Prospects and Problems of Small-holders Dairy Farming: A Case of Bhaluka Upazila in Mymensingh District of Bangladesh

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Abstract

This study examined the profitability of small-holders' dairy farming in Bhaluka Upazila of Mymensingh district in Bangladesh. Five villages namely: Bhaluka, Voradoba, Dhitpur, Birunia and Kachina were purposively selected for the study. Total sample size altogether was 50. Descriptive statistics, activity budget and Cobb-Douglas model were used to achieve the main objectives. The study revealed that farming was the main occupation of the selected dairy farmers, and relatively young (30.01 to 40.0 years) and educated people were involved in dairy farming. The study confirmed that the small-holders' dairy farming was profitable, although they had to face a lot of problems in conducting dairy farming. Scarcity of feed and fodder, lack of improved breed, lack of veterinary care and services, insufficient institutional credit and high prices of concentrate feed were identified as the major problems of small-holders' dairy farming. Availability of feed at fair prices, veterinary services, availability of corruption-free institutional credit, and improved breeding and marketing facilities could be the immediate steps that should be taken for improving small-holders' dairy farming in Bangladesh. Self-employment opportunities could thereby be generated for rural youths, supply of meat, milk, hides and skins as well as cow-dung (used as fuel, manure and raw materials of bio-gas plant) could be increased and thus, income and better living standard of rural people could be ensured.

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1.   Introduction

Dairy farming is an integral part of agricultural production system in Bangladesh. A large segment of population in Bangladesh lives below the recommended calorie intake of 2122 cal/day. Health and sanitation largely influence the livelihood of the rural family. The rural people of the country suffer from malnutrition. There is no more complete food than milk yet known to mankind. Milk and meat are very rich in nutrient contents which are essential for maintenance of human health. The other products of dairy cow such as, hides and skins, bones and horns are used as raw materials in agro-based industries. Livestock sub-sector generates a significant amount of foreign exchange through the export of hides and skins, leather products, bones, horns, hooves, meats, edible and live animals. Among different export items of livestock, leather and leather goods earn a lot of foreign exchange every year. About 80 percent of national milk output is produced by smallholder producer owning an average of 1- 2 local cows giving 1 to 2 litres of milk per day, the remainder are produced by large farm owning 5 or more cows. About 50.0 percent of the cows of small-holders' are also used for draught purposes as poor farmers cannot afford to raise both dairy and male draught cattle due to feed shortage (Jabbar and Green1983; and Alam 1995).

It may be noted that cattle population had lower growth rates compared to human population over the last three decades. High mortality rate, slaughtering of good quality young cattle in large numbers, more especially during the greatest Muslim festival (i.e., in *Eidul-Azha*) and unplanned slaughtering of cattle for meat throughout the year are the main factors responsible for the slower growth rate of cattle population in Bangladesh. As a result, there exists an acute shortage of animal protein; and hence, the intake of milk and meat in our daily diet is gradually declining.

Dairy cows produce milk and meat for human consumption. The other products of dairy cows such as hides and skins, bones and horns, as stated earlier, are used as industrial raw materials. The cow-dung is essential nutrient for maintaining soil fertility. In rural areas, cow-dung is dried and used as fuel for cooking purpose. At present, cow-dung is gradually being used as raw material of bio-gas plant. Dairy cows provide substantial cash income out of the sales of milk. Since dairy is a labour intensive activity, people rear dairy cows as a major source of their family income and in this sense, dairy helps in poverty alleviation.

Nevertheless, a remarkable number of dairy farms have been established in the country. As a result, local milk production and rural employment opportunity have

increased. At present, livestock sector is one of the most important sectors in agriculture and the people are taking up the dairy cow rearing as a profession. Despite the fact, there is a wider gap between demand and supply of milk in the country. As a consequence, the country has to import a huge quantity of powder milk by spending its hard-earned foreign currency every year. Under the circumstances, the need for dairy research has become imperative in this country. Moreover, dairy products like butter, *ghee* and cheese have high nutritive value and their demands are increasing day by day due to the positive income effect of the people. Thus for promoting the interest of both producers and consumers, the need for encouraging milk supplies to meet increasing demand is an urgent need at present in Bangladesh. This study was, therefore, designed to investigate the problems and prospects of small-holders' dairy farming in Bangladesh.

