ECONOMICS OF MINI DAIRY FARMS IN SELECTED AREAS OF BANGLADESH

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Summary

In this study an attempt was made to evaluate the economics of dairy farming in selected areas of Bangladesh. Data from 20 randomly selected farms were collected by survey method. Results show that cross-bred cows were more in number (2.55) in those farms than that of local cows (0.65). The number of cross-bred cows increased as the farm sizes increased. The production of milk per cross-bred cow was higher (5.66 litres) than the local ones (2.23 litres). Highest (5.74 litres) milk yield per cross-bred cow was recorded in large farms. The average lactation period for cross-bred cows was higher (304 days) than the local cows (210 days). In production cost of farms, concentrates took the highest share (35.19%) followed by labour charges (23.64%). The production cost and gross returns for mini dairy farms were higher in large farms (TK. 183,005 and TK. 187,544, respectively), compared to medium and small farms. The benefit-cost ratio of all farms was 1 : 1.03, indicating that mini dairy farming is economically profitable. In addition, each farm created an annual employment opportunity of 649.70 man-days which was met by both male and female labourers. The small farms employed more female family labourers while the large farms depended more on hired labourers. The expansion of dairy farming with cross-bred cows is suggested for accelerating income and employment opportunities in rural Bangladesh.

(Key Words : Mini Dairy Farms,   Cost and Returns,   Benefit-Cost Ratio,   Employment Benefits)

Introduction

About two-thirds of the total population in Bangladesh suffers from malnutrition. The magnitude of malnutrition can substantially be reduced by milk supplementation. So far, the per capita availability of milk in Bangladesh is only 34 ml per day while the minimum requirement is 250ml (FAO, 1974). The total production of milk is 1.34 million metric tons or 13.58% of the total requirement (Alam, 1992).

The domestic demand for milk has been rising faster than the domestic production of milk, and as a result, the volume of imported milk has increased over the years. An increase in the domestic production of milk will increase the supply of fresh milk in the country and help to reduce the volume of imported milk. The government of Bangladesh has therefore, given priority for the development of dairying at farmers level to increase the supply of milk.

The expansion of dairy sectors depends, among other things, on the profitability of milk production at farmers level. A number of studies have been conducted on the profitability of milk production (Grover et. al., 1992; Gangwar et. al., 1989; Gupta et. al., 1897) in neighbouring countries. Such studies, however, are scant in Bangladesh and therefore, the present study was undertaken to evaluate the economics of dairying.

Materials and Methods

Two thanas (thana is an administrative unit of local government, consisting of several union councils), Savar and Manikgonj of greater Dhaka district in Bangladesh were selected for this study. Twenty farms were selected randomly, ten from each thana, and the selected farms were classified by herd size into three categories: (i) Small farm (1-5 cattle), Medium farm (6-10 cattle) and (iii) large farm (11-20 cattle). The farm selected for investigation had at least one cross-bred dairy cow for milk production.

Data on cattle population, quantity of milk produced, production cost and returns for the farms were collected by survey method. For this purpose, a survey schedule

was prepared and pretested in the field before final collection of data. The data was collected for the year 1991. The collected data were analysed using statistical techniques such as, mean, percentages and ratios for better precision of analysis.

Estimation procedure for costing

The procedure used to estimate the cost of production and returns of the mini dairy farms is given below:

1. Variable cost : It includes feed cost, labour cost, veterinary cost, fodder production cost, transportation cost, miscellaneous cost and interest on operating capital.

a. Feed cost : Feed cost includes cost of concentrates, rice-straw and green grasses of both home-produced and purchased. The value of home produced feed was calculated using farm-gate prices and the value of the purchased feeds was estimated at prevailing market prices.

b. Labour cost : Both family labour and hired labour (casual and permanent) was considered in it. The family labour was valued at prevailing wage rate, where as the value of hired labour was calculated on actual payment basis.

c. Veterinary cost : It includes the value of medicines and fees actually paid to veterinary doctors.

d. Fodder production cost : It includes cost of ploughing, seedlings, fertilizer and opportunity cost of land use.

e. Transportation cost : It includes carrying cost of feeds and marketing cost of cattle and milk.

f. Miscellaneous cost : Miscellaneous costs include death-loss of animals, cost of ropes, salt and earthen pots etc.

g. Interest on operating capital : It was calculated on the prevailing bank rate for one year @ 10% per annum.

