A Comparative Study on the Quality of Rasogolla Made in Laboratory and Collected from Local Markets of Mymensingh, Bangladesh

Sharif Uddin Tarafdar¹, Md. Ahsan Habib Pramanik², Biplob Basak², Muhammad Siddiquur Rahman² and Sanjib Kumar Biswas²
¹Department of Dairy Science ²Department of Poultry Science, Bangladesh Agricultural University, Mymensingh, Bangladesh

Abstract: Rasogolla is one of the most important pleasant and charming foods to most of the people of Bangladesh. In most of the markets of Bangladesh rasogolla are more or less available, but the quality of rasogolla varies from place to place. Sometimes manufacturers add some ingredients that decrease the quality of rasogolla. That is why, this research work was carried out to study the quality of rasogolla available in markets and to compare them with rasogolla prepared in the laboratory and also to investigate both the physical and chemical characteristics. Four rasogolla samples were collected from local markets of Mymensingh district and another sample was prepared in the laboratory to conduct the experiment with the above theme. Then the rasogolla were judged by a panel of expert judges for organoleptic test and also analyzed for chemical qualities. Considering the physical and chemical properties of both the samples of rasogolla, the results indicated that the laboratory made rasogolla was significantly better in quality than market rasogolla. As the laboratory made rasogolla was prepared with special care whereas market rasogolla might have the adulterated during preparation. It may be suggested that to obtain the better quality rasogolla proper method, proper composition of the ingredients, and also the strict hygienic and sanitation measures should be followed that will also gives the consumers satisfaction.

Key words: Rasogolla, physical quality and chemical quality

Introduction
Bangalis consume various dairy items, among them rasogolla is the very important one. That is why, the rasogolla is acceptable to Bangali and also to others. Not only Bangali but also Indian people are fond of this product. Kuila et al. (2000) in their review paper discussed the manufacture and characteristics of milk sweets in eastern India. These include sandesh, rasogolla, chamcham, pantooa, rasmalai, khir mohan, kalajam, chhinar jilipi, bari, sitabhog, sharputa, sharthaja, chhina poda, buri, peda, kalakand, kheer kadambara and misti doi (dahi). It is concluded that the industry offers employment to approximately 200,000 people per year and has tremendous export potential. Bhattacharya and Rai (1980) also defined rasogolla as famed chhina based sweet-meats of Bengal, being made from milk curd which is kneaded into small balls that are boiled in clarified sugar syrup. Chhina is the residue obtained after the liquid portion is drained off from fermented milk and rasogolla is prepared by boiling chhina (rolled in to small ball in 40-60% sugar syrup).

Actually when the rasogolla first prepared was not investigated but it is more or less obvious that the product was first introduced in the Indian subcontinent. It is reported that about 10% of the total milk produced in Bangladesh are used for the preparation of chhina and finally for sweet making (Forth plan study, No. 3. 1988).

In Bangladesh, more commonly rasogolla is made from cow milk. But adequate quantity of milk is not available round the year. The average milk production of local cow is very low. Moreover, the production and supply of cow milk is not satisfactory, specially in the months from July to November due to the seasonal effect the production goes to a minimal level. The scarcity of milk hampers the production of sweetmeat, which contributes in the rise of price. The daily requirement of milk and its deficits in Bangladesh are given in Table 1.

