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Consumers' preferences for processed milk – A study in Mymensingh town

F. A. Mila¹ and S. K. Raha²

¹Department of Agricultural Marketing & Business Management, Sylhet Agricultural University, Sylhet-3100, Bangladesh and ²Department of Agribusiness and Marketing, Bangladesh Agricultural University, Mymensingh-2202, Bangladesh, E-mail: fam_agecon@yahoo.com

Abstract

The study examined the consumer preference for processed milk in Mymensingh town. The study was mainly based on primary data in which 40 consumers were purposively selected from Mymensingh town. In the study, preference of consumers for processed milk i.e. powder milk, condensed milk and pasteurized milk were investigated. Consumers' preference for processed milk was ascertained through a 4-point numerical rating scale. The consumers highly preferred powder milk and the computed preference index of powder milk was 80. The computed preference index of pasteurized milk was 71. The computed preference index of raw milk was 54. The lowest preference of consumers was for condensed milk and the computed preference index of condensed milk was 36. The study revealed that Milk Vita has ranked first (90) followed by Diploma (85), Dano (81), Arong (68) and Red Cow (61) were the major brands preferred by the consumers. On the other hand, Danish (36), Nido (34), Starship (34), Marks (27) and Farmland (26) were less preferred for consumption of processed milk. The relationship between the factors that influencing consumer's preferences and their preferences of processed milk was also explored. Spearman rank correlation coefficient test was used to explore relationship between the variables. The monthly income of the family, price level, taste level, fat content, nutritional value and attitudes towards processed milk of the consumers were significantly related with their preferences of processed milk while the other factors (age, family size, education level) were not significantly related.

Keywords: Processed milk, Consumer preference, Spearman rank correlation coefficient test

Introduction

The milk market of Bangladesh is basically comprised of liquid and powder milk. At present, about 45 brands of processed milk are available in the market and if it takes into account those that are less prominent the number could rise to more than 60. Melamine contamination may be a recent phenomenon but it can be safely assumed that Bangladesh milk market has for long been unsafe with adulterated and low quality products (The Executive Times, November 2008).

Milk consumption should be at least 120 gm per day (as fluid or processed in any form) per person in Bangladesh. The annual milk demand would be about 5.70 million tonnes for about 130 million people of Bangladesh (Hemme *et al.* 2004). As now the population has increased, the demand is likely to be more than 6 million tonnes (The Executive Times, November 2008). However, given that most of the populations are poor, such a demand is hard to fulfill. Also, milk is widely used in the making of different products such as sweets, yoghurt and ice cream, which means the potential demand for milk in the country, is quite large indeed. As per some available data domestic production of milk in the country is now about 2.5 million tons (The Executive Times, November 2008).

The emergence of high income urban population group has changed the pattern of milk use. They show the preference for processed milk and milk products over ordinary raw milk because of ordinary raw milk is relatively much more perishable and susceptible to disease and processed milk and milk products are convenient to handle and have higher value and facilitate large scale use especially at the time of festivals. Therefore, the use of condensed milk, pasteurized milk, milk beverage, milk powder, butter, ghee, cheese, baby food etc., have been considerably increased and housewives of high income group in urban areas prefer them.

The Arla Food Ingredients (AFI) brand Dano occupies the highest market share (26 per cent) of the total market for powdered milk in Bangladesh. The powdered milk market is extremely price sensitive and the competition is tough among different brands, particularly, the brands Dano, Nido, Red Cow and Diploma and so these brands have been doing aggressive marketing, spending millions of taka on television and newspaper for different promotional activities.

Many of the top brands of powdered milk and condensed milk in Bangladesh have been operating here since before the country's independence. However, the real growth of the powdered milk market actually took place during the mid 90s and in the new millennium.

A good number of studies have been conducted on consumption pattern and consumer preference of milk in Bangladesh. But to the best of author's knowledge no study on consumer preferences for processed milk are conducted in Bangladesh. So, this has inspired the researcher to conduct a study on processed milk marketing. It is expected that result of the study will help to knock the door of policy maker in formulating different policies in the aspects of processed milk marketing. The study, therefore, may serve as a basis for further study.

