and a greenish yellow tinge was observed in the whey. The final pH was recorded with the help of pH meter. The contents were allowed to stand for 2 to 3 min and then draining of whey was followed using a muslin cloth. The free whey was collected and *Chhana* so obtained was allowed for further draining till dripping of free whey completely ceased (i.e. approx. 25 to 30 min).

Experimental *Chhana* was prepared as similar to that of control *Chhana* with slight modifications. For preparing experimental *Chhana* samples, calculated quantity of WPC at different rates viz. 0.25, 0.50, 0.75, 1.00, 1.25 and 1.50 per cent ((w/w) of mixed milk) was blended with lukewarm milk (~ 20x its weight) at 35-40°C. It was then blended with mixed milk which was used for preparation of *Chhana* according to the method given above.

On completion of draining, immediately control and experimental *Chhana* were weighed and their samples were drawn as per the standard procedure described in Appendix D of BIS (2785-1979) [5] and subjected to compositional analysis.

Detail flow diagram for manufacturing of control as well as experimental *Chhana* is given Figure 1. The designations of control and experimental *Chhana* prepared from selected rates of WPC ((% w/w) of mixed milk) is presented in Table 1.

Table 1: Designations of control and experimental *Chhana* prepared from selected rates of WPC

Sr. No.	Rate of WPC ((%w/w) in mixed milk)	*Chhana*
i.	0.00	CC (Control)
ii.	0.25	C1
iii.	0.50	C2
iv.	0.75	C3
v.	1.00	C4
vi.	1.25	C5
vii.	1.50	C6