Rasogollas are obtained most of all markets of Bangladesh because from birth to death in each sphere of life rasogolla have occupied a significant place in our society. On each and every occasion like Eid, Puja, Birthday, Marriage, funeral ceremonies, religious festivals and even in guest entertainment, rasogolla inevitable. In shortly it may said that, there is no such ceremony and festival which goes out of rasogolla. Rasogolla is one of the most important pleasant and charming foods to most of the people of Bangladesh. Rasogolla are extensively used, chiefly alone with other foods due to their flavour and high food value. They are also easily digested. However, rasogolla is chhina based food product, it is very vital to health because of its fairly high protein and fat content, minerals, specially calcium and phosphorus content and also fat soluble vitamins, particularly, vitamin A and D content. The food value of rasogolla largely depends upon the chhina which is prepared from milk. The average chemical composition of chhina are Moisture-65.37%; Fat-23.52%; Protein-17.26%; Lactose-2.21%; Ash-1.68%; and Sucrose-28.80%; (Ravichandra et al., 1997). Sweetmeats are nature’s most important contribution to civilization. The first pre-requisite for producing excellent quality of sweetmeats is the availability of high quality chhina. Efforts have been made to manufacture rasogolla from buffalo milk with only limited success and market specimens do not possess the desired body texture (Kanwal et al., 1980). Cow milk is exclusively used for chhina preparation by halvirs as it yields a superior and most acceptable quality product suitable from rasogolla making (Suguna Rao et al., 1989).

In most of the markets of Bangladesh rasogollas are more or less available but the quality of rasogolla of various places varies due to varieties in manufacturing procedure followed by persons of different places. Kanwal et al. (1980) showed the variation in rasogollas composition which obtained from laboratory and market. The compositional differences which were obtained are given in Table 2.

The persons involved in manufacturing rasogolla, all are not honest. There are some people among them who add some ingredients that gives unsatisfactory quality of rasogolla. Among the factors which affect the quality of rasogolla it is one of them. In the laboratory, the scientific methods are followed to manufacture the rasogolla. That is why, the quality of laboratory made rasogolla are generally superior. Not only laboratory but also some manufacturer who tries to maintain the quality and also try to develop their quality to keep their goodwill. Considering the above stated facts, the present experiment was undertaken with the following objectives:

i. To study the quality of laboratory made and local market rasogolla
ii. To inform the consumers about the food value of laboratory made and local market rasogolla.
iii. To suggest an appropriate method of rasogolla preparation.
Table 1: Daily requirement of milk and its deficits in our country

<table>
<thead>
<tr>
<th>Content deficits</th>
<th>Per day requirement and availability</th>
<th>Total requirement and availability</th>
<th>Total deficits</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Requirement</td>
<td>Production</td>
<td>Requirement</td>
<td>Production</td>
</tr>
<tr>
<td>Milk</td>
<td>250 ml</td>
<td>34 ml</td>
<td>9.90 million ton</td>
<td>1.40 million ton</td>
</tr>
</tbody>
</table>


Table 2: Composition of rasogolla

<table>
<thead>
<tr>
<th>Constituents</th>
<th>Rasogolla Laboratory made</th>
<th>Market samples Yamananagar</th>
<th>Karnaal Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moisture</td>
<td>37.0</td>
<td>36.2</td>
<td>30.9</td>
</tr>
<tr>
<td>Total solids</td>
<td>63.0</td>
<td>64.8</td>
<td>65.1</td>
</tr>
<tr>
<td>Sucrose</td>
<td>51.9</td>
<td>53.6</td>
<td>55.1</td>
</tr>
<tr>
<td>Protein</td>
<td>6.8</td>
<td>6.6</td>
<td>8.0</td>
</tr>
<tr>
<td>Fat</td>
<td>4.2</td>
<td>4.6</td>
<td>5.7</td>
</tr>
</tbody>
</table>

Materials and Methods

This experiment was conducted at the Bangladesh Agricultural University, Dairy Science Laboratory during the period from 28th February to April 12, 2001, chemical analysis was done at the Dairy Science Laboratory and Food Technology Laboratory of Bangladesh Agricultural University, Mymensingh. For this experiment four samples of market rasogolla from four different markets of Mymensingh district, surrounding areas were chosen. One sample from each market was taken and three replications were made for each sample.

Similarly sample was prepared in the Laboratory under strict hygienic condition and designated as 'L' rasogolla. Market prepared rasogolla were brought to the Dairy Technology Laboratory and kept in refrigerator under 4°C for organoleptic evaluation and chemical analysis.

