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Yield and quality characteristics of *paneer* made from milk blend containing homogenized milk

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ABSTRACT

The research was carried out to ascertain the feasibility of preparing *paneer* from milk blend containing low pressure homogenized milk to avail the benefits rendered by homogenization. Standardized milk was subjected to two-stage homogenization (4.90 and 0.98 MPa respectively) and then blended with unhomogenized standardized milk in three proportions (i.e. 3:7, 4:6 and 1:1, w/w). It was necessary to add calcium chloride to the milk blend to improve the firmness of resultant *paneer.* The experimental *paneer* samples obtained from 'milk blend' containing homogenized milk, as well as control sample (only from unhomogenized milk) were studied for their proximate composition, physico-chemical characteristics, textural properties and sensory quality. *Paneer* obtained from milk blend (homogenized:unhomogenized; 4:6 w/w) resulted in greater fat recovery and moisture content culminating in significantly higher yield compared to control *paneer* (CP). The hardness of *paneer* obtained from blended milks was lower, but the springiness of BMP3:7 sample was greater than that of CP. The total sensory score of experimental *paneer* BMP4:6 was similar to the score associated with CP, but greater than the scores associated with *paneer* samples BMP3:7 and BMP1:1. Blending of homogenized (low pressure) milk with unhomogenized milk in 4:6 proportion helped in obtaining *paneer* with superior fat recovery and yield compared to use of unhomogenized milk, without any adverse effect on sensory properties and with concomitant cost savings.

Key words: Composition, Low pressure homogenization, Milk solids recovery, *Paneer*, Sensory quality, Textural properties.

INTRODUCTION

Paneer is a South Asian variety of non-fermentative, non-renneted, non-melting and unripened type of soft cheese obtained by acid and heat coagulation of milk. *Paneer* is highly nutritious and wholesome food as it contains high amount of milk fat, protein, minerals along with moderate amount of vitamins and other minor nutrients. *Paneer* is considered to be a rich source of animal protein for the vegetarian people, having a high biological value ranging between 80.38 and 86.56 (Shrivastava and Goyal 2007). Now-a-days *paneer* has spread throughout the world rather than being limited to south Asian regions (Aneja *et al.* 2002).

Paneer is prepared by coagulation of heated milk with organic acids (*viz.* citric acid, lactic acid, tartaric acid, sour whey), drainage of whey and subsequent pressing of the coagulum to attain desired block shape and moisture content (about 50.0 to 55.0 %). The recovery of fat, protein and Total solids (TS) in *paneer* is reported to vary from 81.5-92.9, 84.1-92.0 and 52.3-61.1 % respectively (Bhattacharya *et al.* 1971, Vishweshwaraiah and Ananthakrishnan 1985, Chandan 2007, Sahu and Das 2010, Khan *et al.* 2012). *Paneer* retains about 50.0 % of minerals and 10.0% of lactose originally present in milk (Rao *et al.* 1992).

In the preparation of cheese (especially soft varieties), homogenization of milk has resulted in improvement in the appearance (whiter and glossy) of product, enhanced the fat recovery and moisture content leading to increased yield of product (Jana and Upadhyay 1992). The fat recovery in Queso Blanco cheese (unaged white cheese) made from unhomogenized and homogenized (pressure of 6.86 MPa) milks (3.68 % milk fat) has been reported to be 69.81 and 86.90 % respectively. The protein and TS recoveries for control cheese was reported to be 87.62 % and 50.99 % respectively; such values for homogenized milk cheeses were 89.84 % and 57.88 % respectively (Parnell-Clunies *et al.* 1985). Vishweshwaraiah and Ananthakrishnan (1985) reported that homogenization of cow milk improved the yield and sensory quality of *paneer;* however detailed study was not carried out. In fact, homogenization of milk would be of significance in the manufacture of 'low-fat' *paneer,* which suffers from hard and chewy body owing to reduced moisture content and increased casein-casein interaction. However, Chawla *et al.* (1985) did not notice any improvement in the quality of 'low-fat' *paneer* prepared from milk subjected to homogenization treatment.

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There is absence of detailed scientific study (i.e. milk solids recovery, textural properties, sensory quality) in literature on the use of homogenized milk in the manufacture of *paneer*. Use of homogenized milk per se for *paneer* making did not give fruitful result, especially owing to inferior physical characteristics. Hence, the research work was planned with the objective of ascertaining the feasibility of using low pressure homogenization and blending such milk with unhomogenized milk in the preparation of *paneer* with advantages usually associated with the use of homogenized milk (recovery of milk constituents, yield, colour, flavor).