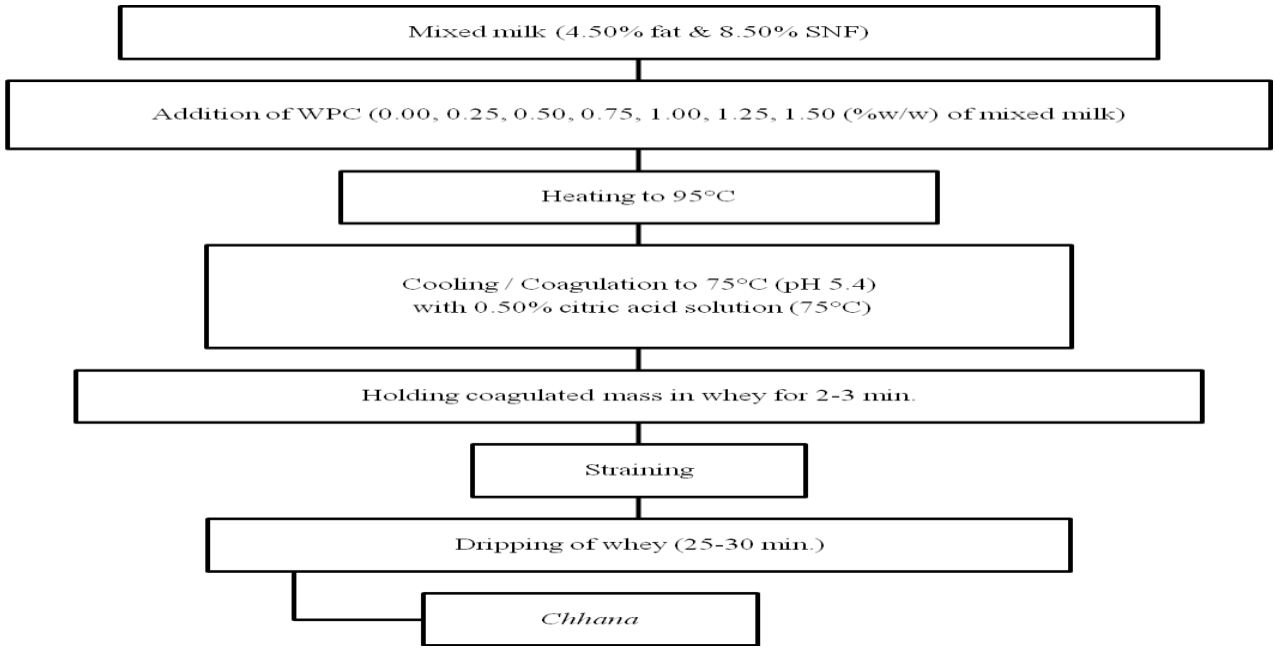

Fig 1: Flow diagram for manufacture of control as well as experimental *Chhana*

Analysis

Sample preparation

The representative samples of *Chhana* were drawn as prescribed in Appendix D of BIS (2785-1979) [5] for cheese (hard variety), processed cheese, processed cheese spread and soft cheese.

Compositional analysis

Fat, proteins, ash and moisture of *Chhana* samples were subjected to chemical analysis as per the method given in BIS (5162-1980) [6]. Whereas, lactose content of *Chhana* was determined by subtracting fat, proteins and ash content from the total solids content.

Sensory Evaluation of *Chhana*:

Chhana was cut in to cubes of approximately 25 g each. The *Chhana* samples were tempered to 10±2°C before judging. Sensory analysis of *Chhana* samples was conducted in isolated booths illuminated with incandescent light maintained at 23 ± 2 °C. Samples were served in petri dishes. The plates were labelled with three digit codes. The orders of presentation of samples were randomized across subjects. The sensory panel (n=10) was composed of staff members and post graduate students working in the institution. Panellists were instructed to use lukewarm water as rinsing agent as and when required. Overall acceptability of the *Chhana* as measured by the characteristics of the *Chhana* which are

colour and appearance, flavour, body and texture using the 9-point hedonic scale. Reliability and validity of the 9-point hedonic scale in the assessment of several hundred food items have been confirmed (Resurreccion, 2004) [7].

Statistical analysis

The mean values generated from the analysis of duplicate samples of *Chhana*, obtained in three replications were subjected to statistical analysis using completely randomized design (CRD) as per Steel and Torrie (1980) [8].

Results and Discussion

Effect of addition of WPC at different rates on yield, TS and fat recovery in *Chhana*

The average yield, TS recovery and fat recovery of *Chhana* as affected by varying rates of WPC in mixed milk is presented in Table 2.

A. Yield: The mean values of per cent yield varied from 16.25 (CC) to 22.23 (C6) (Table 2). The tabulated values showed that, the per cent yield of *Chhana* significantly (P≤0.05) increased with increasing the rate of WPC in mixed milk. It was also observed that, the yield of CC, C1 and C2 were at par (P>0.05) with each other. However, addition of WPC at greater rate than 0.50 (% w/w) of mixed milk resulted in significant (P≤0.05) increase in yield of experimental *Chhana* as compared to control *Chhana.*

This difference in yield can be mainly attributed to the higher moisture retention in the experimental samples (54.39 per cent in C1 to 62.31 per cent in C6) compared to control (52.36 per cent in CC) as described in (Table 2). No data were reported in the literature on the effect of addition of WPC in mixed milk on yield of *Chhana* for comparison with yield of experimental *Chhana.*

B. TS recovery: The mean values of per cent TS recovery of *Chhana* samples were 59.53 (CC) to 64.69 (C4) (Table 2).The tabulated values reveal that addition of WPC had a significant (P≤0.05) effect on the per cent TS recovery in experimental *Chhana* samples. Per cent TS recovery in CC was significantly (P≤0.05) lower than all experimental *Chhana* samples. The per cent TS recovery of C1, C2 and C3 was statistically at par (P>0.05). Then per cent TS recovery of C2, C3, C4, C5 and C6 was statistically at par (P>0.05). In addition, per cent TS recovery of C4 sample was significantly (P≤0.05) higher than control *Chhana* sample.

However, there was a significantly (P≤0.05) increase in per cent TS recovery of experimental sample, when WPC was added up to the rate of 1.00 (% w/w) of mixed milk as compared to control sample. In view of lack of information available in the literature on the per cent TS recovery of experimental *Chhana* as affected by addition of WPC in mixed milk, it was not possible to make comparison.