Preparation of rasogolla in the laboratory: For making chhana, cow milk was collected from Bangladesh Agricultural University (BAU) Dairy Farm. Before making chhana milk sample was analyzed in the laboratory to know their fat and SNF content. It was found that cow milk contains 43 g/kg (4.3%) fat and 84 g/kg (8.4%) SNF respectively.

Physical tests (sensory and organoleptic evaluation): To judge the physical parameter flavour score, body and texture, Colour and appearance, Taste score. Total physical score were carried out.

Chemical tests: To investigate the chemical characteristics Moisture contents (g/kg), Total solids content (g/kg), Protein contents (g/kg), Fat contents (g/kg), Carbohydrate contents (g/kg), Ash content (g/kg). Acidity percentage and pH were determined

Statistical analysis: Data collected from different parameters were subjected to statistical analysis. Analysis of Variance test (ANOVA) was done to find out the statistical difference between different treatments. In this experiment all experimental materials were completely homogenous and for this reason data were analyzed by using one way analysis of variance test (CRD) as per MSTAT statistical programme. The differences among sample means were compared by calculating LSD value with the help of a Least Significant Difference test (Gomez and Gomez, 1984).

Results and Discussion

Flavour score: Flavour score of rasogolla L was 41.76 ± 1.15, rasogolla M1 was 37.82 ± 1.58, rasogolla M2 was 39.74 ± 0.92, rasogolla M3 was 39.15 ± 1.06, and rasogolla M4 was 37.94 ± 1.36 respectively. The statistical analysis showed significant difference

Fig. 1: Schematic diagram for the preparation of rasogolla

(P < 0.05) between laboratory and market rasogolla (Table 3). Flavour score of market rasogolla samples were almost similar but laboratory rasogolla showed highest score. The result indicates that the laboratory made rasogolla were superior from site of flavour. Bhattacharya and Raj (1980) indicated that flavour of rasogolla was enhanced by cooking. Katra and Bhargava (1994) said that flavour was adversely affected by the addition of soymilk and Chakrabarti and Gangopadhyay (1990) also said that flavour of soy-bean could considerably be overcome with the use of rose flavour. Flavour may differ with source of milk. Joshi et al. (1981) revealed that, chhana from cow and buffalo milk had acceptable flavour where as from goat milk had acidic flavour.

Body and texture score: The body and texture score for L, M1, M2 and M4 sources rasogolla were 28.10 ± 0.62, 25.12 ± 1.28, 24.99 ± 0.43, 27.19 ± 1.00 and 26.46 ± 1.55 respectively (Table 3). Statistical analysis showed that there were significant difference (P < 0.05) within the body and texture score of different sources of rasogolla samples (Laboratory made rasogolla and market rasogolla). According to Gupta et al. (1993) textural quality of market rasogolla was significantly correlated with moisture, fat, protein and calcium contents and Bhattacharya and Raj (1980) said that use of high fat milk leads to higher fat contents in rasogolla.
which softens the body and improves the texture. Body and texture of rasogolla may vary with various factors. Joshi et al. (1991) observed that chhana prepared from buffalo milk had hard body and coarse texture. Cow and goat milk produced chhana with soft body and smooth texture. Texture also decreased with increased temperature and length of storage (Arora et al., 1996). The body and texture of rasogolla was better in laboratory made rasogolla than the market rasogolla and it may due to the above factors mentioned by the different authors.

**Colour and appearance score:** The colour and appearance score of L, M₁, M₂, M₃ and M₄ sources rasogolla were 14.01 ± 0.56, 11.83 ± 0.95, 12.11 ± 0.36 and 10.98 ± 0.81 respectively, which is shown in the Table 3. Statistical analysis showed that there was significant difference (P< 0.01) within the colour and appearance score of different sources of rasogolla samples. The highest mean value (14.01) of colour and appearance was recorded for laboratory made rasogolla than other rasogolla samples collected from markets. The variation of colour and appearance were probably due to fat% in milk. According to Mini et al. (1995) rasogolla prepared from whole milk score higher than the skim milk for colour and appearance. Tambat et al. (1992) showed effect of fat and maida levels gives acceptable colour and appearance when rasogolla were prepared. Some times cooking time might enhanced the colour of rasogolla (Bhattacharya and Raj, 1980).

