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## Study on the quality of the Rassomalai manufactured in laboratory and sweetmeat shops of different districts of Bangladesh

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### Abstract

An experiment was conducted at the Dairy Science Laboratory of the Department of Dairy Science, Bangladesh Agricultural University, Mymensingh during the period from July to September, 2004. Rassomalai is a famous sweetmeat of Bangladesh. In our country sweetmeat traders do not apply the scientific procedure to produce quality Rassomalai. In this experiment Rassomalai was manufactured in Laboratory and compared with that of product collected from different districts (sadar) of Bangladesh. Physical, chemical and microbiological characteristics were investigated. Significant difference ( $P < 0.01$ ) was found in case of Rassomalai in terms of physical characteristics. It was observed from results that the moisture, dry matter, protein, fat, carbohydrate, ash g/kg and acidity % and pH contents of Laboratory made and different districts (Range Values) Rassomalai samples were 528.9 and 469.1-559.4; 471.1 and 440.6-530.9; 173.0 and 145.5-153.1; 80.0 and 60.2-62.2; 204.9 and 220.5-304.3; 13.2 and 12.1-15.2 g/kg and 0.38 and 0.32-0.53 % and 6.27 and 5.90-6.07 respectively and total viable count/ml and coliform count/ml showed significant differences ( $P < 0.01$ ) among the treatment means. Physical, chemical and microbiological examinations revealed that the quality of different districts Rassomalai was inferior to Laboratory made Rassomalai.

**Keywords:** Quality, Rassomalai, Laboratory, Districts

### Introduction

Rassomalai is one of the most important and charming foods to most of the people of Bangladesh. The sweetmeats are delicious, wholesome, nutritious and very fame item in Bangladesh (Mannan *et al*, 1994). All other sweetmeat Rassomalai is the most popular in our country. Rassomalai is a chhana based sweetmeat. Chhana is highly recommended for diabetic patient on accounts of its high protein and low sugar content as stated by De (1988). The food value of Rassomalai largely depends upon the chhana which is prepared from whole milk. Sweetmeats are nature's most important contribution to civilization. Rassomalai is being produced traditionally throughout the country. It consists mainly three points of view: first small balls which are made by the freshly prepared chhana. Secondly sugar syrup where balls are put gently to heating and thirdly malai which is prepared from raw milk by boiling up to desirable colour.

There is no legal standard and standardization to produce high quality of Rassomalai in the country as well as no sanitary measures are adopted from the hygienic point of view. In the Laboratory, the scientific methods are followed to manufacture the Rassomalai. That is why, the quality of Laboratory made Rassomalai are generally superior. Considering the above stated facts, the experiment was undertaken with the following objectives:

- To study the comparison of the physical, chemical and microbiological characteristics of Rassomalai made in different districts of Bangladesh with that of the Laboratory made Rassomalai.
- To standardized the methods for the preparation of Rassomalai.
- To recommend businessman about appropriate technology to be used for the manufacture of Rassomalai.

## Materials and Methods

### Experimental background

Rassomalai sample (A) was manufactured in the Laboratory. At the same time the samples of Rassomalai were collected from five different districts (Sadar) of Bangladesh, were Comilla (B), Sherpur (C), Mymensingh (D), Dhaka (E), and Jessore (F), respectively.

### Manufacture of Rassomalai

Three litres of milk was collected from Dairy Farm. Out of this milk about 1.80 litre milk was heated to boiling for preparation of chhana and remaining 1.20 litre milk was used for malai preparation. After heating milk was cooled to 84°C and sour whey (360ml) was added until Chhana separates. Whey was removed from chhana by filter cloth. Chhana was broken, flour (16g) was added and kneaded mass was produced. Small balls were made with a smooth surface and without signs of cracks. Concentrated sugar syrup (sugar: water=1:1) was made and heated to boiling. Balls of chhana were cooked in the boiling sugar syrup for 15 - 20 minutes. 1.20 litre whole milk, 40g sugar and 3 - 4 pieces of cardamom were taken in a pan and heated until the volume was reduced by 50%. Balls of Chhana were cooked in hot malai for 3 - 5 minutes and Rassomalai was prepared for consumption. A schematic presentation for preparation of Laboratory made Rassomalai is shown in Fig. 1.