C. Fat Recovery : The range of mean values for the fat recovery of *Chhana* were 90.11 (CC) to 96.92 (C3) (Table 2).The tabulated values reveal that addition of WPC in mixed milk had a significant (P≤0.05) effect on the per cent fat recovery in experimental *Chhana*. The per cent fat recovery of all experimental *Chhana* were statistically at par (P>0.05) with each other and also significantly (P≤0.05) higher than control *Chhana* except C1 *Chhana* sample.

Published data on per cent fat recovery of experimental *Chhana* as affected by addition of WPC in mixed milk were not available for comparison. However, fat recovery of control *Chhana* obtained in this present investigation was found similar with reported by Sahu and Das (2009) [9].

Table 2: Effect of addition of WPC at different rates on yield, TS recovery and fat recovery of *Chhana*

Treatments	Yield (%)	TS recovery (%)	Fat recovery (%)
CC	16.25± 1.06^{e}	59.53±1.18^{c}	90.11±2.09^{b}
C1	17.63±1.45^{de}	61.85±1.16^{b}	93.83±2.13^{ab}
C2	18.36± 1.55^{cde}	62.76±1.20^{ab}	95.27±2.18^{a}
C3	19.53±2.18^{bcd}	63.92±1.17^{ab}	96.92±2.13^{a}
C4	20.49±1.45^{abc}	64.69±1.19^{a}	96.74±2.07^{a}
C5	21.50±1.83^{ab}	64.44±1.23^{a}	96.27±2.23^{a}
C6	22.23±0.70^{a}	64.36±1.22^{a}	95.00±2.21^{a}
SEm	0.88	0.68	1.24
CD (0.05)	2.68	2.09	3.76
CV (%)	7.87	1.89	2.27

Each observation is a mean ± SD of three replicate experiments (n=3); $^{a-f}$ Superscript letters following numbers in the same column denote significant difference (P<0.05)

Effect of addition of WPC at different rates on composition of *Chhana*

The average chemical composition of *Chhana* as affected by varying rates of WPC in mixed milk is presented in Table 3.

Table 3: Effect of addition of WPC at different rates on composition of *Chhana*

Treatments	Moisture (%)	Protein (%)	Fat (%)	Ash (%)	Lactose (%)
CC	52.36± 2.90^{e}	16.87±0.97	24.96±1.14^{a}	2.34±0.06^{a}	3.47±0.04^{a}
C1	54.39±1.98^{de}	16.32± 1.11	23.95±0.19^{ab}	2.14±0.05^{b}	3.20±0.05^{b}
C2	55.56±1.03^{cde}	16.00±0.97	23.35±1.11^{ab}	2.04±0.07^{c}	3.05±0.07^{c}
C3	57.45±1.66^{bcd}	15.43±0.50	22.33±0.92^{bc}	1.90±0.03^{d}	2.89±0.09^{d}
C4	59.16±2.05^{abc}	15.04±1.79	21.25±1.04^{cd}	1.80±0.05^{e}	2.75±0.01^{e}
C5	60.88±2.56^{ab}	14.64± 0.31	20.15±1.21^{de}	1.70±0.01^{f}	2.62±0.02^{f}
C6	62.31±2.34^{a}	14.28±0.38	19.23±0.35^{e}	1.64±0.03^{f}	2.54±0.04^{f}
SEm	1.24	0.57	0.54	0.02	0.03
CD (0.05)	3.77	NS	1.63	0.08	0.09
CV (%)	3.75	6.37	4.21	2.50	1.90

Each observation is a mean ± SD of three replicate experiments (n=3); NS = Non-significant at 5% level of significance; $^{a-f}$ Superscript letters following numbers in the same column denote significant difference (P<0.05)

A. Moisture: The average mean values of per cent moisture content of *Chhana* made with different rates of addition of WPC varied from 52.36 (CC) to 62.31 (C6) and presented in Table 3. Incorporation of WPC in mixed milk had significant (P≤0.05) effect on per cent moisture content of *Chhana*. The tabulated values show that per cent moisture content of *Chhana* samples CC, C1 and C2 were at par (P>0.05) with each other, that means there was no significant (P>0.05) increase in moisture of *Chhana* when WPC was added up to the rate of 0.5 (% w/w) of mixed milk. However, addition of WPC at greater than 0.50 (% w/w) of mixed milk resulted in significant (P≤0.05) increase in moisture of *Chhana* compare to CC sample.