**Taste score:** The average mean value for laboratory made rasogolla (L) and market rasogolla (M₁, M₂, M₃ and M₄) were observed 8.93 ± 0.09, and 6.79 ± 0.26, 7.34 ± 1.04, 6.65 ± 1.20 and 7.56 ± 0.59 respectively (Table 3). Statistically the differences within the values were highly significant (P< 0.01). Highest score was noticed for laboratory made rasogolla and market rasogolla score were more or less similar. During preparation of rasogolla in laboratory all of the ingredients used as standard levels. Actually taste of rasogolla depends on the ingredients used for. Soni et al. (1979) reported that the rasogolla contained 37% moisture, 51.9% sucrose, 6.8% protein and 4.2% fat. The rasogolla prepared in laboratory was better than the market rasogolla.

**Total physical score:** Total physical score shown in Table 3 for rasogolla were 92.80 ± 1.54 for laboratory made (L) and 81.66 ± 2.19, 84.18 ± 0.64, 83.97 ± 1.58 and 82.22 ± 2.27 for market rasogolla, M₁, M₂, M₃ and M₄ respectively. As the all physical parameters for laboratory made rasogolla were higher than the market rasogolla that is why total physical score gone highest. And this highest value indicated that the laboratory made rasogolla was superior than the market sources. Total score for market rasogolla were near for each other, as all physical parameters score, were near. The difference between the laboratory made rasogolla and market rasogolla were highly significant (P< 0.01). Total physical score of rasogolla may vary with different factors. According to Puranik et al. (1997) for pure rasogolla chhana was not acceptable and accordingly to Mini et al. (1995) milk sources (whole milk, skim milk, coconut milk) were responsible for overall quality of rasogolla and in this case they showed control rasogolla gave higher score than the others.

Tarafdar et al. (1988) obtain that overall quality scores of rasogolla prepared with mechanically kneaded chhana were 7.8% lower than those market rasogolla.

**Chemical parameters:**

- **Moisture content:** The average amount of moisture of rasogolla samples L, M₁, M₂ and M₄ were 528.80 ± 9.80, 433.95 ± 8.66, 450.03 ± 12.04, 487.00 ± 8.07 and 478.40 ± 15.25 g/kg respectively. Statistically there were significant differences (P< 0.01) between the moisture of different sources of rasogolla (Table 4). Higher moisture content was noticed in laboratory made rasogolla whereas market rasgolla samples noticed lesser amount of moisture. Bhattacharya and Raj (1980) reported that acceptable quality rasagolla contain 49.85 to 53.80% moisture. The higher amount of moisture indicate good quality rasogolla and sometimes it may give good flavour. Tewari and Sachdeva (1991) observed good flavour in the products whereas chhana containing 62.5 and 63.5% moisture. Gupta et al. (1993) said overall textural quality was significantly correlated with moisture. Hardness of rasogolla also influenced by moisture content and this type of comments was drawn by Ravichandara et al. (1997). So that it may expressed that laboratory made rasagolla was superior than market rasagolla.

- **Total solids content:** The total solids content for L, M₁, M₂, M₃ and M₄ sources of rasagolla were 474.26 ± 9.66, 566.33 ± 8.62, 548.97 ± 12.04, 513.00 ± 9.07 and 520.60 ± 15.25 g/kg respectively (Table 4). Statistical analysis showed that there were significant differences (P< 0.01) within the total solids content of laboratory made rasogolla and market rasagolla. Sur et al. (1999) reported standard total solids for rasagolla 44.63% which was more or less similar with the laboratory made rasagolla (474.25 g/kg). The total solids contents of market rasagolla were higher than laboratory rasagolla indicating inferiority of the sources. Kanwal et al. (1980) also showed total solids of 63.0% for laboratory made rasagolla and 64.8% for market rasagolla which also indicated higher percent of total solids content in market rasagolla. So the results obtained by the scientists are more or less agreed with the result got this research.

