

# Effect of source of milk on yield and chemical composition of Chhana and Rasagulla

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**Abstract:** The effect of source of milk on the yield and composition of *Chhana* and *Rasagulla* were studied. Highest yield of *Chhana* was observed in Buffalo milk (19.8 %) as compared to Cow (15.9%) and Goat milk (15.9%). Buffalo milk *Chhana* had shown higher protein (16.44 %), fat (29.72 %) and ash content (2.30 %) as compared to Cow (14.84, 24.84, and 1.94 %) and Goat milk *Chhana* (14.58, 25.84, and 1.98 %). The moisture content was significantly lower in Buffalo milk *Chhana* than Cow and Goat milk *Chhana*. The effect of source of *Chhana* on yield and chemical composition of *Rasagulla* was also carried out. Higher yield of *Rasagulla* was observed from Buffalo milk *Chhana* (18.56 %) followed by Goat milk *Chhana* (17.51 %) and Cow milk *Chhana* (16.35 %). Buffalo milk *Rasagulla* had shown higher protein (5.52 %), fat (6.51 %) and ash content (2.92 %) as compared to Cow milk *Rasagulla* (4.76, 4.94, and 2.51 %) and Goat milk *Rasagulla* (4.84 and 5.04 %).

**Key words:** *Chhana*, *Rasagulla*, Buffalo milk, Cow Milk and Goat Milk, yield, and fat, SNF

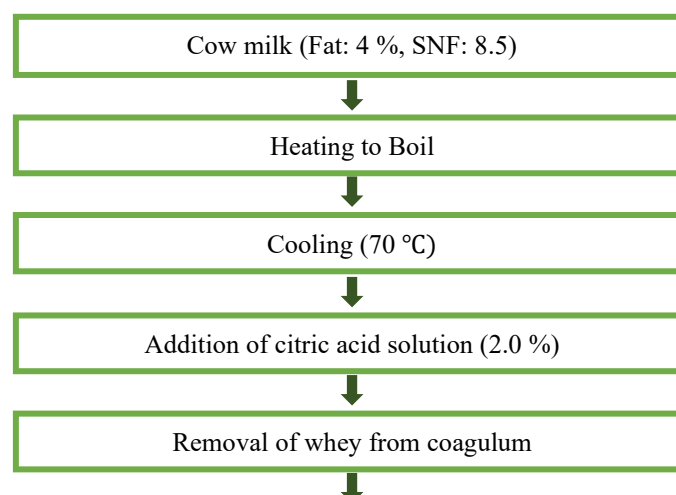
## I. INTRODUCTION

Cow milk is generally preferred for preparation of Chhana and Rasagulla than buffalo and other species milk as it produces soft, sponge and juicy Rasagulla. However, the share of milk production from buffaloes is second highest in India after cow milk. But utilisation of buffalo and other species milk for production of Rasagulla is limited even though these milks are nutritionally rich with therapeutic benefits. The reason for not being utilised the buffalo milk for Chhana and Rasagulla preparation is because of its inherent physico-chemical characteristics associated with buffalo milk, which results in poor quality Chhana and Rasagulla with an acceptable sensory score and textural values. Therefore, in this investigation an attempt has been made to understand the effect of different milk source on yield and chemical composition of Chhana and Rasagulla using buffalo milk and goat milk. in comparison with cow milk Rasagulla as standard.

## II. MATERIALS AND METHODS

Milk: Cow milk, Buffalo milk and Goat milk, Citric acid, Sugar, Steel utensils and Muslin cloth