Some research studies (Jabbar and Raha 1984, Halim 1992, and Talukder and Uddin 2000) concerning the economics of milk production of local and cross-breed dairy cows have so far been done in Bangladesh, but these are not enough to make any meaningful conclusion since, at present, feed, labour and other input costs are much higher than ever before. The economic characteristics of local breed dairy cows are yet to be confirmed and the profitability of house-hold dairy farming has not been clearly assessed. The findings of the present study are expected to be helpful to individual farmers by providing valuable insight into the problems of dairy cow owners, and policy makers may also find the study useful in making new policy regarding small-holders' dairy farming. The study will also generate valuable information to the researchers, NGO personnel as well as extension workers. This study was designed to achieve the following specific objectives:

i.   to identify the socioeconomic characteristics of small-holders' dairy farmers;
ii. to assess the profitability of small-holders' dairy farming;
iii to estimate the contribution of key variables in conducting dairy farming; and
iv. to identify the major socioeconomic problems facing the farmers in conducting dairy farming.

2.   Research Methods

Five adjacent villages namely: Bhaluka, Voradoba, Dhitpur, Birunia and Kachina of Bhaluka Upazila in Mymensingh district were selected purposively to achieve the main objectives of the study. In fact, a list of farmers, who raised at least one or two local breed cows, was prepared for each of the selected villages. Then ten

farmers from each village were selected randomly. Thus, the total sample size altogether became 50. After pretesting, a survey schedule was finalized to record the desired primary information from the small-holder dairy farmers. Data for 2010/11 were collected by the first author herself during July 2011.

Descriptive statistics, activity budgets (Dillon and Hardaker 1993) and Cobb-Douglas Production Function Model were employed to achieve the major objectives of the study. The following specification was made for the Cobb-Douglas model:

$$Y = aX_1^{b_1} \times X_2^{b_2} \times X_3^{b_3} \times X_4^{b_4} \times X_5^{b_5} \times e^{ui}$$

In log linear form it can be written as follows:

$$\ln Y = \ln a + b_1 \ln X_1 + b_2 \ln X_2 + b_3 \ln X_3 + b_4 \ln X_4 + b_5 \ln X_5 + Ui$$

Where,

Y	=	Value of the average milk yield per cow per day (Taka);
X_1	=	Value of paddy straw used per cow per day (Taka);
X_2	=	Value of green grass used per cow per day (Taka);
X_3	=	Value of bran used per cow per day (Taka);
X_4	=	Value of labour used per cow per day (Taka);
X_5	=	Value of veterinary cost used per cow per day (Taka);
In	=	Natural logarithm;
a	=	Intercept/constant;
bi	=	Production coefficients; and U = Error term.

3. Results and Discussion

3.1 Socioeconomic Characteristics of the Dairy Farmers

This section presents some basic socio-demographic characteristics (i.e., age, family size, level of education and occupation) of the selected dairy farmers having one to two local breed dairy cows.

The age groups of the selected farmers were classified into five categories such as: (i) 20.01 - 30.00 years; (ii) 30.01 - 40.00 years; (iii) 40.01 - 50.00 years; (iv) 50.01 - 60.00 years; and (v) Above 60.00 years. Table 1 indicates that the highest number of dairy farmers (34.00 percent) belonged to the age group of 30.01 - 40.00 years; 18.0 percent were in the age group of 20.00 - 30.00 years; 24.0 percent were in 40.01-50.00 years; 14 percent were in 50.01-60.00 years and 10 percent belonged to above 60.00 years age (Table 1).

As can be seen in Table 2, only 12.0 percent of the selected dairy farmers were illiterate. This implies that the majority of the dairy farmers were literate. None of

them were highly educated. Some 16.0 percent of the selected farmers can put their signature only. However, some of the selected dairy farmers (14.0 percent) had secondary while a few of them (6.0 percent) were educated up to higher

Table 1: Age Distribution of the Sample Dairy Farmers

Age group (years)	Number of dairy farmers	Percent of total
20.01 - 30.00	9	18.00
30.01 - 40.00	17	34.00
40.01 - 50.00	12	24.00
50.01 - 60.00	7	14.00
Above 60.00	5	10.00
Total	50	100

Source: Adapted from Pathan (2011, p. 36).

secondary level. This implies that, unlike crop farming, relatively educated people are coming up in this dairy business.