2. Fixed cost : It includes depreciation of cow-sheds, depreciation of cows, depreciation of equipments and interest on fixed capital.

a. Depreciation of cow-shed : It was calculated on the basis of straight line method (Shiyani et. al., 1989). The value of cow-sheds were divided by their respective useful life. The useful life of cow-sheds was considered 5 years for kutcha-sheds and 15 years for pucca-sheds.

b. Depreciation of cows : It was also calculated on the basis of straight line method. The present value of cow was divided by the productive life of cows. The productive life of the cows was considered ten lactations.

c. Depreciation of equipments : The depreciation of equipments was also calculated following the straight line method. The value of the equipments were divided by the useful life of equipments. The useful life of equipments was considered 1 year to 5 years depending on their nature.

d. Interest on fixed capital : The interest on fixed capital was calculated on the basis of prevailing bank rate @ 10 percent per annum.

3. Returns : It includes the value of milk, ploughing, cow-dung and appreciation of cattle.

a. Sale of milk : It is the value of quantity of milk sold and quantity of milk consumed at home at the prevailing market rate.

b. Sale of ploughing : The opportunity cost of ploughing of farmer's own land and the money received by ploughing of other's land were included in it.

c. Sale of cow-dung : It is the value of all cow-dung produced in the farm during the year under study. It is also calculated on the basis of prevailing market rate.

d. Sale of cattle : It is the value of all animals sold during the year at the prevailing market rate.

e. Appreciation of cattle : It is the value-difference of the young stock at the beginning of the year and at the end of the year. The appreciation was calculated for 1-3 years of cattle.

Results and Discussion

Cattle population

The population of cattle of 20 farms investigated at Savar and Manikgonj was 179. The number of cattle and dairy cows per farm were 8.95 and 3.20, respectively. The number of dairy cows possessed by large, medium and small farms were 6.25, 2.91 and 1.40, respectively. Number of female cattle (88.83%) outnumbered the males (11.17%) in each farm size group. The males were mostly young. The farmers keep more number of females for milk as well as calf production, and a few number of males for the purpose of natural breeding. The proportion of cross-bred cattle was higher on large farms (82.50%) followed by medium (71.80%) and small farms (71.43%) with an average of 76.54%. The number of cross-bred cattle increased with the increase in farm size (table 1). Relatively, large farms had better access to artificial insemination facilities resulting in higher number of cross-bred cattle in those farms.

Production of milk

Average production of milk per day per farm from local cows were 0.63, 1.78 and 0.84 litres for large, medium and small farms, respectively. In the case of cross-bred cows, the production of milk per day per farm were 34.42, 10.00 and 4.75 litres for large, medium and small farms, respectively. The medium farms reared more number of local cows while the large farms reared more

number of cross-bred cows. Average milk production per day per farm were 35.05, 11.78 and 5.59 litres for large, medium and small farms, respectively (table 2). The average milk yield per day per cow for local and corss-bred cows were 2.23 and 5.66 litres, respectively. The difference in milk yield was attributed to the genetical superiority of cross-bred cows over the local breeds. Moreover, the average lactation period was higher (304 days) for cross-bred cows than for the local ones (210 days). Similar results were also obtained by Rahman et. al. (1988) and Alam et. al.(1992).

TABLE 1. CATTLE POPULATION OF THE DAIRY FARMS

Herd Size	Number of farms	Number of cattle per farm	Percentage of cattle by sex		Percentage of cattle by breed		Number of dairy cows per farm	Average number of milk cows per farm by breed	
			Male	Female	Local	Cross-bred		Local	Cross
Large	4	20.00	7.50	92.50	17.50	82.50	6.25	0.25	6.00
Medium	11	7.09	14.10	85.90	28.20	71.80	2.91	0.91	2.00
Small	5	4.20	14.29	85.71	28.57	71.43	1.40	0.40	1.00
All	20	8.95	11.17	88.83	23.46	76.54	3.20	0.65	2.55

TABLE 2. MILK PRODUCTION OF DAIRY FARMS

Herd size	Number of milk cows per farm		Average lactation period (day)		Averge milk production per day (litre)					
					Local		Cross		All breeds	
	Local	Cross	Local	Cross	per farm	per cow	per farm	per cow	per farm	per cow
Large	0.25	6.00	198.00	291.40	0.63	2.50	34.42	5.74	35.05	5.61
Medium	0.91	2.00	210.00	312.00	1.78	1.96	10.00	5.00	11.78	4.05
Small	0.40	1.00	219.00	310.00	0.84	2.10	4.75	4.75	5.59	4.00
All	0.65	2.55	210.00	304.00	1.45	2.23	14.44	5.66	14.89	4.65

Production cost for mini dairy farms

The production cost for mini dairy farms consisted of variable and fixed costs. The cost of various inputs such as feed (concentrates, rice-straw and green grasses), veterinary care, fodder production, transportation, miscellaneous (death-loss, ropes, salt and earthen pots etc.) and interest on operating capital were considered as variable cost. Fixed costs included the depreciation cost of cows, cow-sheds, dairy equipments and interest on fixed capital.