## Results and Discussion

### Physical parameters

The scores of flavour, body and texture, colour and appearance, taste and overall final scores of Rassomalai samples were given in the Table 1. The flavour scores of laboratory made Rassomalai (A) and the Rassomalai of five different districts (B, C, D, E and F) were  $43.59 \pm 0.42$ ,  $34.91 \pm 0.74$ ,  $35.46 \pm 2.02$ ,  $39.32 \pm 1.80$ ,  $36.66 \pm 1.99$  and  $34.61 \pm 0.60$ , respectively. Significant difference ( $P < 0.01$ ) was found in respect of flavour among the treatment means (Table 1). Similar trend was found in case of body and texture and colour and appearance. The taste scores of Laboratory made Rassomalai (A) and five different districts (sadar) Rassomalai (B, C, D, E and F) were  $9.19 \pm 0.36$  and  $6.34 \pm 0.06$ ,  $6.67 \pm 0.57$ ,  $7.68 \pm 0.72$ ,  $6.41 \pm 0.02$  and  $6.32 \pm 0.25$ , respectively (Table 1). Significant difference ( $P < 0.01$ ) was found in respect of taste of the samples (Table 1). The overall scores of six samples were determined on the basis of the average scores recorded for different sensory attributes and the results are presented in Table 1. Significant differences ( $P < 0.01$ ) were found in respect of overall score of the samples (Table 1). In respect of overall score it was found that sample (A) ranked first followed by D, E, B, C and F. Judging from the results of all physical parameters, it may be said that Laboratory made Rassomalai (A) was better than different districts Rassomalai and among the district Rassomalai samples D was better than E, B, C and F.

The present study revealed that flavour, body and texture, colour and appearance, taste, and overall score had a significant effect. Islam *et al.* (2003) stated that flavour, body and texture, taste and overall score had significant effect but colour and appearance had non-significant effect.