MATERIALS AND METHODS

Mixed milk (cow and buffalo milk) procured from Anubhav Dairy, Anand Agricultural University, Anand was used to prepare *paneer*. Whole milk was separated to obtain cream (40-45% fat) and skim milk (0.1 % fat). The skim milk was pasteurized at 75°C/ no hold, cooled to 4 °C and used for standardizing milk for *paneer* making. Anhydrous citric acid was obtained from M/s. Loba Chemie Pvt. Ltd., Mumbai while calcium chloride (dihydrate) was obtained from M/s. Merck Ltd., Mumbai.

Preparation of *paneer*: The *paneer* was prepared following the method of Chawla *et al*. (1985) with certain modifications. The milk filtered through a clean muslin cloth was standardized to 4.5% fat. The milk used for control *paneer* (CP) was directly heated to 82°C, held for 5 min. and subsequently cooled to 70°C for coagulation. The experimental milks standardized to 4.5 % fat were preheated to 65°C and then subjected to two stage homogenization (i.e. 4.90 and 0.98 MPa pressure in first and second stage respectively). For preparation of *paneer* from blended milks, milk homogenized as mentioned earlier was blended with unhomogenized standardized milk at predetermined proportions (i.e. homogenized: unhomogenized milk; 3:7, 4:6 and 1:1 w/w). Calcium chloride ($CaCl_2$) was added at the rate of 0.005 % w/w to the 'milk blends' only which facilitated firm coagulum. The 'milk blends' were also heated to 82°C and held for 5 min. before cooling to 70°C.

Paneer was prepared by coagulating the milk at 70°C (in all cases) using 1.0% citric acid solution at the same temperature as milk (i.e. 70°C), followed by whey drainage, hooping and pressing of curd, and finally immersing the blocks of *paneer* in pasteurized chilled water. The *paneer* blocks removed from the wrapped muslin cloth were drained of free water and then stored at refrigeration temperature. For each treatment, 3.0 kg of milk was used to prepare *paneer* product.

ANALYSES

Physico-chemical analysis: The standardized milk was analyzed for fat (BIS 1977), protein (Jayaraman 1981) and TS content (Milk Industry Foundation 1959) using standard methods.

The *paneer* samples were analysed for moisture content using Mojonnier milk tester (Milk Industry Foundation 1959), fat content by Van Gulic method (BIS 1979), total nitrogen content by semi micro Kjeldahl method (Jayaraman 1981), and ash content and titratable acidity using standard method (BIS 1961). The pH of *paneer* was determined by the method described by O' Keefe *et al.* (1976).

Texture profile analysis: The compression (40.0 % compression relative to initial height of *paneer* sample) testing of tempered (23±1°C) cubic *paneer* samples (2.00 ± 0.06 cm) was carried out using Food Texture Analyser (M/s. Lloyd Instrument, Model 1000, LRX, England; Sr. No. 160374) using 5.0 KN (Kilo Newton) load-cell at cross head speed of 50 mm/min. The textural measurement of *paneer* samples was performed at 23±1°C temperature and 55.0±1% relative humidity (RH). Textural parameters such as hardness, cohesiveness, springiness and adhesiveness were noted from the tabulated results displayed in the screen of the computer, while gumminess and chewiness were calculated (Voisey 1976). Five cubic samples of *paneer* for each treatment under study were analyzed for texture and the average of these reading was reported.

Sensory scoring of product: The panel of judges for sensory evaluation of *paneer* comprised of eight persons who were selected on the basis of duo-trio test (Clark *et al*. 2009). The *paneer* samples were evaluated using the score card specified for *paneer* by BIS (2003) and scored out of 100.

Statistical analysis: The mean values of each attribute under study obtained from duplicate samples of five replications were subjected to statistical analysis using 'Completely Randomized Design' (CRD) with equal number of observations (Steel and Torrie 1980).

RESULTS AND DISCUSSION

Paneer was prepared from control milk (unhomogenized) and milk blends (homogenized: unhomogenized – 3:7, 4:6 and 1:1 w/w) to gain some of the advantages resulting from use of milk homogenization in directly acidified cheeses. The standardized milk used for *paneer* making had 4.59% fat, 3.56% protein and 13.75% TS.