### Methods



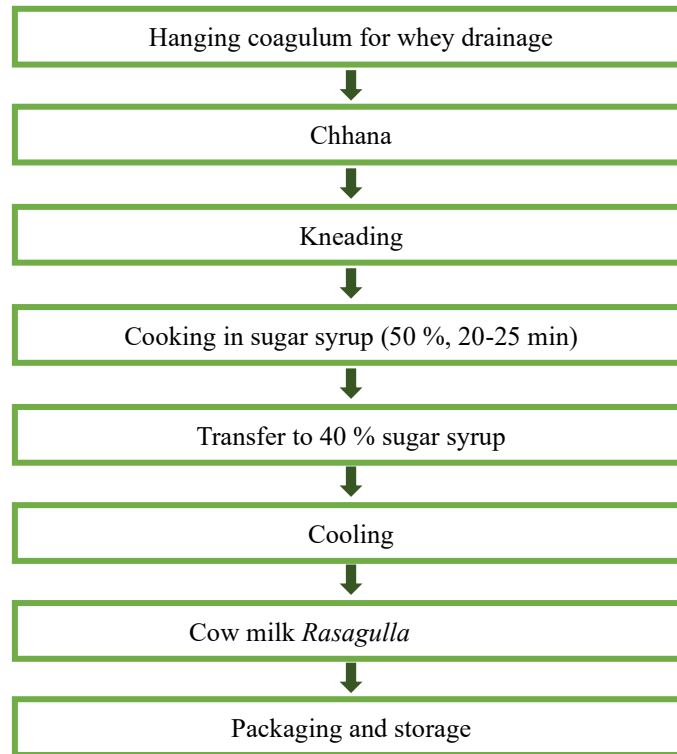
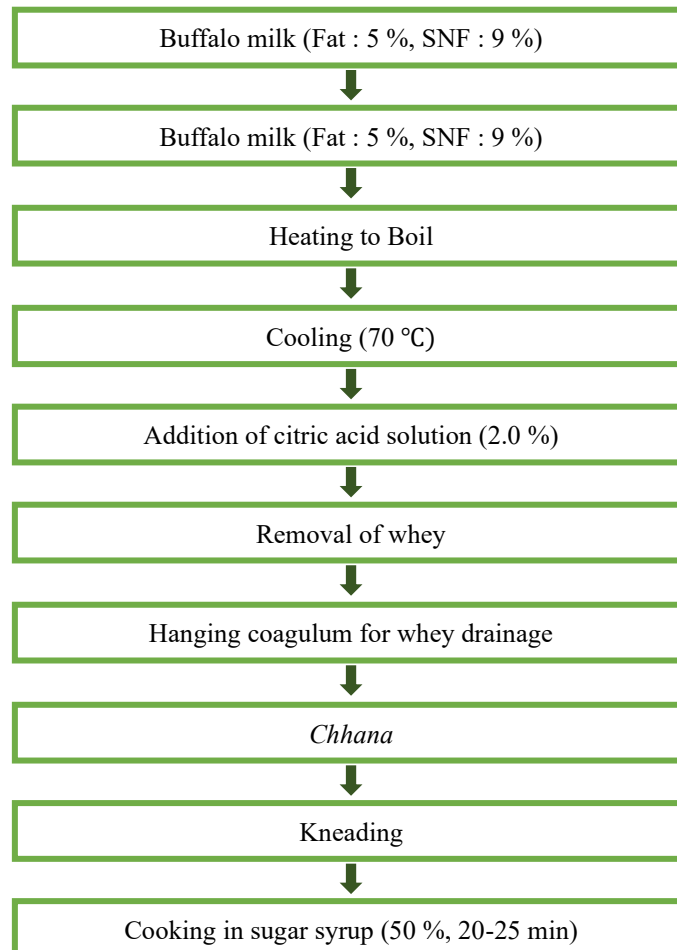