**Protein content:** Protein contents of different sources of rasagolla are presented in Table 4. From this table it was found the mean protein content of rasagolla samples were 59.50 ± 1.87, 54.33 ± 4.36, 52.77 ± 2.96, 52.37 ± 2.32 and 51.37 ± 1.86 g/kg for L, M₁, M₂, M₃ and M₄ sources sample respectively. Statistical analysis showed that protein content of rasagolla samples varies significantly (P< 0.05). Laboratory made rasagolla contain higher protein level as compare to market rasagolla though all this sources (Laboratory made rasagolla and market rasagolla) content protein level according to BSTI. As per the Bangladesh Standard Testing Institute (BSTI, 1993) specification of minimum protein content of rasagolla should be 6%. Higher protein percent increase the quality of rasagolla. Sur et al. (2000) stated that protein percent 6.62 and Desai et al. (1993) also observed 6.7% protein in better quality of spongy rasagolla. Kanwal et al. (1980) revealed that laboratory rasagolla and market rasagolla content 6.8 and
6.6% protein respectively. Whereas Gangopadhyay et al. (1996) indicated laboratory made rasagolla content 7.0-7.2% protein.

This study also showed higher amount of protein level in laboratory made rasagolla than market rasagolla like the results drawn by varies scientists given above.

**Fat content**: The amount of mean fat contents of $L$, $M_1$, $M_2$, and $M_3$ sources rasagolla sample were 49.30 ± 0.66, 41.07 ± 1.20, 42.97 ± 4.08, 40.63 ± 1.18 and 40.53 ± 3.04 g/kg respectively which are demonstrated in Table 4. Differences were highly significant (P < 0.01) among these mean value (Table 4). From this result it was observed that laboratory made rasagolla had significantly highest amount of fat and market rasagolla had the lowest amount of fat (Table 4). Quality of rasagolla mainly influences by the quality of milk. Bhattacharyya and Raj (1980) reported in a study that use of high fat milk leads to a higher fat content in the rasagolla which soften the body and improve the texture. Kanwal et al. (1980) studied that laboratory made rasagolla and market rasagolla contain 4.2 and 4.6% had respectively. In another study Sur et al. (2000) showed that fat percent of rasagolla was 6.35 when rasagolla was prepared from buffalo milk. So the result obtained by this research was almost satisfactory in relation to fat content. As the fat content of laboratory made rasagolla was higher than market rasagolla, it gave the good score compared to market rasagolla.

**Carbohydrate content**: The average amount of carbohydrate of rasagolla was $36.70 ± 10.68, M_1 was $46.90 ± 11.87, M_2 was $44.25 ± 13.03, M_3 was $40.80 ± 2.36 and M_4 was $41.72 ± 10.84 g/kg respectively (Table 4). Statistical analysis indicated that there were significant differences (P < 0.01) within the carbohydrate content of different sources of rasagolla samples. Market sample of rasagolla may have adulteration and most of the ingredients which are used in rasagolla as adulterated materials generally content higher amount of carbohydrate that give the market rasagolla higher levels of carbohydrate content. Adhikari et al. (1992) said that chhana content with higher percent of lactose contributed this higher percent of lactose within the rasagolla when rasagolla was prepared from that chhana. Kanwals et al. (1980) indicated that rasagolla prepared in laboratory had sucrose of 51.90% whereas market rasagolla had 53.60% sucrose. In another study sur et al. (2000) noted 32.13% sucrose in rasagolla which were prepared from buffalo milk. Carbohydrate content of laboratory made rasagolla was obtained by this study was close to noted by Sur et al. (2000). As carbohydrate content of laboratory made rasagolla was lesser amount than market rasagolla, so laboratory made rasagolla regarded as superior than market rasagolla.