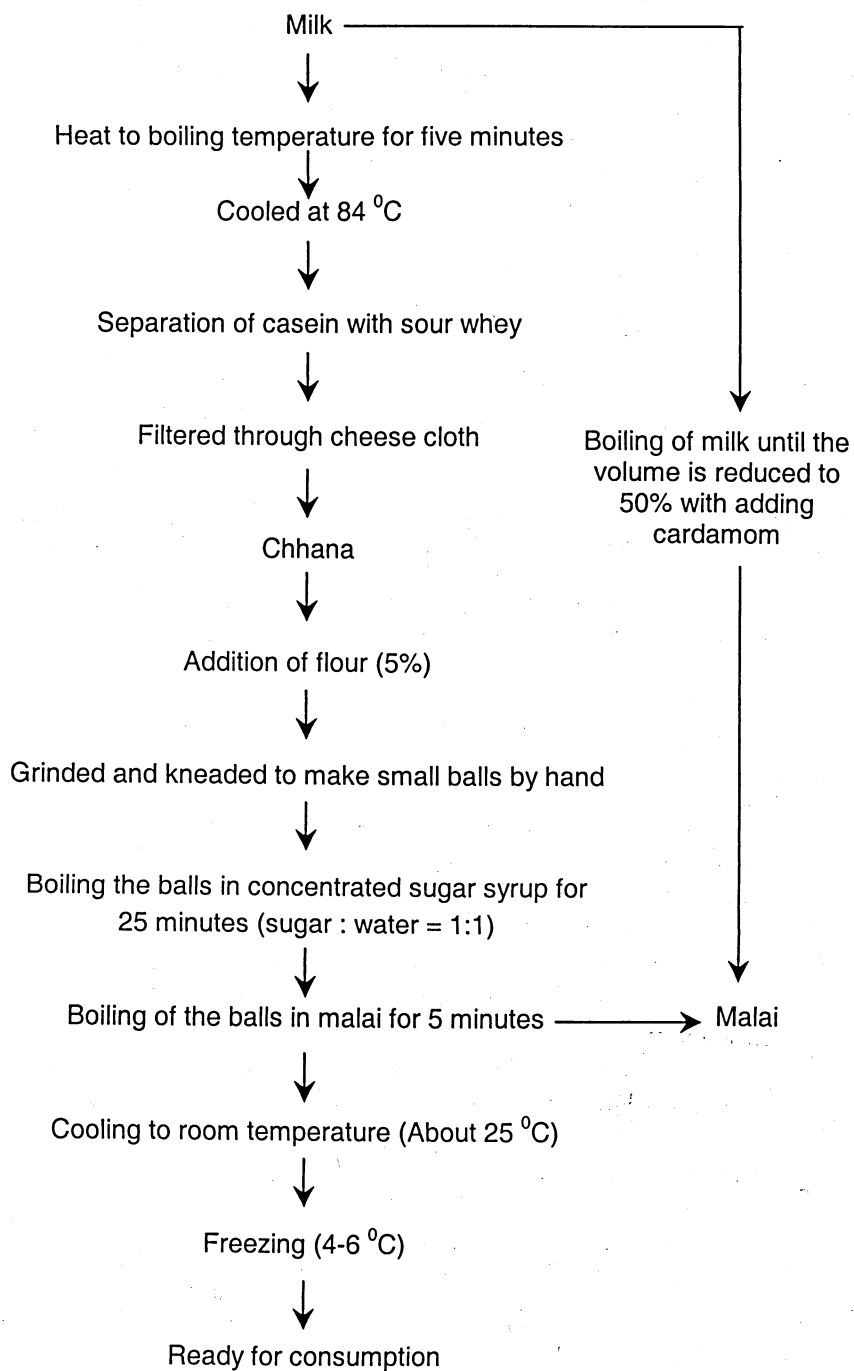


Fig. 1. Schematic diagram for the preparation of Rassomalai

**Table 1. Comparison of average score of various organoleptic characteristics of Laboratory made Rassomalai and the Rassomalai collected from five different districts of Bangladesh**

Physical Parameter	Sample						LSD value	Level of Significance
	A	B	C	D	E	F		
Flavour-45	43.59 <sup>a</sup> ± 0.42	34.91 <sup>c</sup> ± 0.74	35.46 <sup>c</sup> ± 2.02	39.32 <sup>b</sup> ± 1.80	36.66 <sup>c</sup> ± 1.99	34.61 <sup>c</sup> ± 0.60	2.55	**
Body and Texture-30	28.33 <sup>a</sup> ± 0.63	25.72 <sup>b</sup> ± 0.53	23.74 <sup>c</sup> ± 0.69	25.86 <sup>b</sup> ± 1.39	24.57 <sup>bc</sup> ± 0.89	23.30 <sup>c</sup> ± 0.24	1.44	**
Colour and Appearance-15	14.35 <sup>a</sup> ± 0.52	11.63 <sup>bc</sup> ± 0.42	11.34 <sup>bc</sup> ± 0.72	12.37 <sup>b</sup> ± 1.00	11.27 <sup>bc</sup> ± 0.88	10.44 <sup>c</sup> ± 0.41	1.24	**
Taste-10	9.19 <sup>a</sup> ± 0.36	6.34 <sup>c</sup> ± 0.06	6.67 <sup>c</sup> ± 0.57	7.68 <sup>b</sup> ± 0.72	6.41 <sup>c</sup> ± 0.02	6.32 <sup>c</sup> ± 0.25	0.74	**
Overall score obtained	95.46 <sup>a</sup> ± 1.45	78.59 <sup>c</sup> ± 0.80	77.20 <sup>c</sup> ± 3.96	85.00 <sup>b</sup> ± 4.18	78.92 <sup>c</sup> ± 3.64	73.85 <sup>c</sup> ± 0.93	5.14	**