Recognizing the important contribution of processed milk in the national economy, the present study examined the consumer preferences for processed milk at Mymensingh town. The specific objective of the study is to assess consumers' preferences for processed milk.

The paper is divided into four sections. Materials and methods are discussed in section two while results and discussion are placed in section three. Conclusions are drawn in final section.

Materials and Methods

Mymensingh town was considered as the typical towns in terms of consumption of processed milk as large number of educational institutions are located here. So, Mymensingh town was selected for this study. Purposive sampling technique was used for selection of respondents of this study. The researcher was required to draw samples of consumers from the different stages to meet the objectives of the study. In the study, 40 consumers were selected purposively. Selected respondents were interviewed directly with the help of pre-tested survey schedules during February to March, 2009. Collected data were checked and crosschecked before transferring to the computer. In analyzing the data, tabular and statistical methods were used to fulfill the objectives of the study.

Variables of the study and their management

For clear understanding about consumers preferences for different types of processed milk, 4-point numerical rating scales were used. The processed milk consists of three types such as powder milk, pasteurized milk and condensed milk. The powder milk also consists of 8 brands. These were Dano, Diploma, Starship, Nido, Fresh, Red Cow, Marks, and Farmland. Again the pasteurized milk consists of 4 brands. These were Milk Vita, Arong, Aftab and Pran. The condensed milk consists of only 2 brands. These were Danish and Starship sweetened condensed milk.

In all relationships, two kinds of variables are identified, one is the dependent variable and the other is the independent variable. An independent variable is that factor, manipulated by the experimenter, in his or her attempt to ascertain the relationship with an observed phenomenon. A dependent variable is that factor which appears, disappears or varies as the experimenter introduces, removes or varies the independent variable (Townsend, 1953).

For clear understanding of preference of consumers towards processed milk a detailed brand-wise preferences as well as rank order were computed in the present study. Spearman rank correlation coefficient was used to measure the extent of preference and to determine the relationship between preference of processed milk and the factors influencing consumers' preferences.

Measurement of independent variables: Nine selected factors that influencing the consumers to purchase processed milk were the independent variables of this study. These were age, level of education, family size, monthly income of the family, price level of processed milk, taste of processed milk, nutritional value of processed milk, fat content of processed milk and consumers' attitude towards processed milk. Measuring devices of these independent variables are described below:

Age: Age of a consumer was measured in terms of actual years from his/her birth to the time of interview on the basis of his/her statement. A score of one (1) was assigned for each years of his/her age.

Level of education: The education of a consumer was measured on the basis of his/her level of education in the educational institutions. It was expressed in score. A score of one was given for passing each level in educational institution. For example, if a respondent had the education equal to or equivalent of class VII, his education score was taken as 7.

Family size: The family size was measured by the number of family members of a consumer. The family members included the respondent, his/her spouse (if any) and other dependent members. A score of one was assigned for each member of the family.

Monthly income of the family: This refers to the total earning in taka of all the family members of a respondent in a month. Family income was measured in 'thousand' taka and a score was given to one thousand taka.

Price level of processed milk: Price level of processed milk was measured by the scoring which was done in the following manner.

Table 1. Price Level of Processed Milk & Their Score Value

Price level	Assigned score
High price	1
Moderate price	2
Low price	3

That is, high price means low preference; moderate price means moderately preferred and low price means high preference.

Nutritional value of processed milk: On the basis of consumers' opinion, nutritional value of processed milk was measured by their preference of nutritional value of processed milk i.e. highly nutritious means high preference, moderately nutritious means moderately preferred and low nutritious means little preference. The nutritional value score was computed in the following manner:

Table 2. Nutritional Value of Processed Milk & Their Score Value

Nutritional value	Assigned score
Low nutritious	1
Moderately nutritious	2
Highly nutritious	3

Fat content of processed milk: From consumers view, fat content of processed milk was measured by the preference level of fat content of processed milk i.e. high fat content means high preference, moderate fat content means moderately preferred and low fat content means low preference. The scoring of fat content was done in the following manner:

Table 3. Fat Content of Processed Milk & Their Score Value

Fat content	Assigned score
Low fat content	1
Moderate fat content	2
High fat content	3