The increase in moisture retention could in part be ascribed to the water binding ability of whey proteins. The denatured proteins in WPC are essentially insoluble, but had very high water binding capacity (Short *et al*., 1978) [10]. Thus, the increase in yield and moisture of experimental samples corroborates with reported literature as described in (Table 2). No scientific data were available in literature on effect of addition of WPC (in mixed) on moisture content of experimental *Chhana.* So, it was difficult to make comparison. However, the average values of per cent moisture content of control and experimental *Chhana* obtained in the present investigation were 52.36 (CC), 54.39 (C1), 55.56 (C2), 57.45 (C3), 59.16 (C4), 60.80 (C5), 62.31 (C6). These values of per cent moisture content of control and experimental samples of *Chhana* met FSSAI (2011) [11] and BIS (5162-1980) [6] requirements viz. maximum 70 per cent moisture and maximum 65 per cent moisture respectively. Thus addition of WPC at the rates studied, didn't affect the legal requirements with respect to per cent moisture content of *Chhana*.

B. Protein: As seen in Table 3, the range of mean values of per cent protein of different *Chhana* under study were 14.28 (C6) to 16.87 (CC). The per cent protein content of *Chhana* decreased with increasing rate of addition of WPC in mixed milk. However, this effect was very marginal and was found to be non-significant (P>0.05).

The average values of per cent protein content on dry matter basis obtained in the present investigation were 35.41 (CC), 35.78 (C1), 36.00 (C2), 36.27 (C3), 36.82 (C4), 37.43 (C5) and 37.89 (C6). These values of per cent protein content on dry matter basis of control and experimental samples of *Chhana* met BIS (5162-1980) [6] requirements viz. minimum 25 per cent on dry matter basis. Thus addition of WPC at different rates, didn't affect the legal requirements with respect to per cent protein content on dry matter basis of *Chhana*.

C. Fat: The average values of per cent fat content of *Chhana* varied from 19.23 (C6) to 24.96 (CC) made with different rates of addition of WPC were presented in Table 3. Incorporation of WPC in mixed milk showed significant (P≤0.05) effect on fat content of *Chhana.* Per cent fat content of *Chhana* samples CC, C1 and C2 were at par (P>0.05) with each other. Also, per cent fat content of C3 sample was statistically at par (P>0.05) with C1 and C2. Significant (P≤0.05) reduction in fat content of *Chhana* prepared with addition of WPC at greater rate than 0.50 (% w/w) of mixed milk per cent could be ascribed to higher moisture content of such samples owing to improved water binding capacity.

In view of lack of information available in literature on the fat content of experimental *Chhana*as affected by addition of WPC in mixed milk. However, average values of FDM (fat on dry matter basis) content of all *Chhana* samples were 52.39 (CC), 52.51 (C1), 52.54 (C2), 52.48 (C3), 52.03 (C4), 51.52 (C5) and 51.03 (C6). These values of FDM content of all the samples of *Chhana* met both FSSAI (2011) [11] and BIS (5162-1980) [6] requirements viz. minimum 50 per cent fat on dry matter basis. Hence, addition of WPC at the rates studied, didn't affect the legal requirements with respect to FDM.

D. Ash : Data of per cent ash content of *Chhana* samples made with imposition of different treatments were presented in Table 3, with the range of 1.64 (C6) to 2.34 (CC). There was significant (P≤0.05) difference in ash content of control and experimental *Chhana* found. The ash content of experimental samples significantly (P≤0.05) decreased with increasing the rate of addition of WPC from 0.25(C1) to 1.25 per cent (C5) (w/w) of mixed milk. While ash content of experimental sample C5 containing WPC 1.25 (% w/w) of mixed milk was at par (P>0.05) with C6 containing WPC 1.5 (% w/w) of mixed milk. In view of lack of information available in the literature on the ash content of *Chhana* as affect by addition of WPC in mixed milk, it was difficult to make comparison. However, the values of ash content of all experimental samples obtained in the present study were comparable with reported by Kumar and Shrinivasan (1982) [12].