Table 3 presents production costs for mini-dairy farms for the year 1991. The average total production cost per farm (variable and fixed costs) were Tk. 183,005, Tk. 71,959 and Tk. 35,770 for large, medium and small farms, respectively. The average rearing cost per cattle were Tk. 9,150.25, Tk. 10,149 and Tk. 8,516.67 for large, medium and small farms, respectively. The higher cost involvement in medium farms was due to higher cost incurred in green grasses and veterinary charges.

An examination of variable cost shows that concentrates were the major cost (35.19%) followed by labour charge (23.64%), rice-straw (11.46%), green grasses (7.17%), interest on operating capital (3.28%), transportation (2.68%), veterinary charges (1.64%), Miscellaneous cost (1.45%) and cost of fodder production (0.50%). The share of variable cost to total cost was 86.99%.

The use of fodder was low, because the farmers were less interested in growing fodders foregoing crop production. Farmers of the study area considered livestock as subsidiary occupation and they considered livestock less important in earning farm income. Therefore, less importance was given to production of fodder.

With regards to fixed costs, the depreciation cost of cows took the largest share (11.43%) followed by depreciation cost of cow-shed (0.66%), interest on fixed

TABLE 3. ANNUAL PRODUCTION COST OF MINI DAIRY FARMS (TAKA)

(One Taka = US$ 0.025)

Items of expenditure	Large	Medium	Small	All
Variable cost :				
Concentrates	72,384 (39.55)	22,861 (31.77)	11,606 (32.45)	29,952 (35.19)
Rice-straw	17,876 (9.77)	9,046 (12.57)	4,810 (13.45)	9,753 (11.46)
Green grasses	11,876 (6.49)	6,516 (9.06)	584 (1.63)	6,105 (7.17)
Labour charge	36,500 (19.94)	17,987 (25.00)	11,665 (32.61)	20,109 (23.64)
Veterinary charge	2,000 (1.09)	1,691 (2.35)	260 (0.73)	1,395 (1.64)
Fodder cultivation	1,500 (0.83)	200 (0.28)	61 (0.17)	425 (0.50)
Transportation	7,230 (3.95)	1,264 (1.76)	548 (1.53)	2,278 (2.68)
Miscellaneous(death-loss, ropes, salts, earthen pots etc.)	1,000 (0.55)	1,200 (1.67)	1,500 (4.19)	1,235 (1.45)
Interest on operating cost	6,937 (3.79)	2,132 (2.96)	945 (2.54)	2,196 (3.28)
Total variable cost	157,303 (85.96)	62,897 (87.41)	31,979 (89.40)	74,048 (86.99)
Fixed cost :				
Depreciation of cow-shed	1,243 (0.68)	447.00 (0.62)	276.00 (0.77)	563.00 (0.66)
Depreciation of cow	22,250 (12.16)	8,036 (11.17)	3,420 (9.56)	9,725 (11.43)
Depreciation of equipment	985 (0.54)	147 (0.20)	76 (0.21)	297.00 (0.35)
Interest on fixed capital	1,224 (0.67)	432 (0.60)	19 (0.05)	487.00 (0.57)
Total fixed cost	25,702 (14.04)	9,062 (12.59)	3,791 (10.60)	11,072 (13.01)
Total production cost (V.C + F.C)	183,005 (100)	71,959 (100)	35,770 (100)	85,120 (100)
Cost of maintenance of dairy cows	92,411	44,723	21,694	41,880
Total milk production (litres)	10,155	3,494	1,656	4,367
Cost of milk / litre	9.10	12.80	13.10	9.59

Figures in parentheses are percentages.

capital (0.57%) and depreciation cost of equipments (0.35). The depreciation cost of cows was higher due to higher amortized values of local and cross-bred cows.

Unit cost of milk

The unit cost of producing one litre of milk was calculated by dividing the total maintenance cost of dairy cows by the total quantity of milk produced in the reference year. The average unit cost of milk per litre was 9.59 (table 3). The unit cost per litre of milk was Tk. 9.10, Tk.12.80 and Tk. 13.10 for large, medium and small farms, respectively. The unit cost of milk production decreased with and increase in herd size. Higher milk yield per cow has lowered the cost of production of milk in the large category of farms.

The average price of milk received by the farmers for

all categories of farms was Tk. 14.00 per litre.

Returns to mini dairy farms

Returns to mini dairy farms came from the sale of milk, sale of cattle, appreciation of cattle, sale of cow-dung and sale of ploughing.