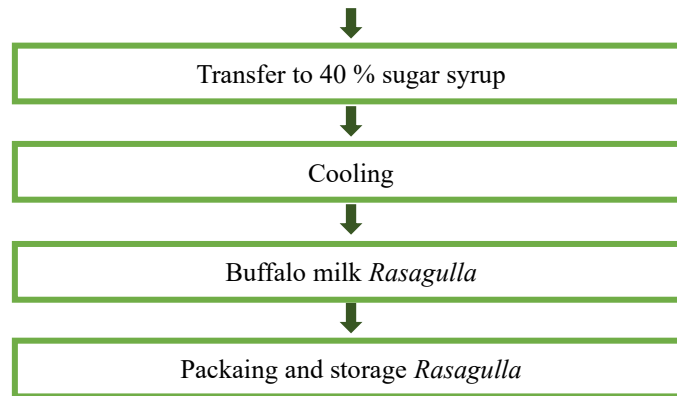
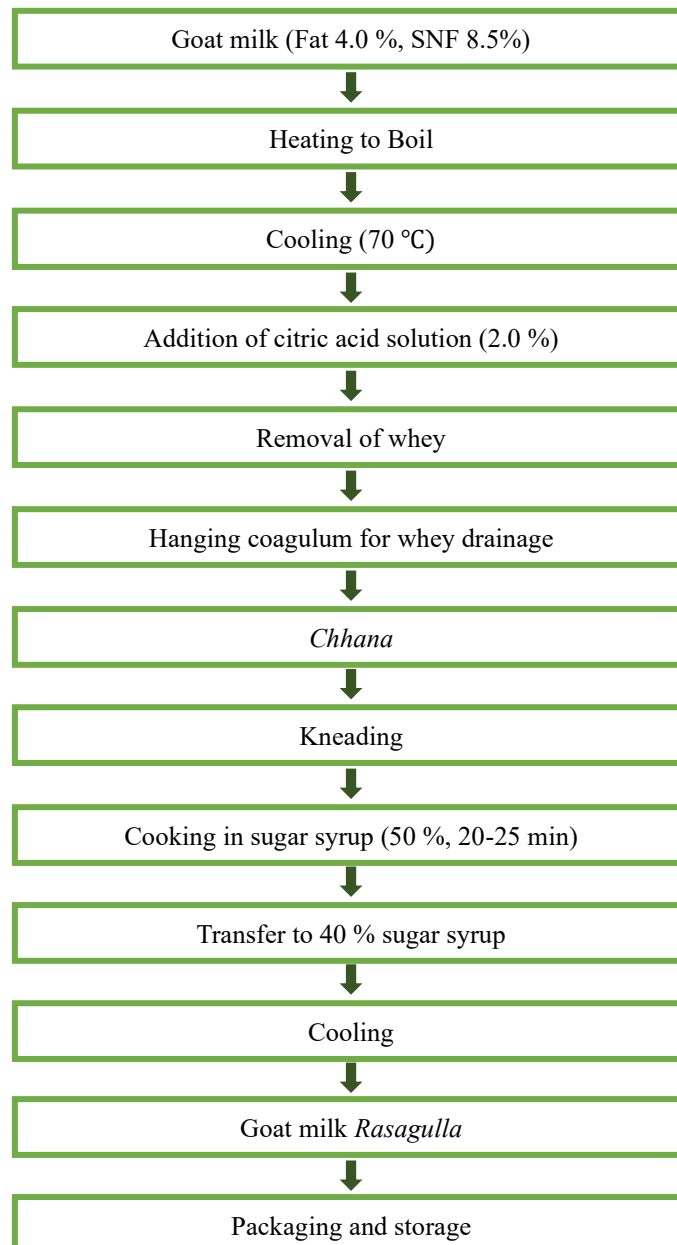