The work in which a person is usually engaged throughout the year is known as his/her main occupation. It appeared from Table 3 that agriculture was still the primary occupation of 80.0 percent of the selected dairy farmers. Apart from crop farming, these farmers have gradually been switching over to dairy farming for increasing household income and year-round employment of family members.

Table 2: Literacy Levels of the Selected Dairy Farmers in Bhaluka Upazila

Literacy level	Number of dairy farmer s	Percent
Illiterate	6	12.00
Can sign only	8	16.00
Primary	26	52.00
Secondary	7	14.00
Higher secondary and above	3	6.00
Total	50	100

Source: Adapted from Pathan (2011, p. 37).

Nevertheless, small business and service were also the main occupation of 16.0 and 4.0 percent of the small-holder dairy farm owners, respectively (Table 3).

The above-mentioned survey results clearly indicate that the relatively younger and educated farmers are interested in dairy farming. Unlike crop farming, a success of dairy farming depends on many technical factors, for example, veterinary care and disease control. In other words, a minimum educational background is required for conducting a successful dairy farm.

Table 3: Occupational Status of the Selected Dairy Farmers

Main occupation	Number of dairy farmers	Percent
Agriculture	40	80.00
Business	8	16.00
Service	2	4.00
Total	50	100

Source: Adapted from Pathan (2011, p. 37).

3.2   Profitability of Small-holders' Dairy Farming

3.2.1 Costs of dairy farming

The profitability analysis of the small-holders' dairy farming with local breed done in this study reveals that the costs of the farm consist of costs of feeds, labour, housing, veterinary care and cost of capital. Feed costs accounted for 57.74 percent of the total gross costs of small-holders' dairy farming, and is thus the most important cost of rearing dairy cows. Cost of feed included expenses on paddy straw, green grass, oilcake, bran (rice, wheat and pulse), salt, etc. The total feed cost per day per cow was estimated at Tk 41.0 (Table 4). Among various feed items paddy straw, green grass, oilcake and bran were the most common and important items of feed.

Human labour cost is the second most important cost in dairy farming and it has implication for income and employment generation. It appears from table 4that total labour costs per day were estimated at Tk 19.5 for a diary cow and their respective share of total gross costs was 27.46 percent.

In the study area, there were straw-made and tin-shade houses for dairy cows. The cost of housing was calculated by taking into account the deprecation cost, repairing cost and interest on the average value of housing shed and on repairs, respectively. Depreciation was measured by dividing the original value of the house during the time of construction by its total life in years. Interest rate was assumed to be 12 percent per annum. The housing cost comprised about 1.83 percent of total cost amounting to Tk 1.3 per dairy cow per day (Table 4).

Veterinary cost was calculated by taking into account the actual cost incurred by the farmers for the treatment of cows. Doctors' fees and medicine were two major components of the total veterinary cost. The total veterinary cost per day per cow amounted to Tk 0.58 and comprising 0.82 percent of total cost (Table 4).

Table 4 : Activity Budgets: Per Day Cost and Return of a Local Breed Cow

Particular	Unit	Quantity	Price/unit (Tk)	Total (Tk/day)	Percentage of total
A. Gross Costs:					
Feed cost				41.0	57.74
Paddy straw	kg	1.0	10.0	10.0	14.08
Green grass	kg	2.0	9.0	18.0	25.35
Oil cake	kg	0.19	26.0	4.94	6.96
Bran	kg	0.24	30.0	7.2	10.14
Salt	kg	0.08	11.0	0.88	1.24
Labour cost	Man-day	0.13	150.0	19.5	27.46
Housing cost	-	-	-	1.3	1.83
Veterinary cost	-	-	-	0.58	0.82
Capital cost	-	-	-	7.39	10.40
Miscellaneous cost	-	-	-	1.363	1.92
Total cost				71.0	100.00
B. Gross Returns					
Milk	litre	2.0	57.0	114.0	82.01
Cow dung	kg	1.0	5.0	5.23	3.8
Inventory change		-	-	19.52	14.04
Total return				139.0	100.00
C. Net return (A - B)				68.0	
BCR (undiscounted)				1.95	

Source: Adapted from Pathan (2011, p. 40).