The average value of ash content on dry matter basis were 4.91 (CC), 4.69 (C1), 4.59 (C2), 4.47 (C3), 4.41 (C4), 4.35 (C5) and 4.34 (C6). These values of ash content on dry matter basis of control and experimental samples of *Chhana* met BIS (5162-1980) [6] requirements viz. maximum 5.00 per cent ash on dry matter basis. Thus addition of WPC at the rates studied did not affect the legal requirements with respect to per cent ash on dry matter basis.

E. Lactose : The range of mean values of per cent lactose content of *Chhana* as affected by varying rates of WPC were 2.54 (C6) to 3.47 (CC) and also presented in Table 3. The experimental samples showed a significantly (P≤0.05) lower lactose content as compared to control *Chhana*. The lactose content of experimental samples decrease significantly (P≤0.05) with increasing rate of addition of WPC from 0.25(C1) to 1.25 per cent (C5) (w/w) of mixed milk. While lactose content of experimental sample C5 containing WPC 1.25 (% w/w) of mixed milk was at par (P>0.05) with sample C6 containing WPC, 1.50 (% w/w) of mixed milk. Published data on the per cent lactose as affected by addition of WPC in mixed milk were not available for comparison, however, the lactose content obtained for control sample in the present investigation was higher than the values reported by Sen and Rajorhia (1986) [13].

Effect of addition of WPC at different rates on sensory attributes of *Chhana*

Effect of addition of WPC at different rates on sensory attributes of *Chhana* from mixed milk is presented in Table 4.

Table 4: Effect of addition of WPC at different rates on sensory attributes of *Chhana*

Treatments	Sensory attributes			
	Body & texture	Flavour	Colour & Appearance	Overall acceptability
CC	8.23± 0.04[a]	8.27±0.11	8.29±0.08	8.54±0.037 [a]
C1	8.21±0.06 [a]	8.30±0.04	8.31±0.04	8.52±0.43 [a]
C2	8.05±0.05 [a]	8.32±0.08	8.33±0.07	8.37±0.25 [a]
C3	8.00±0.09 [a]	8.34±0.29	8.33±0.26	8.27±0.36 [a]
C4	7.98±0.49 [a]	8.33±0.09	8.34±0.29	8.22±0.34 [a]
C5	7.44±0.05[b]	8.32±0.22	8.33±0.20	7.99±0.05 [b]
C6	6.89±0.47[c]	8.31±0.08	8.32±0.12	7.97±0.10 [b]
SEm	0.152	0.090	0.103	0.126
CD (0.05)	0.463	NS	NS	0.385
CV (%)	3.37	1.880	2.160	2.65

Each observation is a mean ± SD of three replicate experiments (n=3); [a-f] Superscript letters following numbers in the same column denote significant difference (P<0.05)

A. Body and texture score: It could be seen from Table 4 that, body and texture scores of control and experimental *Chhana* ranged from 8.23 (CC) to 6.89 (C6**).** Addition of WPC at different rates shows significant (P≤0.05) effect on the body and texture score of *Chhana* samples. However body and texture score of control sample (CC) and experimental samples (C1 to C4) has non significant (P>0.05) effect. While body and texture score of C5 and C6 samples were significantly (P≤0.05) lower than control sample (CC).

B. Flavour score: Flavour score of control and experimental *Chhana* was ranging from 8.27 (CC) to 8.34 (C3). However, there were non-significant (P>0.05) effect of addition of WPC at different rate in mixed milk to be found on flavour score of control and experimental *Chhana*.