Fig. 1. Flow chart for preparation of Chhana & *Rasagulla* from cow milk



**Fig. 2. Flow chart for preparation of *Chhana* & *Rasagulla* from Buffalo milk****Fig. 3. Flow chart for preparation of *Chhana* & *Rasagulla* from Goat milk**

III. RESULTS AND DISCUSSIONS

The yield of *Chhana* prepared from Cow, Buffalo and Goat milk is presented in Table (1). The yield of *Chhana* for Cow, Buffalo and Goat milk was 15.92, 19.82, and 15.95 per cent, respectively. The yield of *Chhana* was highest in Buffalo milk (19.82 %) as compared to Cow (15.92%) and Goat milk (15.95%). Significant difference was found.

Table 1: Effect of source of milk on yield and chemical composition of *Chhana*

Source of milk for <i>Chhana</i>	Yield (%)	Moisture (%)	Protein (%)	Fat (%)	Lactose (%)	Ash (%)
Cow milk	15.92 <sup>a</sup>	53.49 <sup>a</sup>	16.51 <sup>a</sup>	25.82 <sup>a</sup>	2.24 <sup>a</sup>	1.94 <sup>a</sup>
Buffalo milk	19.82 <sup>b</sup>	48.64 <sup>b</sup>	17.80 <sup>b</sup>	28.72 <sup>b</sup>	2.54 <sup>a</sup>	2.30 <sup>a</sup>
Goat milk	15.95 <sup>ac</sup>	53.05 <sup>ac</sup>	16.31 <sup>ac</sup>	26.72 <sup>c</sup>	1.97 <sup>a</sup>	1.95 <sup>a</sup>
CD (p<0.05)	0.54	0.76	0.56	0.56	0.59	0.56

- All the values are average of three trails.
- Similar superscripts indicate non-significant at corresponding critical difference (CD)

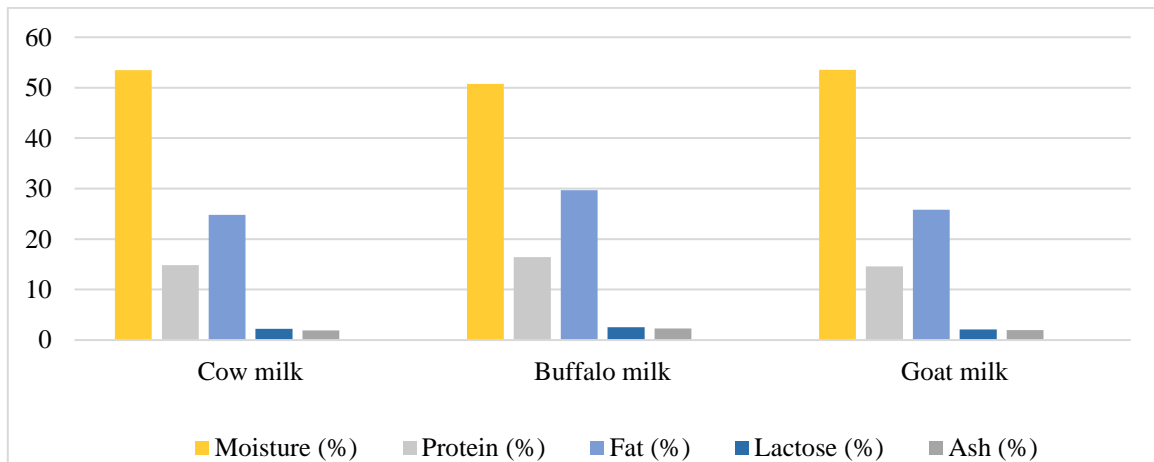


Fig. 1. Effect of source of milk on yield and chemical composition of *Chhana*

to be noted between Buffalo, Cow and Goat milk with respect to yield of *Chhana*. While there was no significant difference in yield of *Chhana* between Cow (15.92 %) and Goat milk (15.95 %).

The moisture and protein content in *Chhana* of Cow and Goat milk was found to be 53.49, 16.51 and 53.05, 16.31 per cent, respectively. No significant difference was observed in moisture and protein content of *Chhana* between Cow and Goat milk. However, lowest moisture and highest protein content in *Chhana* of Buffalo milk was observed (48.64 and 17.80 %respectively) as compared to Cow and Goat. Highest fat (28.72 %) and ash (2.30 %) content in *Chhana* obtained from Buffalo milk was found to be noted as compared to Cow (25.82, and 1.94) and Goat (26.72 and 1.95) samples. There was significant difference in fat and ash content of Buffalo milk *Chhana* as compared to Cow and Goat milk *Chhana*.