Taste level of processed milk: Taste level of processed milk was measured by the preference level of taste of processed milk i.e. high taste means high preference, moderate taste means moderately preferred and low taste means low preference. The scoring of taste was done in the following manner:

Table 4. Taste Level of Processed Milk & Their Score Value

Taste level	Assigned score
Low taste	1
Moderate taste	2
High taste	3

Consumers attitude towards processed milk: For measuring consumers attitude towards processed milk 5 statements were used. The answers to these statements were yes or no. Score 0 was assigned for no and score 1 was assigned for yes. Thus the consumers' attitude towards processed milk was obtained by adding the score of all 5 items and it ranged from 0 to 5, 0 indicating no favourable attitude towards processed milk and 5 indicating very favourable attitude towards processed milk. The following five questions were used to measure attitude towards processed milk.

Measurement of dependent variables

Preferences of processed milk were dependent variable for this study. To measure the preference of processed milk of a consumer 14 selected brands of processed milk were identified during pre-testing of the interview schedule. A 4-point numerical rating scale was developed to explore the extent of preference of processed milk. The weights were assigned to each of the responses in the following way:

Table 5. Extent of Preference and Their Measurements

Extent of preference	Weights
No preference at all	0
Little preference	1
Moderate preference	2
High preference	3

Preference score of a respondent could range from 0 to 42, 0 indicating no preference and 42 indicating high preference.

For clear understanding and in depth analysis of preference of a respondent to processed milk, rank order for each of the brands of processed milk was computed by using the following formula (Jamal, 1996):

$$\text{Computed Preference Index (CPI)} = C_{hp} \times 3 + C_{mp} \times 2 + C_{lp} \times 1 + C_{np} \times 0$$

Where, C_{hp} = Consumers with high preference

C_{mp} = Consumers with moderate preference

C_{lp} = Consumers with little preference

C_{np} = Consumers with no preference

The CPI value for a processed milk could range from 0 to 120, 0 indicating no preference and 120 the very high preference.

Estimation of consumer preference for processed milk

Descriptive analysis: For estimating consumer preference for processed milk some statistical measures such as number, frequency counts, percentage, range, mean, standard deviation and rank order were used in describing the selected variables, whenever applicable. Null hypotheses to be tested for assessing consumers' preferences for processed milk are given below:

- i) H_0 : There is no relationship between preference of processed milk and age of the consumers.
- ii) H_0 : There is no relationship between preference of processed milk and income level.
- iii) H_0 : There is no relationship between preference of processed milk and education level.
- iv) H_0 : There is no relationship between preference of processed milk and family size.

- v) H_0 : There is no relationship between preference of processed milk and price level.
- vi) H_0 : There is no relationship between preference of processed milk and taste level.
- vii) H_0 : There is no relationship between preference of processed milk and nutritive value.
- viii) H_0 : There is no relationship between preference of processed milk and level of fat content.
- ix) H_0 : There is no relationship between preference of processed milk and attitude towards processed milk.

Spearman Rank Correlation Co-efficient (r) was used to test the formulated hypothesis of the study and to determine the nature of relationship between the dependent and independent variables. Five percent level of probability was used as a basis for accepting or rejecting the null hypothesis. The analysis was performed by using statistical treatment with SPSS computer package.

Results and Discussion

Consumer's physical, psychological and social environment affects his/her motives for product usages and how he/she evaluates products (Solomon, 2003, p. 290). All the consumers together constitute the consumer market. Consumers play the key role in guiding an economy to the production of goods and services that they demand. Consumer's research is extremely important to market strategy, because knowledge of the factors influencing consumer-buying behaviour and consumer's preference towards a product can help increase market share.

Preference for powder milk

According to preference level of powder milk of the consumers, they were classified into four categories (Table 6).

Table 6. Distribution of consumers according to their preferences for powder milk

Level of preference	Number	Percent
No preference	04	10.00
Low preference	07	17.50
Moderate preference	14	35.00
High preference	15	37.50
Total	40	100.00

Table 6 shows that 10 percent of the consumers had no preference, about 18 percent of the consumers had low preference, 35 percent of the consumers had moderate preference and about 38 percent of the consumers had high preference for powder milk.