Capital cost was measured in the present study as the interest on the average value of dairy cows. The average capital cost of a dairy cow per day was Tk 7.39 (Table 5) and constituted 10.40 percent of total cost (Table 4).

Miscellaneous cost included costs of some minor items like feeding troughs, ropes, milking equipment, milk marketing, mosquito coil, chain, etc. Miscellaneous cost per day per cow was Tk 1.09 and shared 1.53 percent of total costs (Table 4).

3.2.2 Returns from small-holders' dairy farming

The returns from dairy cows included returns from liquid milk either sold or consumed by the farmers, cow dung and calf. Per unit price of milk in the local market fluctuates frequently throughout the year, more particularly during the period of the greatest social festivals in the locality. Similarly, yield of milk per cow not only varies from one another of the same breed due to management

Table 5 : Activity Budgets: Annual Cost and Return of Dairy Farm Having

Particular	Unit	Quantity	Price/unit (Tk)	Total (Tk/year)
A. Gross Costs				
Feed cost				13313.0
Paddy straw	kg	330.0	10.0	3300.0
Green grass	kg	570.0	9.0	5130.0
Oil cake	kg	70.0	26.0	1820.0
Bran	kg	90.0	30.0	2700.0
Salt	kg	30.0	11.0	363.0
Labour cost	Man-day	46.0	150.0	6900.0
Housing cost	-	-	-	475.0
Veterinary cost	-	-	-	212.0
Capital cost	-		-	2700.0
Miscellaneous cost	-		-	500.0
Total cost				24,100.0
B. Gross Returns				
Milk	litre	730.0	57.0	41,610.0
Cow dung	kg	382.0	5.0	1910.0
Inventory change	-	-	-	7125.0
Total return				50,645.0
C. Net return (A - B)				26,545.0

Source: Adapted from Pathan (2011, p. 41).

practices, but also some other biological factors. For simplicity of the analysis, the returns from milk were calculated on the basis of the average quantities of milk yield per cow and its average price received per litre.

Returns from cowdung were found out by taking average price at which cow-dung was sold in the study areas. The average price of cow-dung sold in the study areas was Tk 5.0 per kg. The return from milk per day was Tk 114 for a dairy cow which was 82.02 percent of total return (Table 4). The average return from the cow-dung per dairy cow per day was Tk 5.23 and 3.8 percent of total return (Table 4). The value of inventory change per day of cows was Tk 19.52 comprising 14.04 percent of the total return.

3.2.3 Net returns from small-holders' dairy farming

Total gross returns per day stood at Tk 139.0 for a dairy cow. Net returns were calculated by deducting the total gross costs from total gross returns. The net return (or profit) per day was estimated at Tk 68.0 per cow.

3.2.4 Undiscounted benefit-cost ratio (BCR)

The undiscounted BCR of a dairy cow was calculated as a ratio of total gross returns and total gross costs. Table 4 shows that the BCR of a dairy cow emerged as 1.95 implying that Tk 1.95 would be earned by investing Tk 1.0 in small-holders' dairy farming. In other words, investment in small-holders' dairy farming is profitable from the viewpoint of new investors.

3.3   Interpretations of the Results of Cobb-Douglas Model

Estimated values of the relevant coefficients and related statistic of Cobb-Douglas production function model used for small-holders' dairy farming are presented in Table 6. The value of the coefficient X_1 (paddy straw) was negative and insignificant. This implies that 1.0 percent increase in the straw, keeping other factors constant, would result in decrease of milk yield by 0.01 percent. The estimated values of X_2 (green grass), X_3 (bran cost), X_4 (labour cost), and X_5 (veterinary cost) were found positive and hence, these variables can contribute to increase milk yield of small-holders' dairy farming. Since the value of R^2 was 0.88, it implied that 88.0 percent of the variation in milk yield of small-holders' dairy farming were explained by the included independent variables of the model,

The F-value of the model was highly significant at 1.0 percent level implying that all the variation in milk yield depends mainly upon the explanatory variables included in the model. The sum of the values of the coefficients of the small-holders' dairy farming was 1.30. In other words, the production function exhibited increasing returns to scale for dairy cows. This implies that there is a better scope for further improvement in yield by resource allocation of dairy farms.