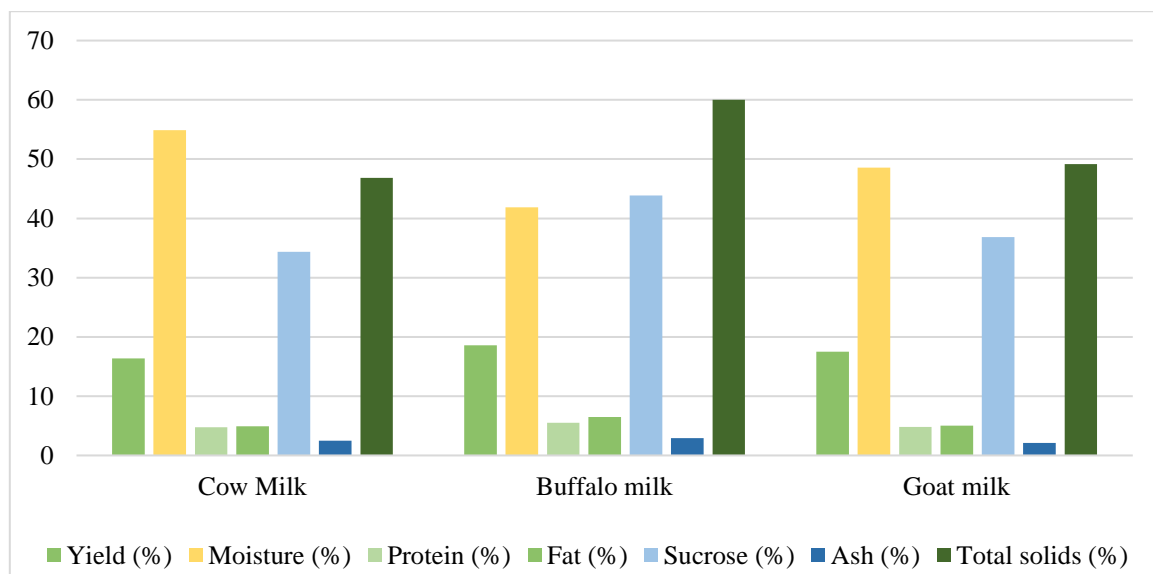
The results pertaining to the source of *Chhana* on yield and chemical composition of *Rasagulla* is presented in Table (2), Fig (9) and plate (2) Buffalo milk *Chhana* resulted in higher yield of *Rasagulla* (18.56 %) followed by *Rasagulla* obtained from Goat(17.51 %) milk *Chhana* and Cow milk *Chhana*(16.35 %) The protein, fat, ash, moisture and sucrose content of Buffalo milk *Rasagulla* were recorded to be 5.52 per cent, 6.51 per cent, 2.92, 41.51 and 43.54 per cent, respectively.

*Rasagulla* prepared from Buffalo milk had lowest moisture content of (41.51 %) as compared Cow’s milk (54.54 %) and Goat milk (54.33 %). Buffalo milk *Rasagulla* had shown significantly higher fat (6.51%), total solids (58.49%), ash (2.92 %), and sucrose (43.54%) content as compared to Cow and Goat milk *Rasagulla*.

**Table 2 : Effect of source of *Chhana* on yield and chemical composition of *Rasagulla***

Source of <i>Chhana</i>	Yield (%)	Moisture (%)	Protein (%)	Fat (%)	Sucrose (%)	Ash (%)	Total solids (%)
Cow Milk	16.35 <sup>a</sup>	54.54 <sup>a</sup>	4.76 <sup>a</sup>	4.94 <sup>a</sup>	33.25 <sup>a</sup>	2.51 <sup>a</sup>	45.46 <sup>a</sup>
Buffalo milk	18.56 <sup>b</sup>	41.51 <sup>b</sup>	5.52 <sup>b</sup>	6.51 <sup>b</sup>	43.54 <sup>b</sup>	2.92 <sup>ab</sup>	58.49 <sup>b</sup>
Goat milk	17.51 <sup>c</sup>	54.33 <sup>ac</sup>	4.74 <sup>ac</sup>	5.24 <sup>a</sup>	33.35 <sup>ac</sup>	2.34 <sup>a</sup>	45.67 <sup>c</sup>
CD (p<0.05)	0.59	0.58	0.52	0.54	0.51	0.48	0.42

- All the values are average of three trails.
- Similar superscripts indicate non-significant at corresponding critical difference (CD)



**Fig. 2. Effect of source of *Chhana* on yield and chemical composition of *Rasagulla***

A significant difference was found in the Buffalo milk *Rasagulla* with respect to protein, fat, total solids and sucrose content as compared to Cow and Goat milk *Rasagulla*. The protein, fat and ash content of Cow’s milk were observed to be almost similar with that of Goat milk *Rasagulla*. There is no significant difference observed in respect of above parameters for Cow and Goat milk *Rasagulla*. However, there is statistically significant difference with respect to moisture, yield, and sucrose content of Cow and Goat milk.