Mean value in a row with different superscripts differ significantly

\*\*Significantly different at  $P < 0.01$ , Note : A = Laboratory made Rassomalai, B = Rassomalai collected from Comilla, C = Rassomalai collected from Sherpur, D = Rassomalai collected from Mymensingh, E = Rassomalai collected from Dhaka, F = Rassomalai collected from Jessore

### Chemical parameters

The moisture content of Rassomalai samples A, B, C, D, E and F were  $528.9 \pm 6.2$ ,  $559.4 \pm 8.3$ ,  $469.1 \pm 2.1$ ,  $490.3 \pm 23.7$ ,  $497.7 \pm 4.5$  and  $510.3 \pm 39.4$  g/kg respectively. There was a significant difference ( $P < 0.01$ ) in moisture content of the samples (Table 2). The maximum moisture content was noticed in sample B and the lowest moisture content was found in sample C. Increased level of moisture content in Rassomalai may be due to the effect of duration of cooking. The dry matter content of Rassomalai samples of A, B, C, D, E and F were  $471.1 \pm 6.2$ ,  $440.6 \pm 8.3$ ,  $530.9 \pm 2.2$ ,  $509.7 \pm 23.7$ ,  $502.3 \pm 4.5$  and  $469.8 \pm 5.3$  g/kg respectively. Significant difference ( $P < 0.01$ ) was found in respect of dry matter of the sample (Table 2). The protein content of Rassomalai samples of A, B, C, D, E and F were  $173.0 \pm 4.2$ ,  $146.6 \pm 2.2$ ,  $149.7 \pm 4.9$ ,  $153.1 \pm 5.1$ ,  $146.7 \pm 2.5$  and  $145.5 \pm 5.5$  g/kg respectively. There was a significant difference ( $P < 0.01$ ) in protein content of the samples (Table 2). The fat content of Rassomalai samples of A, B, C, D, E and F were  $80.0 \pm 0.2$ ,  $61.3 \pm 1.2$ ,  $62.2 \pm 1.1$ ,  $60.4 \pm 1.0$ ,  $60.2 \pm 0.9$  and  $59.8 \pm 0.2$  g/kg respectively. Statistical analysis showed that there was a significant difference ( $P < 0.01$ ) in fat content within different six samples (Table 2). Fat content was the highest in sample A among six samples and Sample F was the lowest. Increased level of fat content in Rassomalai due to the effect of pure chhana. The carbohydrate content of the Rassomalai samples of A, B, C, D, E and F were  $204.9 \pm 4.2$ ,  $220.5 \pm 5.0$ ,  $304.3 \pm 3.9$ ,  $282.4 \pm 25.5$ ,  $283.1 \pm 7.0$  and  $249.3 \pm 3.4$  g/kg respectively. Statistical analysis showed that there was a significant difference ( $P < 0.01$ ) in carbohydrate content among the means of six different samples (Table 2). Carbohydrate content of Rassomalai samples depended upon the addition of sugar and starchy materials. The g/kg of ash content of Rassomalai samples of A, B, C, D, E and F were  $13.2 \pm 0.2$ ,  $12.1 \pm 0.8$ ,  $14.6 \pm 1.1$ ,  $13.7 \pm 1.0$ ,  $12.3 \pm 0.2$  and  $15.2 \pm 0.4$ , respectively. Significant difference ( $P < 0.01$ ) was found in respect of ash content of the samples (Table 2). Table 2 shows that the ash content of Rassomalai samples differed widely. The acidity per cent of Rassomalai samples of A, B, C, D, E and F were  $0.38 \pm 0.05$ ,  $0.53 \pm 0.03$ ,  $0.47 \pm 0.05$ ,  $0.37 \pm 0.03$ ,  $0.32 \pm 0.03$  and  $0.52 \pm 0.03$ , respectively.