Preference for pasteurized milk

According to preference level of pasteurized milk of the consumers, they were classified into four categories that are presented in Table 7.

Table 7. Distribution of consumers according to their preferences for pasteurized milk

Level of preference	Number	Percent
No preference	06	15.00
Low preference	09	22.50
Moderate preference	13	32.50
High preference	12	30.00
Total	40	100.00

Table 7 indicates that 15 percent of the consumers showed no preference while about 23 percent of the consumers showed little preference for pasteurized milk. About 33 percent of the consumers had moderate preference and 30 percent of the consumers had high preference for pasteurized milk.

Preference for condensed milk

The consumers were also classified into four categories on the basis of preference level of condensed milk which are given in Table 8.

Table 8. Distribution of consumers according to their preferences for condensed milk

Level of preference	Number	Percent
No preference	17	42.50
Low preference	14	35.00
Moderate preference	5	12.50
High preference	4	10.00
Total	40	100.00

Table 8 shows that about 43 percent of the consumers had no preference, 35 percent of the consumers had low preference for condensed milk and about 13 percent of the consumers showed moderate preference while other 10 percent of the consumers showed high preference for condensed milk.

Consumers' preferences for different types of processed milk

The preferences of the consumers for different types of processed milk are presented in Table 9.

Table 9. Rank order and computed preference Index (CPI) of the consumers of processed milk in Mymensingh town

Categories	Highly preferred	Moderately preferred	Low preference	No preference at all	Total score (CPI)	Rank order
Powder milk	15	14	07	04	80	1
Pasteurized liquid milk	12	13	09	06	71	2
Condensed milk	04	05	14	17	36	4

The findings presented in Table 9 indicate that the preferences for processed milk varied from consumers to consumers and product to product. The table shows that the consumers highly preferred powder milk and the computed preference index of powder milk was 80. The second highest preference of consumers was pasteurized milk and the computed preference index of pasteurized milk was 71. The lowest preference of consumers was condensed milk and the computed preference index of condensed milk was 36. The computed preference index for different types of processed milk is shown in Fig. 1.

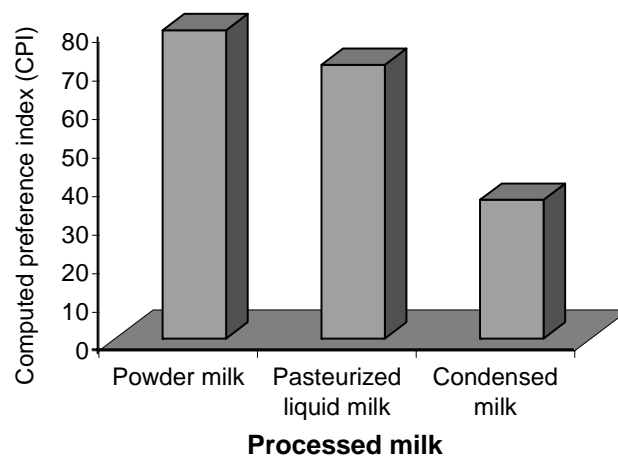


Fig. 1. Computed preference index of different types of processed milk

Extent of preference of processed milk

The extent of preference of processed milk score of the consumers ranged from 8 to 27, against the possible range of 0 to 42. The mean value and standard deviation were 18.15 and 4.80 respectively. According to preference of processed milk scores, the consumers were classified into three categories and presented in Table 10.

Table 10. Distribution of the consumers according to their preference scores

Characteristics	Possible range	Observed range	Category	Number	Percent	Mean	Standard deviation
Preference of processed milk	0-42	8-27	Low (1-10)	5	12.5	18.15	4.80
			Medium (11-20)	22	55		
			High (21 & above)	13	32.5		
Total				40	100		

Table 10 indicates that the highest proportion (55 percent) of the consumers had medium preference of processed milk as compared to high preference (32.5 percent) and only 12.5 percent had low preference. This means that all the consumers of the study area had moderate preference of processed milk. The findings are also presented in Fig. 2.