Cow, Buffalo, and Goat milk were used for preparation of *Chhana*. The yield and chemical composition of *Chhana* obtained from these three sources are presented in Table (1).

The chemical characteristics such as moisture, protein, fat, and ash content of *Chhana* was analysed. A remarkably higher fat (28.72 %), protein (17.80 %) ash (2.30 %) and yield (19.82 %) of *Chhana* was obtained from Buffalo milk as compared to Cow (25.82, 16.51, 1.94, and 15.92 %) and Goat milk *Chhana* (26.72, 16.31, 1.95 % and 15.92 %). This may be due higher fat, protein and ash content in initial Buffalo used in *Chhana* preparation. Lower moisture content was observed in Buffalo milk *Chhana* (48.64 %) than Cow (53.49 %) and Goat milk *Chhana* (53.05 %). This is attributed to higher total solids content in Buffalo milk than Cow and Goat milk. our findings are in agreement with the findings of the previous workers (Chaudhary *et al.*, 1998; Haque *et al.*, 2003; Jindal *et al.*, 2001; and Eman *et al.*, 2017))

#### IV. DISCUSSION

*Rasagulla* was prepared from *Chhana* obtained from standardized Cow, Buffalo and Goat milk and the resultant *Rasagulla* was analysed for yield and chemical characteristics such as fat, protein, sucrose, ash and moisture content and results are presented in Table (2).

It is seen from the table that yield of *Rasagulla* obtained from Buffalo milk *Chhana* was higher in Buffalo milk *Rasagulla* (18.56 %) as compared to Cow milk (16.35 %) and Goat milk *Rasagulla* (17.51 %). This is attributed to higher total solids of Buffalo milk used for *Rasagulla* preparation. These findings are in agreement with the findings of Joshi *et al.*, (1991) and Eman *et al.*, (2017). Buffalo milk *Rasagulla* had the highest protein (5.52 %) and fat (6.515) content followed by Cowmilk *Rasagulla* (4.76 and 4.94 %) and lowest protein and highest fat content was observed in Goat milk *Rasagulla* (4.74 and 5.24). These findings agree with the findings of earlier workers (Jaikhani *et al.*, 1980; Soni *et al.*, 1980; Sindhu *et al.*, 1996; Haque *et al.*, 2003).

It was observed that Buffalo milk *Rasagulla* had significantly higher amount of fat and protein than *Rasagulla* obtained from Cow's milk and Goat milk. Highest fat and protein content of Buffalo milk *Rasagulla* indicated that it was made from high quality *Chhana* which rich in milk fat and protein. The results concur with the results of Desai *et al.*, (1993) and Haque *et al.*, (2003). The moisture content was highest (54.54 %) for *Rasagulla* from Cow milk, followed by Goat (54.33 %) and Buffalo milk *Rasagulla* (41.51 %). These differences might be due to a difference in the level of total solids in the initial milk used for *Rasagulla* preparation. These findings are in agreement with the findings of Chaudhary *et al.*, (1998); Haque *et al.*, (2003) and Eman *et al.*, (2017). The maximum ash per cent was noted in Buffalo milk *Rasagulla* followed by Cow milk *Rasagulla* and lowest was in Goat milk *Rasagulla*, because Buffalo milk had higher number of total solids than Cow and Goat milk. These findings are in agreement with reports of earlier workers. (Kumar *et al.*, 1982a and 1982b; Jindal *et al.*, 2001; Eman *et al.*, 2017 and Jahura *et al.*, 2019).

#### V. CONCLUSION

From the study it was concluded that source of milk has significant effect on yield and chemical composition of *Chhana* and *Rasagulla*. *Chhana* and *Rasagulla* obtained from buffalo milk resulted in high yield as compared to cow and goat milk. Higher fat, protein and ash content was observed in buffalo milk *Chhana* and *Rasagulla* followed by goat milk. Cow milk *Chhana* and *Rasagulla* had lowest fat, protein, and ash content. Textural quality of *Chhana* and *Rasagulla* obtained from buffalo milk has scored lowest sensory and textural values as compared to cow and goat milk due to hard, rubbery and coarse body and texture of *Rasagulla* obtained from buffalo milk which was not acceptable by the panel of judges.

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