Statistical analysis showed that there was a significant difference ( $P<0.01$ ) between the acidity content of the samples. Acidity of B and F was higher than other samples indicating that their quality was slightly lower. The pH value of Rassomalai samples of A, B, C, D, E and F were  $6.27\pm0.06$ ,  $5.90\pm0.00$ ,  $6.03\pm0.06$ ,  $6.07\pm0.06$ ,  $6.03\pm0.06$  and  $5.90\pm0.00$ , respectively. Statistical analyses showed that there were significant difference ( $P<0.01$ ) within the pH value of different samples. The pH of Laboratory made Rassomalai and different district Rassomalai were within the accepted level. On the other hand it was found that pH value also depends on the fat per cent of milk. Kanwal Soni *et al.* (1980) reported that the fat content of chhanna increased with increasing of pH.

**Table 2. Comparison of average score of various chemical composition of Laboratory made Rassomalai and the Rassomalai collected from five different districts of Bangladesh**

Chemical Parameter	Sample						LSD value	Level of Significance
	A	B	C	D	E	F		
Moisture (g/kg)	528.9 <sup>ab</sup> $\pm 6.2$	559.4 <sup>a</sup> $\pm 8.3$	469.1 <sup>d</sup> $\pm 2.1$	490.3 <sup>cd</sup> $\pm 23.7$	497.7 <sup>bcd</sup> $\pm 4.5$	510.3 <sup>bc</sup> $\pm 39.4$	34.4	**
Dry matter (g/kg)	471.1 <sup>c</sup> $\pm 6.2$	440.6 <sup>d</sup> $\pm 8.3$	530.9 <sup>a</sup> $\pm 2.2$	509.7 <sup>b</sup> $\pm 23.7$	502.3 <sup>b</sup> $\pm 4.5$	469.8 <sup>c</sup> $\pm 5.3$	19.9	**
Protein (g/kg)	173.0 <sup>a</sup> $\pm 4.2$	146.6 <sup>b</sup> $\pm 2.2$	149.7 <sup>b</sup> $\pm 4.9$	153.1 <sup>b</sup> $\pm 5.1$	146.7 <sup>b</sup> $\pm 2.5$	145.5 <sup>b</sup> $\pm 5.5$	7.6	**
Fat (g/kg)	80.0 <sup>a</sup> $\pm 0.2$	61.3 <sup>bc</sup> $\pm 1.2$	62.2 <sup>b</sup> $\pm 1.1$	60.4 <sup>c</sup> $\pm 1.0$	60.2 <sup>c</sup> $\pm 0.9$	59.8 <sup>c</sup> $\pm 0.2$	1.5	**
Carbohydrate(g/kg)	204.9 <sup>d</sup> $\pm 4.2$	220.5 <sup>d</sup> $\pm 5.0$	304.3 <sup>a</sup> $\pm 3.9$	282.4 <sup>b</sup> $\pm 25.5$	283.1 <sup>b</sup> $\pm 7.0$	249.3 <sup>c</sup> $\pm 3.4$	20.2	**
Ash (g/kg)	13.2 <sup>cd</sup> $\pm 0.2$	12.1 <sup>d</sup> $\pm 0.8$	14.6 <sup>ab</sup> $\pm 1.1$	13.7 <sup>bc</sup> $\pm 1.0$	12.3 <sup>d</sup> $\pm 0.2$	15.2 <sup>a</sup> $\pm 0.4$	1.3	**
Acidity %	3.8 <sup>b</sup> $\pm 0.5$	5.3 <sup>a</sup> $\pm 0.3$	4.7 <sup>a</sup> $\pm 0.5$	3.7 <sup>bc</sup> $\pm 0.3$	3.2 <sup>c</sup> $\pm 0.3$	5.2 <sup>a</sup> $\pm 0.3$	0.6	**
pH	62.7 <sup>a</sup> $\pm 0.6$	59.0 <sup>c</sup> $\pm 0.0$	60.3 <sup>b</sup> $\pm 0.6$	60.7 <sup>b</sup> $\pm 0.6$	60.3 <sup>b</sup> $\pm 0.6$	59.0 <sup>c</sup> $\pm 0.0$	0.8	**