For study purpose, most of the parameters such as fat content of standardized milk (4.59%), heating temperature of milk (82°C for 5 min.), homogenization temperature and pressure (65°C, 4.90 and 0.98 MPa pressure at first and second stage respectively), strength of citric acid solution (1.0 %) and milk coagulation temperature (70°C) were kept constant. Since use of homogenization treatment impairs the body and texture of full-fat *paneer*, such treatment is never being adopted at commercial level. The dicing property is one important property of *paneer* which requires the product to be firm (Kumar 2014). It was assumed that blending of homogenized milk with unhomogenized milk would improve the physical properties of *paneer*, at the same time enable

obtaining some advantages accrued upon milk homogenization. The advantages anticipated were whiter color of *paneer*, improved flavor owing to better dispersion of fat globules in *paneer* matrix and increase in the milk solids recovery with concomitant increase in yield of *paneer*. Hence, it was decided to prepare full-fat *paneer* from milk blend containing homogenized milk subjected to low pressure homogenization. The homogenized milk was blended with unhomogenized milk in three proportions (i.e. 3:7, 4:6 and 1:1 w/w) and the *paneer* made thereof were designated as BMP3:7, BMP 4:6 and BMP1:1 respectively. The *paneer* made solely from unhomogenized milk was designated as control *paneer* (CP).

Volume of coagulant, coagulum characteristics during *paneer* preparation: Since the *paneer* obtained from milk blend containing homogenized milk was softer than that obtained from unhomogenized milk, it was necessary to add 0.005% $CaCl_2$ to the milk blends. Use of $CaCl_2$ at higher level (0.01% by weight of milk) produced *paneer* coagulum having less cohesion hence use of such higher level was discouraged. Sachdeva *et al.* (1991) recommended addition of 0.08% $CaCl_2$ to cow milk to obtain *paneer* having compact, sliceable, firm, cohesive body and a closely knit texture. Addition of $CaCl_2$ is a usual practice in preparation of cheeses from cow milk (Wolfschoon-Pombo 1997). The presence of cow milk in the milk blend and the homogenization treatment led to softer coagulum formation during *paneer* making.

It is worth mentioning that the quantity (volume) of coagulant required was greater in case of *paneer* made using 4:6 and 1:1 milk blends as compared to control (unhomogenized) milk. The volume of citric acid (1.0 % solution) required to coagulate 1 kg standardized milk was 163.33, 163.33, 168.33 and 173.33 ml for *paneer* samples CP, BMP3:7, BMP4:6 and BMP1:1 respectively. Chawla *et al*. (1985) also noted higher requirement of coagulant when using homogenized cow milk for *paneer* making as against use of unhomogenized milk. The pH of whey during milk coagulation was 5.41, 5.28, 5.16 and 5.01 respectively when preparing *paneer* samples CP, BMP3:7, BMP4:6 and BMP1:1.

Proximate composition of *Paneer*: The values tabulated in Table 1 indicated that all the *paneer* samples (i.e. control and experimental ones) conformed to the compositional standards prescribed by Food Safety and Standards Act (FSSA) (i.e. maximum 60.0 % moisture and minimum 50.0 % fat on dry matter [FDM]) (FSSA 2017). The moisture, protein, lactose and ash content of *paneer* samples were significantly ($P \leq 0.05$) affected by the use of homogenization pre-treatment, even when such homogenized milks were blended with untreated milk. The pH of *paneer* samples was also significantly ($P \leq 0.05$) affected (Table 1) by the presence of homogenized milk in the milk blend for *paneer* preparation. The titratable acidity of *paneer* samples remained unaffected by the use of homogenized milk in the milk blend for *paneer* making. The moisture content of *paneer* samples BMP4:6 and BMP1:1 was significantly ($P < 0.05$) greater than that of control *paneer* (CP) (Table 1). However, the *paneer* made from milk blend containing least amount of homogenized milk (BMP3:7) had moisture content that was at par with that of CP. Even though the FDM content of *paneer* obtained from milk blend was comparatively higher than that of CP, the difference was found to be non-significant (Table 1).