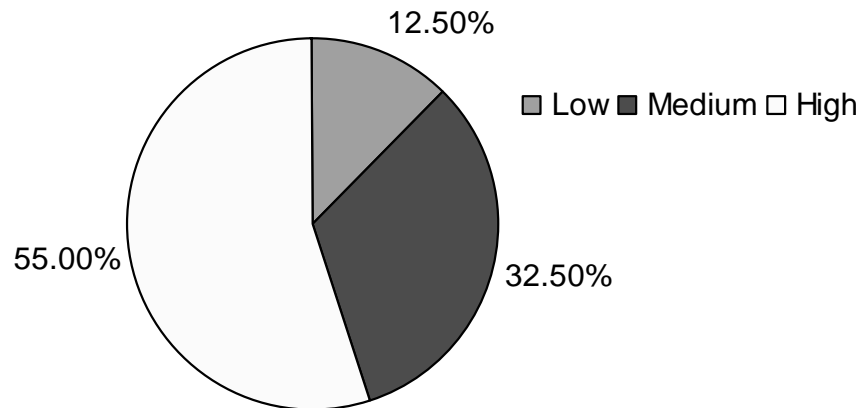


Fig. 2. Consumer's preferences for processed milk

In order to measure the extent of preference to each type of processed milk a CPI (computed preference index) was calculated and presented in Table 11.

In the present study, 14 different brands of processed milk were taken to measure the extent of preference. The value of CPI of processed milk could range from 0 to 120 while 0 indicating no preference and 120 indicating very high preference of processed milk. The information of Table 12 shows that Milk vita has ranked first (90) followed by Diploma (85), Dano (81), Arong (68) and Red cow (61) which were the major brands preferred by the consumers. Danish (36), Nido (34), Starship (34), Marks (27) and Farmland (26) were less preferred processed milk.

Factors influencing consumer preference for processed milk

Relationship between the factors influencing consumers' preference with their preferences of processed milk: This section describes the relationship between the nine selected factors (independent variables) that influenced the consumers' preference towards processed milk (dependent variable). The summary of the results of correlation analysis are shown in Table 12.

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Table 11. Rank orders of different brands of processed milk on the basis of computed preference Index (CPI)

Brands of processed milk		Extent of preference				CPI	Rank order
		High preference	Moderate preference	Little preference	No preference at all		
Powdered milk	Dano	14	18	3	5	81	3
	Diploma	17	16	2	5	85	2
	Starship	0	9	24	7	42	8
	Red Cow	5	15	14	6	61	5
	Nido	2	6	16	16	34	10
	Fresh	0	17	13	10	47	7
	Farmland	0	3	20	17	26	14
	Marks	0	5	17	18	27	13
Pasteurized milk	Milk Vita	23	10	1	6	90	1
	Aftab	0	15	18	7	48	6
	Arong	7	21	5	7	68	4
	Pran	1	11	15	13	40	9
Condensed milk	Danish	4	5	14	17	36	11
	Starship	2	7	14	17	34	12

Table 12. Correlation Co-efficient between two variables

Dependent variables	Independent variables/ Factors	Value of "r"	Table values with (n-2) df at	
			5%	1%
Preference of Processed milk	Age	0.093 ^{NS}	0.313	0.404
	Level of education	0.306 ^{NS}		
	Family size	0.084 ^{NS}		
	Monthly income of the family	0.367*		
	Price level	-0.395*		
	Nutritional value	0.372*		
	Taste level	0.318*		
	Fat content	0.406**		
	Attitude towards processed milk	0.327*		

** Correlation is significant at the 0.01 level (2-tailed), critical value (0.01) = 0.404

* Correlation is significant at the 0.05 level (2-tailed), critical value (0.05) = 0.313

N= 40, Degrees of freedom= 38, NS= Not Significant

Age and preference of processed milk: The coefficient of correlation between the concerned variables was found to be 0.093. The computed value of 'r' (0.093) was smaller than the tabulated value (r = 0.313) with 38 degrees of freedom at 0.05 level of probability. Hence, the relevant null hypothesis was accepted and it was concluded that age of the respondents had no significant relationship with their preferences of processed milk.