Mean value in a row with different superscripts differ significantly

\*\*Significantly different at  $P<0.01$ , Note : A = Laboratory made Rassomalai, B = Rassomalai collected from Comilla, C = Rassomalai collected from Sherpur, D = Rassomalai collected from Mymensingh, E = Rassomalai collected from Dhaka, F = Rassomalai collected from Jessore.

The results of present study revealed that moisture, dry matter, protein, fat, carbohydrate, ash, acidity and pH had a significant effect ( $P<0.01$ ). Similar results were found by Islam *et al.* (2003).

### Microbiological status

The number of total viable count per ml of Rassomalai samples of A, B, C, D, E and F were  $2.78\pm0.00$ ,  $3.11\pm0.04$ ,  $2.95\pm0.10$ ,  $3.14\pm0.03$ ,  $2.89\pm0.01$  and  $2.87\pm0.02$ , respectively. There was a significant difference ( $P<0.01$ ) in total viable count of the samples (Table 3). Table 3 indicates that the number of total viable count in sample A was the lowest and D was the highest among six samples. The number of coliform bacteria per ml of Rassomalai presented in Table 3. The number of coliform per ml of Rassomalai of A, B, C, D, E and F samples were

0.00±0.00, 1.03±0.89, 1.30±0.30, 1.42±0.10, 0.00±0.00 and 1.20±0.17, respectively. Statistical analysis showed that there was a significant difference ( $P<0.01$ ) of coliform contents within six different samples. Low coliform count in Laboratory made Rassomalai indicates that the hygienic quality of the Laboratory was good. The result of present study revealed that the total viable count and coliform count had a significant difference ( $P<0.01$ ). Islam *et al.* (2003) stated that total viable count had a significant difference ( $P<0.01$ ) but coliform count had non-significant difference.

**Table 3 Comparison of average score of various bacterial status of Laboratory made Rassomalai and the Rassomalai collected from five different districts of Bangladesh**

Bacterial Parameter	Sample						LSD value	Level of Significance
	A	B	C	D	E	F		
Total viable count/ml (Log count)	2.78 <sup>c</sup> ±0.00	3.11 <sup>a</sup> ±0.04	2.95 <sup>b</sup> ±0.10	3.14 <sup>a</sup> ±0.03	2.89 <sup>b</sup> ±0.01	2.87 <sup>b</sup> ±0.02	0.08	**
Coliform/ml (Log count)	0.00 <sup>b</sup> ±0.00	1.03 <sup>a</sup> ±0.89	1.30 <sup>a</sup> ±0.30	1.42 <sup>a</sup> ±0.10	0.00 <sup>b</sup> ±0.00	1.20 <sup>a</sup> ±0.17	0.70	**

Mean value in a row with different superscripts differ significantly

\*\*Significantly different at  $P<0.01$ , Note : A = Laboratory made Rassomalai, B = Rassomalai collected from Comilla, C = Rassomalai collected from Sherpur, D = Rassomalai collected from Mymensingh, E = Rassomalai collected from Dhaka, F = Rassomalai collected from Jessore

Judging from the results of all the parameters studied it was observed that Laboratory made Rassomalai was better than that of Rassomalai collected from different districts. In the Laboratory, Rassomalai was prepared by using standard method and good quality raw materials were used for its preparation. For this reason quality of Laboratory made Rassomalai was superior. In order to maintain the quality of product throughout the country Bangladesh Standard and Testing Institution (BSTI) could take appropriate steps in this connection.

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