3.4   Problems of Small-holders' Dairy Farming

Although small-holders' dairy farming was found profitable, the survey results presented in Table 7 clearly indicated that the dairy farmers had to face some major problems in conducting dairy farming in Bhaluka Upazila. Milk marketing was one of the crucial problems, since 80.0 percent of the owners of dairy farms made a complaint about this problem. Lack of improved breed and facilities for artificial insemination turned out as the second biggest problem for the dairy farmers as 72.0 percent were reporting this problem. Similarly, scarcity of feed and fodder, insufficient institutional credit, lack of technical knowledge, lack of grazing land etc., were the major problems for dairy farmers.

Table 6: Estimated Values of Co-efficient and Related
Statistic of Cobb-Douglas Model

Explanatory variables	Coefficients (ßi)	Standard error	t-value
Intercept	-1.9	0.884	-2.121
Paddy straw (X_1)	-0.01	0.174	-0.047
Green grass (X_2)	0.24	0.152	1.551
Bran (X_3)	0.14	0.068	2.013**
Labour (X_4)	0.64	0.146	4.365***
Veterinary cost (X_5)	0.292	0.120	2.421**
F-value	42.29	-	-
R^2	0.88	-	-
R^2	0.86	-	-
Return to scale (Ó ßi)	1.30	-	-

Source: Adapted from Pathan (2011, p. 51).
Note: ** = 5% level of significance; and *** = 1% level of significance.

Ensured supply of feed at a subsidized price, availability of veterinary care and service facilities, organized marketing facilities for liquid milk, training facilities for scientific ways and means of rearing dairy cows and availability of corruption free institutional credit to the door-steps of the interested farmers could be some positive steps for overall improvement as well as expanding small-holders' dairy farms in rural Bangladesh.

4.   Conclusion and Recommendations

The present study reveals that the small-holders' dairy farming is profitable, but it is constrained by some crucial problems. If proper remedial steps could immediately be taken, small-holders' dairy farming would be a more viable and sustainable enterprise in rural Bangladesh. Thus, small-holders' dairy farming can play very important role to overcome some burning problems of malnutrition, low income, unemployment and unfavourable balance of payments situation of the country. The policy makers should, therefore, pay an immediate attention to the findings of the present study and appropriate policy could be undertaken for expansion of small-holders' dairy farming in rural areas to enable then contribute to increasing milk production in Bangladesh.

On the basis of the findings of the present study, the following recommendations are made for sound dairy farming for the small farmers of Bangladesh:

The government should provide necessary assistance for establishment of feed mills in the private sector for making quality feed available to the local markets at a fair price;

Table 7 : Major Problems of Small-holders Dairy Farming in Bhaluka

Nature of problems	Number of dairy farmers	% of farmers reporting problem
Scarcity of feed and fodder	35	70.0
Lack of grazing land (green grass)	30	60.0
Inadequate veterinary care and services	26	52.0
Lack of improved breed and artificial insemination	36	72.0
Marketing problem of milk	40	80.0
Lack of technical knowledge	32	64.0
Complex terms and condition for institutional credit	33	66.0

Source: Adapted from Pathan (2011, p. 54).

a.   Milk marketing facilities should be improved either by establishing milk processing plant in the region or making provision for collection of milk at fair price through well organized marketing channels and/or cooperatives;

b.   Since investment in small-holders' dairy farming is profitable, corruption-free institutional credit could be expanded in this region;

c.   The concerned government organization should strengthen their programme to train the interested youths on dairy management, animal health care, sanitation and marketing techniques on priority basis;

d.   The government and non-government organizations should come forward to ensure quality breed and artificial insemination facilities to the door-steps of the farmers.

Since the vast majority of farmers of the study area did not maintain any written financial records of their day-to-days' farm transactions, the researchers had to fully rely upon the memories and sincerity of the farmers for the accuracy of data. Which proper care was taken to collect accurate data, primary data collection was really a challenging task and the possibility of data errors, therefore, cannot fully be ruled out. Nevertheless, the present study has given an important clue to the researchers and policy makers for taking more effective steps in this area in future.

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