**Ash content**: Amount of ash of different rasagolla samples were 8.37 ± 0.42, 9.16 ± 0.43, 9.13 ± 0.13, 8.28 ± 0.33 and 9.46 ± 0.41 g/kg for $L$, $M_1$, $M_2$, $M_3$ and $M_4$ sources rasagolla sample respectively (Table 4). Statistical analysis showed that there were significant differences (P < 0.05) between the ash content of different sources of rasagolla samples. Laboratory made rasagolla had lower level of ash as compared to market rasagolla. Generally the rasagolla which content higher amount of total solids may have higher levels of ash. In Table 4 total solids of laboratory rasagolla was lower (47.42 ± 25 g/kg) than market rasagolla (around 54.00 g/kg), so market rasagolla had higher levels of ash. Sur et al. (2000) mention that 0.33% ash in rasagolla prepared from buffalo milk, Katra and Bhargava (1990) said higher ash and total carbohydrate decreased the sponginess.

**Acidity percentage**: The acidity percentage of different sources of rasagolla samples are shown in (Table 4). It was found that the average acidity for $L$, $M_1$, $M_2$, $M_3$ and $M_4$ sources rasagolla were $0.82 ± 0.10, 0.86 ± 0.21, 0.85 ± 0.17, 0.90 ± 0.23 and 1.0 ± 0.13 respectively. Statistically there were no significant differences between the acidity of different sources of rasagolla. Acidity of market rasagolla samples were higher than that of laboratory prepared rasagolla. Haque (2000) showed the acidity of rasagolla were 0.75, 0.70 and 0.71% respectively which are prepared from cow, buffalo and equal mixture of cow and buffalo milk. Chanda (1999) observed acidity of rasagolla 0.60, 0.70, 1.10 and 1.40% respectively which are prepared from cow milk chhana. 10% soya chhana, 20% soya chhana and 30% soya chhana. The result obtained by this research work were more or less nearest with the result obtained by Haque (2000) and Chanda (1999). So the results were within the accepted level. Arora et al. (1996) said that the lactic acidity was increased during the storage. Laboratory made rasagolla were not stored whereas market rasagolla may be stored, that is why, acidity of laboratory made rasagolla was relatively lower in value than market rasagolla.

**pH value of different rasagolla sample**: The average pH value of different rasagolla samples are presented in Table 4. From the table it is observed that mean pH for $L$, $M_1$, $M_2$, $M_3$ and $M_4$ sources rasagolla were 6.8 ± 0.10, 6.3 ± 0.26, 6.4 ± 0.30, 6.2 ± 0.57 and 6.1 ± 0.32 respectively. Statistical analysis showed that there were no significant differences within the pH value of different sources of rasagolla samples. The pH of laboratory made rasagolla and market rasagolla were within the accepted level whereas pH of laboratory made rasagolla was slightly higher than market samples. Haque (2000) reported pH of rasagolla made from cow and buffalo milk were 6.60 and 6.73 and Chanda (1999) reported the pH of rasagolla within the range of 6.92 to 6.36. So, in relation to pH of market rasagolla specially the laboratory made rasagolla were within the standard value and quality of rasagolla were good.

Considering the chemical properties the laboratory made rasagolla were superior to market rasagolla from any point of view. As the laboratory made rasagolla was prepared with special care, so, the factor of preparation contributed to make the laboratory made rasagolla good in quality.

**Conclusion**: The experiment was conducted in the Department of Dairy Science, Bangladesh Agricultural University, Mymensingh with the facility available in the Dairy Technology Laboratory. The objective of the experiment was to compare physical and chemical characteristics of market rasagolla found in Mymensingh district with that of laboratory made rasagolla. The experiment was conducted through collection of rasagolla from four local markets of Mymensingh district and with that of the prepared in the laboratory. The rasagolla, both commercially produced and laboratory made, were judged by a panel of expert judges for organoleptic test. The samples were also analyzed for chemical qualities. Data obtained were analyzed statistically using

---

*Table 4. Comparison of average chemical composition of different sources of rasagolla*
Terafdar et al.: Quality of Rasogolla made in laboratory and markets

Completely Randomized Design (CRD). The total final score of physical parameters (consisting flavour, body and texture, colour and appearance, taste) of laboratory made rasogolla was 92.80 ± 1.51 and the same score of market rasogolla (Surrounding Mymensingh) were 81.56 ± 2.19. 84.18 ± 0.84, 83.97 ± 0.56, 82.22 ± 2.27 respectively. According to panelists, the highest score was obtained in laboratory made rasogolla and lower score was obtained in market rasogolla. Statistically, significant differences (P<0.01) were found among those mean values.