The highest share of total returns for all categories of farms came from the sale of milk (69.43%) followed by the sale of cattle (12.60%), the appreciation of cattle of 1 to 3 years of age (11.58%), the sale of cow-dung (4.13%) and the sale of ploughing (2.26%). The gross return was the highest for large farms (Tk. 187,544) followed by medium (Tk. 74,802) and small farms (Tk. 37,717). Net returns for large, medium and small farms were Tk. 4,539,

Tk. 2,843 and Tk. 1,947, respectively. On average, a farm earned a net return of Tk. 2,959. The net benefit increased as herd size increased and varied from Tk. 1,947 to Tk. 4,539 (table 4). Higher returns on large farms was possible due to selling higher quantity of milk from large number of cross-bred cows. The financial solvency of the large farms helped them in procurement and better management of more cross-bred dairy cows to produce higher quantity of milk. The calculated benefit-cost (B : C) ratios were 1 : 1.02, 1 : 1.04 and 1 : 1.05 for large, medium and small farms, respectively. For all farms, B : C ratio was 1 : 1.03, indicating that mini-dairy farming was econimically profitable in the rural areas of Bangladesh.

TABLE 4. ANNUAL RETURNS TO MINI DAIRY FARMS (TAKA)

Source	Large	Medium	Small	All
Sale of milk	142,230 (75.84)	48,900 (65.37)	23,250 (61.64)	61,154 (69.43)
Sale of ploughing	500 (0.27)	2,455 (3.28)	2,154 (5.71)	1,989 (2.26)
Sale of cow-dung	8,919 (4.76)	2,629 (3.51)	1,633 (4.33)	3,638 (4.13)
Sale of cattle	16,000 (8.53)	11,636 (15.56)	6,000 (15.91)	11,000 (12.60)
Appreciation of calves and heifer	19,895 (10.60)	9,182 (12.28)	4,680 (12.41)	10,199 (11.58)
Gross return	187,544 (100)	74,802 (100)	37,717 (100)	88,079 (100)
Gross margin	30,241	11,905	5,738	14,031
Net return	4,539	2,843	1,947	2,959
Benefit-cost ratio (on variable cost)	1 : 1.19	1 : 1.19	1 : 1.18	1 : 1.19
B/C ratio(on total cost)	1 : 1.02	1 : 1.04	1 : 1.05	1 : 1.03

Figures in parentheses are percentages.

TABLE 5. ANNUAL LABOUR EMPLOYMENT PATTERN OF MINI DAIRY FARMS

Herd size	Annual man-days employed / farm						Total		All farms
	Family labour		Casual labour		Permanent labour		Male	Female	
	Male	Female	Male	Female	Male	Female			
Large	91.25	—	182.50	—	547.50	91.25	821.25	91.25	912.50
Medium	182.50	273.75	146.00	—	—	—	328.50	273.75	602.25
Small	182.50	365.00	—	—	—	—	182.50	365.00	547.50
All farms	164.25	240.90	116.80	—	109.50	18.25	620.50	259.15	649.70

Employment benefits

Employment benefits of mini dairy farms is presented in Table 5. It can be seen that mini-dairy farms, on average, created an annual employment opportunity of 649.70 man-days (1 man-day = 8 labour hours for male = 12 labour hours for female = 16 labour hours for children). Labour usage was highest for large farms (912.50 man-days) followed by medium (602.25 man-days) and small farms (547.50 man-days). The use of female family labour was higher (365.00 man-days) on small farms. An explanation is that women in small farms had limited access to other economic activities and they had to remain busy with cattle rearing. In large farms, this activity was not performed by female family labours due to social status associated with them. As a result, the use of female family labour declined with the increase in farm size. Relatively, large farms depended more on hired labourers (casual and permanent).

Conclusions

Cross-bred and local cows were reared for dairying in all mini-dairy farms under study at Savar and Manikgonj of greater Dhaka district in Bangladesh. The milk yield of cross-bred cows was higher than that of local cows. The average number of cross-bred and local cows were 2.55 (76.54%) and 0.65(23.46%) per farms. The number of crows-bred cows increased as the farm size increased. The economic analysis indicates that the dairy farms in these areas were profitable. An average farm earned a profit of taka 2,939 in the reference year. It also created employment opportunities for both family and hired labours. Therefore, a rapid expansion of mini dairy farms with cross-bred cows is recommended for generation of additional income and employment. Subsidy on concentrates, easy access to bank-loan and health coverage with insurance can help establishing more number of cross-bred dairy farms. This will, in turn, stimulate both income and employment and help alleviation of poverty in rural Bangladesh.

Acknowledgements

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