An increase in the moisture content of homogenized milk *paneer* or in case of homogenized milk soft cheese over that of unhomogenized milk counterpart is already reported (Chawla *et al.* 1985, Parnell-Clunies *et al.* 1985, Jana and Upadhyay 1992). The highest protein content was associated with control *paneer* (i.e. 18.66 % in CP) which was significantly ($P \leq 0.05$) greater than the protein content of all the blended milk *paneer* (i.e. 17.58 – 17.63 %). The least pH (i.e. 5.91) was observed for CP which differed significantly ($P \leq 0.05$) from the values associated with rest of the *paneer* samples. Amongst *paneer* prepared from milk blends containing homogenized milk, sample BMP4:6 had the least pH value (i.e. 5.96). However, all the *paneer* samples made from milk blends containing homogenized milk had pH values that were at par with each other (Table 1).

Recovery of milk solids and yield of *paneer*: The fat recovery associated with all the *paneer* samples prepared

Table 1: Influence of incorporating homogenized milk in the milk blend on the physico-chemical properties of *paneer.*

Parameters	CP	BMP 3:7	BMP 4:6	BMP 1:1
Moisture (%)	53.26±0.45^a	54.39±0.98^{ab}	54.96±0.52^b	55.26±1.05^b
Fat (%)	23.70±0.58^a	23.57±0.66^a	23.50±0.34^a	23.12±0.70^a
FDM (%)	50.70±1.25^a	51.68±1.25^a	52.16±0.77^a	51.67±0.74^a
Protein (%)	18.66±0.35^a	17.63±0.74^b	17.60±0.45^b	17.58±0.39^b
Lactose (%)	2.49±0.01^a	2.49±0.05^a	2.26±0.05^b	2.30±0.08^b
Ash (%)	1.89±0.06^a	1.92±0.05^a	1.68±0.06^b	1.74±0.05^b
Acidity (%LA)	0.478±0.03^a	0.460±0.008^a	0.449±0.006^a	0.459±0.006^a
pH	5.71±0.04^a	5.77±0.015^b	5.76±0.01^b	5.78±0.02^b

3:7, 4:6 & 1:1 are proportion of homogenized and unhomogenized milk in milk blend; Figures placed after ± indicates standard deviation, Differing letters as superscript in the same row indicate significant difference at $P<0.05$, FDM – Fat on dry matter, LA – Lactic acid, CP – Control *Paneer*, BMP – Blended milk *paneer.*

from 'milk blend' (i.e. BMP3:7, BMP4:6 and BMP1:1) containing homogenized milk was significantly (P≤0.05) greater when compared to the fat recovery of CP (Table 2). BMP3:7 and BMP1:1 had fat recovery value which was within the recovery values reported for *paneer* samples BMP4:6 and CP. The protein recovery of all the *paneer* samples (including control) was at par with each other (Table 2).

Paneer prepared from milk blends (especially BMP4:6 and BMP1:1 w/w) exhibited significantly (P≤0.05) greater yield as compared to CP. The yield (kg product/100 kg milk) of *paneer* was statistically similar for the products prepared from any combination of milk blend containing homogenized milk (Table 2). Amongst the experimental *paneer* samples, product BMP4:6 registered the highest yield (19.21 %) possibly owing to the significantly(P≤0.05) higher moisture content (Table 1) as well as fat recovery (Table 2) associated with such sample as compared to CP.

Homogenization of milk has proved advantageous in enhancing the recovery of milk solids (especially milk fat recovery) in soft cheeses (Parnell-Clunies *et al.* 1985, Jana and Upadhyay1992). Vishweshwaraiah and Anantakrishnan (1986) reported TS recovery of 62.98% for *paneer* prepared from 4.5% fat standardized milk. TS recovery ranging from 63.0-67.0% has been reported for *paneer* prepared from buffalo milk (Chandan 2007). A decrease in milk solids loss in whey has been reported by Chawla *et al.* (1985) and Mangale *et al.* (1995) when preparing *paneer* from homogenized buffalo milk. A TS recovery of 60.05 % has been noted for buffalo milk *paneer* prepared from unhomogenized milk (Kumar *et al.*, 2008).

Textural characteristic of paneer: The textural properties of *paneer* samples as affected by the presence of homogenized milk in the milk blend are depicted in Table 3. The hardness and springiness is of particular significance for *paneer* since the firmness (hardness) of product decides its cutting/slicing ability, while the inherent elasticity of *paneer* can be construed with its springiness character.