Education and preference of processed milk: The coefficient of correlation between the concerned variables was found to be 0.306. The computed value of 'r' (0.306) was smaller than the tabulated value (r = 0.313) with 38 degrees of freedom at 0.05 level of probability. Therefore, the null hypothesis was

accepted and it was concluded that education level of the consumers had no significant relationship with their preferences of processed milk. This means that the education level of consumers created no influence to purchase processed milk.

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Family size and preference of processed milk: The coefficient of correlation between the concerned variables was found to be 0.084. The computed value of 'r' (0.084) was smaller than the tabulated value ($r = 0.313$) with 38 degrees of freedom at 0.05 level of probability. So, the null hypothesis was accepted and hence it was concluded that family size of the respondents had no significant relationship with their preference of processed milk.

Monthly income of the family and preference of processed milk: The coefficient of correlation between the concerned variables was found to be 0.367. The computed value 'r' (0.367) was greater than the tabulated value ($r = 0.313$) with 38 degrees of freedom at 0.05 level of probability. Therefore, the null hypothesis was rejected and hence it can be concluded that monthly income of the family of the consumers had significant positive relationship with their preference of processed milk. This means that the consumers with higher income were more interested to purchase processed milk.

Price level and preference of processed milk: The coefficient of correlation between the concerned variables was found to be -0.395. The computed value of 'r' (0.395) was greater than the tabulated value ($r = 0.313$) with 38 degrees of freedom at 0.05 level of probability. So, the null hypothesis was rejected and it can be concluded that the price level had significant negative relationship with the preference of consumers toward processed milk. This means that the consumers showed more favourable attitude towards preference of processed milk if their price was low. It was found that the consumers who thought the processed milk price was low were more interested to purchase processed milk.

Nutritional value and preference of processed milk: The coefficient of correlation between the concerned variables was found to be 0.372. The computed value of 'r' (0.372) was greater than the tabulated value ($r = 0.313$) with 38 degrees of freedom at 0.05 level of probability. Therefore, the null hypothesis was rejected and hence it can be concluded that nutritional value of processed milk had significant positive relationship with the preference of consumers towards processed milk. This means that the consumers showed more favourable attitude towards preference of processed milk if the processed milk was highly nutritious. It was found that the consumers who thought the processed milk was highly nutritious were more interested to purchase processed milk.

Taste level and preference of processed milk: The coefficient of correlation between the concerned variables was found to be 0.318. The computed value of 'r' (0.318) was greater than the tabulated value ($r = 0.313$) with 38 degrees of freedom at 0.05 level of probability. So, the null hypothesis was rejected and hence it can be concluded that taste level of processed milk had significant positive relationship with the preference of consumers towards processed milk. This means that the consumers showed more favourable attitude towards preference of processed milk if the processed milk was high taste. It was found that the consumers who thought the taste of processed milk was high were more interested to purchase processed milk.

Fat content and preference of processed milk: The coefficient of correlation between the concerned variables was found to be 0.406. This relationship showed a positive trend and the computed value of 'r' (0.406) was greater than the tabulated value ($r = 0.404$) with 38 degrees of freedom at 0.01 level of probability. Therefore, the null hypothesis was rejected and hence it can be concluded that fat content of processed milk had significant positive relationship with the preference of consumers towards processed milk. This means that the consumers showed more favourable attitude towards preference of processed milk if the processed milk had high fat content. It was found that the consumers who thought the fat content of processed milk was high were more interested to purchase processed milk.

Attitude towards processed milk and preference of processed milk: The coefficient of correlation between the concerned variables was found to be 0.327. This relationship showed a positive trend and

the computed value of 'r' (0.327) was greater than the tabulated value ($r = 0.313$) with 38 degrees of freedom at 0.05 level of probability. Therefore, the null hypothesis was rejected and hence it can be concluded that attitude towards processed milk had significant positive relationship with the preference of consumers towards processed milk. It was found that the consumers were more interested to purchase processed milk because of their favourable attitude towards processed milk.

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Conclusion

The study reveals that the level of preferences for processed milk to consumers was significant. So, there is a good opportunity for the development of the marketing system of processed milk by increasing domestic production of milk as well as reduction of dependency on imported processed milk. In the wake of the recent controversy over toxic melamine in milk, the best way to meet the milk demand is to expand dairy production at farm and household levels.

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