C. Colour and appearance score: It could be seen from tabulated values (Table 4) that the sensory score for colour and appearance varied from 8.29 (CC) to 8.34 (C4). The color and appearance scores of control and experimental *Chhana* were differ non-significantly (P>0.05).

D. Overall acceptability: The score for overall acceptability of *Chhana* samples were depicted in Table 4. Overall acceptability score for *Chhana* samples varied from 8.54 (CC) to 7.97 (C6). There were significant (P≤0.05) effect observed on overall acceptability of *Chhana* samples with increase in rate of WPC in mixed milk. The total score of CC (control sample) and experimental sample C1, C2, C3 and C4 were statistically at par (P>0.05) with each other. While overall acceptability score of experimental sample C5 and C6 were significantly (P≤0.05) lower than control sample (CC).

Based on the above findings, it was concluded that, control and experimental *Chhana* prepared with different rate of WPC had non-significant (P>0.05) effect on flavour as well as colour & appearance score. While body & texture as well as overall acceptability score of CC, C1,C2, C3, and C4 were statistically at par (P>0.05) with each other, whereas score of C5 and C6 samples were significantly (P≤0.05) lower them all.

Chemical composition of control and all experimental samples of *Chhana* met both FSSAI (2011) [11] and BIS (5162-1980) [6] requirements. Hence, addition of WPC at the different rates in mixed milk, didn't affect the legal requirements with respect to chemical composition. However, body & texture as well as overall acceptability score of CC, C1,C2, C3, and C4 were statistically at par (P>0.05) with each other. Whereas yield, TS recovery and fat recovery of sample C3 and C4 samples were statistically at par (P>0.05) with each other, but significantly (P≤0.05) higher than CC. Thus, it was decided to adopt experimental *Chhana* samples – C3 and C4, prepared from 0.75 per cent and 1.0 per cent WPC (w/w) of mixed milk respectively as optimized products, but as *Chhana* is intermediate products so among C3 and C4 sample most acceptable optimized product will depend upon the end use.

Estimation of raw material cost for production of optimized *Chhana*

An attempt was made to determine the approximate cost of raw materials for preparation of control (CC) and experimental samples (C3 and C4) as shown in Table 5.

Table 5: Estimated cost of raw materials required for 1.00 kg of optimized *Chhana*

Ingredients	Rate (`/kg)	CC		C3		C4	
		Quantity (g)	Cost (`)	Quantity (g)	Cost (`)	Quantity (g)	Cost (`)
Milk	42	1000	42	1000	42	1000	42
Citric acid	120	2.50	0.30	2.50	0.30	2.50	0.30
WPC 80	750	-	-	7.50	5.62	10	7.50
Raw material cost		1002.50	42.30	1010	47.92	1012.5	49.80
Yield of *Chhana* (g/kg mixed milk)		162.50	42.30	195.30	47.92	204.90	49.80
Cost of 1kg *Chhana*		1000	260.30	1000	245.36	1000	243.04

CC= *Chhana* prepared from 0.00 (%w/w) of mixed milk (control sample); C3= *Chhana* prepared from 0.75 (%w/w) of mixed milk C4= *Chhana* prepared from 1.0 (%w/w) of mixed milk; WPC 80: Whey Protein Concentrate 80;

The processing and packaging cost for *Chhana* remained same for control (CC) and experimental *Chhana* samples C3 and C4. The raw material cost for experimental sample C3 and C4 were 245.36 and 243.04 `/kg respectively while, raw material cost for CC *Chhana* sample 260.30 `/kg. The experimental *Chhana* sample C3 and C4 cheaper by were 14.94 and 17.26 `/kg respectively than control *Chhana* (CC). In other words cost of experimental *Chhana* sample C3 and C4 were 5.73 and 6.63 per cent respectively less than cost of control *Chhana* (CC).

Conclusion

It is concluded from the present investigation that, good quality of *Chhana* with higher yield and less prize can prepared from 0.75 per cent and 1.0 per cent WPC (w/w) of mixed milk respectively as optimized products, but as *Chhana* is intermediate products so among two products most acceptable optimized product will depend upon the end use.

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