Paneer is reported to have characteristic spongy character (Sindhu 1996). Sample CP had significantly (P≤0.05) higher values for hardness, cohesiveness, gumminess

Table 2: Influence of preparing *paneer* from milk blend containing homogenized and unhomogenized milks on the recovery of milk solids and yield of *paneer.*

Parameters	CP	BMP 3:7	BMP 4:6	BMP 1:1
Yield (kg cheese/100 kg milk)	17.99±0.36^{a}	18.83±0.69^{ab}	19.21±0.49^{b}	19.16±0.63^{b}
Fat recovery (%)	92.78±2.24^{a}	96.64±1.89^{b}	98.38±1.70^{b}	96.51±0.93^{b}
Protein recovery (%)	94.34±1.99^{a}	94.01±1.42^{a}	95.12±1.51^{a}	95.54±1.10^{a}

CP – Control paneer, BMP – *Paneer* from blended milk; 3:7, 4:6 & 1:1 are proportion of homogenized and unhomogenized milk in milk blend; Figures placed after ± indicates standard deviation; Differing letters as superscript in the same row indicate significant difference at P<0.05.

Table 3: Influence of using milk blend containing homogenized milk on the textural properties of *paneer.*

Parameters	CP	BMP 3:7	BMP 4:6	BMP 1:1
Hardness (N)	13.66±0.70^{a}	11.85±0.73^{b}	11.75±0.74^{b}	11.35±0.55^{b}
Cohesiveness	0.408±0.005^{a}	0.386±0.008^{b}	0.363±0.008^{c}	0.355±0.007^{c}
Springiness (mm)	5.56±0.02^{a}	5.65±0.06^{b}	5.54±0.07^{a}	5.16±0.04^{d}
Gumminess (N)	557.33±35.99^{a}	457.41±36.96^{b}	426.52±36.16^{bc}	402.92±24.08^{c}
Chewiness (N-mm)	30.98±2.04^{a}	25.84±2.02^{b}	23.63±2.14^{c}	20.79±1.39^{c}
Adhesiveness (N-mm)	1.62±0.1^{a}	1.60±0.045^{a}	1.66±0.037^{a}	1.62±0.08^{a}

CP – Control *paneer*, BMP – *Paneer* from blended milk; 3:7, 4:6 & 1:1 are proportion of homogenized and unhomogenized milk in milk blend; Figures placed after ± indicates standard deviation; Differing letters as superscript in the same row indicate significant difference at P<0.05.

Table 4: Effect of incorporation of homogenized milk in milk blend on the sensory score of *paneer.*

Sensory attributes	CP	BMP 3:7	BMP 4:6	BMP 1:1
Colour & Appearance (10)	8.69±0.59^{a}	8.50±0.43^{a}	8.55±0.43^{a}	8.60±0.20^{a}
Flavour (50)	43.88±0.85^{a}	43.50±0.91^{a}	43.00±0.91^{a}	42.38±0.85^{b}
Body & texture (35)	29.88±1.11^{a}	28.06±0.65^{bc}	29.38±0.85^{ab}	27.88±1.1^{c}
Package (5)	5.0^{a}	5.0^{a}	5.0^{a}	5.0^{a}
Total score (100)	87.45±1.62^{a}	85.06±0.43^{b}	85.93±1.46^{a}	83.86±1.79^{b}

CP – Control *paneer*, BMP – *Paneer* from blended milk; 3:7, 4:6 & 1:1 are proportion of homogenized and unhomogenized milk in milk blend; Figures placed after ± indicates standard deviation; Differing letters as superscript in the same row indicate significant difference at P<0.05; Full score of 5.0 for package has been given to all *paneer* samples.

and chewiness as compared to any of the *paneer* samples prepared using 'milk blend'. In terms of cohesiveness and chewiness, the *paneer* sample BMP3:7 showed significantly ($P<0.05$) greater values when compared with samples BMP4:6 and BMP1:1 (Table 3); the latter two *paneer* samples had cohesiveness and chewiness values that were at par with each other. A significant ($P < 0.05$) difference in the gumminess values was noted when *paneer* samples CP and BMP3:7 as well as samples BMP3:7 and BMP1:1 was compared with each other (Table 3). The springiness of sample BMP3:7 was significantly ($P<0.05$) greater than the springiness value associated with CP; sample CP and BMP4:6 had similar springiness values (Table 3). *Paneer* sample BMP1:1 had the least springiness value (i.e. 5.16 mm) which was significantly ($P<0.05$) lower when compared to such value associated with any of the rest three *paneer* samples. The higher value of springiness associated with BMP3:7 (i.e. 5.65 mm) is considered to be a positive aspect of *paneer* (Table 3).