From chemical analysis it was observed that average moisture contents of L. M., M., M. and M. rasogolla samples were 52.60 ± 0.60, 49.93 ± 0.56, 45.00 ± 0.04, 47.00 ± 0.07 and 47.90 ± 0.26 g/kg respectively. On the other hand total solids content of the above samples in the same order were 47.25 ± 0.56, 56.56 ± 0.33, 6.82, 54.96 ± 0.70 and 51.00 ± 0.07 and 52.00 ± 0.32 g/kg respectively. Statistically the levels of moisture and total solids content differ significantly (P<0.01) among the different samples.

The protein contents of L. M., M., M. and M. and M. samples were 59.50 ± 1.87, 64.33 ± 2.36, 52.77 ± 2.96, 52.77 ± 2.32 and 51.37 ± 1.88 g/kg respectively. There was significant difference (P<0.05) among them in respect of protein content. The fat contents of L. M., M., M. and M. rasogolla samples were 49.30 ± 0.66, 41.07 ± 1.20, 42.87 ± 4.08, 40.63 ± 1.18 and 40.63 ± 0.04 g/kg respectively. Statistical analysis showed that there was significant difference (P<0.01) among them.

The carbohydrate contents of rasogolla samples of L. M., M., M. and M. were 357.07 ± 10.98, 461.90 ± 11.87, 446.23 ± 13.03, 408.60 ± 2.35 and 417.27 ± 10.84 g/kg respectively. Significant difference (P<0.01) was observed among the carbohydrate contents of various sources of rasogolla. The ash content of L. M., M., M. and M. and M. samples were 8.37 ± 0.42, 9.16 ± 0.43, 9.13 ± 0.13, 9.28 ± 0.32 and 9.46 ± 0.41 g/kg respectively. Statistically the difference within the values were significant (P<0.05).

The average acidity and pH value of rasogolla sample of L. M., M., M. and M. was 0.65 ± 0.10, 0.95 ± 0.10, 0.85 ± 0.17, 0.80 ± 0.23, 1.01 ± 0.13 % and 6.5 ± 0.10, 6.3 ± 0.26, 6.4 ± 0.30, 6.23 ± 0.57, 6.1 ± 0.32 respectively. No significant differences were found within the different samples.

From the results of all parameters (physical and chemical) it was observed that the laboratory made rasogolla was better than the market rasogolla. This may be attributed to addition of pure chhona obtained from fresh milk, optimum level of sugar, control heating and maintenance of strict hygienic measures during preparation of rasogolla in the laboratory. With higher total solids and lower carbohydrate content and with lower protein and fat level in market rasogolla indicated that the manufacturers might have adulterated their products. The possible adulteration may be addition of skim milk, chhona, wheat flour and high level of sugar in the rasogolla formulation. Hence, it is concluded that to produce better quality rasogolla the following recommendations may strictly be followed:

i. Suggested appropriate technique for rasogolla making with specific proportion of ingredients should be followed.

ii. Should have a authorized organization who will try to control the quality of product (rasogolla) by checking the quality of products (physical and chemical point of view, if possible).

iii. Extension work may be done among the producers "To teach them to produce better quality rasagolla".

iv. Better quality rasogolla should have the following composition:

   The moisture content should be within the range of 500-550 g/kg; total solids 450-600 g/kg; protein 50-75 g/kg; fat 40-60 g/kg; carbohydrate 350-360 g/kg and ash content 8-9 g/kg level.

v. Hygienic and sanitary measures should strictly be followed during preparation of rasogolla.

References