Homogenization of milk is reported to favour association of casein micelles and whey proteins with the fat globule membrane (Michalski *et al.* 2002). The interaction between fat and proteins as a result of milk homogenization leads to reduced curd firmness (Tunick *et al.* 1993). Since homogenization of milk is reported to impair the curd forming properties, the textural parameters of *paneer* made from blended milks usually tended to be lower (except for springiness for samplesBMP3:7 and BMP4:6) when compared with such values associated with CP. The higher moisture and FDM content (Table 1) of *paneer* made from blended milks must have led to such difference in the textural properties between CP and the experimental *paneer* samples.

Sensory characteristics of *Paneer*: *Paneer* must have a characteristic blend of flavour of heated milk and acid, i.e. pleasant, mildly acidic and sweet (nutty). The body and texture of *paneer* must be cohesive and sufficiently firm to hold its shape during cutting/slicing, yet it must be tender enough not to resist crushing during mastication (i.e. compact and smooth) (Desai 2007). According to Prince *et al.* (2007) a typically good quality *paneer* should have marble white appearance, a slight spongy body, close-knit texture and sweetish-acidic-nutty flavour.

Based on the result of sensory evaluation, *paneer* samples CP, BMP3:7 and BMP4:6 had equally good flavor rating which was significantly ($P\leq0.05$) higher than the score associated with *paneer* sample BMP1:1 (Table 3). The colour and appearance score and package score of *paneer* remained unaffected by the presence of homogenized milk in the milk blend used for *paneer* making. *Paneer* sample BMP1:1 had the least flavour score (42.38 out of 50.00; Table 4) which implied that presence of homogenized milk in the milk blend did not improve the flavour quality of resultant *paneer* as is the case with soft cheeses prepared from homogenized milk. Chawla *et al.* (1985) also reported that homogenization of low-fat milk did not improve the flavour of resultant *paneer*. However, all the *paneer* samples had flavour score exceeding 84% which is indicative of 'good quality' as per BIS (2003) grading.

Control sample CP was perceived to be firm, cohesive and having a close-knit texture as required for ideal *paneer*, while blended milk *paneer* tended to be softer and in few instances tended to be slightly pasty (especially sample BMP1:1). *Paneer* samples CP and BMP4:6 had significantly ($P<0.05$) superior body and texture scores as compared to rest of the *paneer* samples; the former two samples had body and texture score that was at par with each other (Table 4). *Paneer* samples CP and BMP4:6 had total sensory scores that were at par with each other (Table 4). These two *paneer* samples had total sensory score that was significantly ($P<0.05$) greater than the scores associated with samples BMP3:7 and BMP1:1 (Table 4).

Chawla *et al.* (1985) reported that use of homogenized buffalo milk or even use of homogenized buffalo skim milk mixed with unhomogenized cream (to obtain standardized milk) did not help in improving the flavour of low-fat *paneer*. However, Vishweshwaraiah and Anantakrishnan (1985) noted some improvement in the sensory quality of *paneer* prepared from homogenized milk.

Amongst *paneer* samples produced from milk blend containing homogenized milk, BMP4:6 (homogenized milk:unhomogenized milk, 4:6 w/w) yielded *paneer* that had superior fat recovery, per cent yield compared to control *paneer*; the springiness property and total sensory score were similar to those of control *paneer*. Thus, blending of homogenized milk with unhomogenized milk in 40:60 proportion with external addition of $CaCl_2$ @ 0.005% by weight of milk is recommended for *paneer* making.

CONCLUSION

An increase in the proportion of standardized homogenized milk blended with unhomogenized standardized milk led to favourable increase in the fat recovery and per cent yield of *paneer*. However, incorporation of homogenized milk in the milk blend led to some impairment in few textural properties of resultant product. In order to reap the benefits of milk homogenization, it is advisable to prepare *paneer* from milk blend (homogenized: unhomogenized milk; 4:6 w/w) comprising of standardized milk (4.5% fat) homogenized at low (4.90 and 0.98 MPa in a two stage homogenizer) pressure.

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