

Economics of Small Scale Dairy Farming in Bangladesh under the Government Support Programme

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ABSTRACT : In this study the financial performance of small scale dairy farms participating in the government subsidy programme and the impact of this government intervention on the number of animals owned, production and consumption of milk and labour employment in the farm households have been examined. After receiving the subsidy, dairy farmers expanded their herd size. The major changes occurred in the ownership of calves, heifers and cows in all categories of farms. Significant increases in production and consumption of milk as well as in labour employment were observed. The rates of increase for all the parameters studied were much higher in farms adopting cross breeding compared to those in only local-breed farms. The analysis showed that dairying was a profitable business. However, profitability was greater with cross-bred than with local-bred animals. (*Asian-Aus. J. Anim. Sci.* 1999, Vol. 12, No. 3 : 429-434)

Key Words : Dairy Farming, Economics, Subsidy, Milk Production and Consumption, Employment

INTRODUCTION

Livestock plays an important role in the agricultural economy of Bangladesh. The contribution of the livestock sub-sector to the country's gross domestic product (GDP) is around 3.6 percent and to agricultural GDP is about 11.72 percent (BBS, 1996). The share of this sub-sector to total value of exports was 6.19 percent and to value of agricultural exports was 18.04 percent in 1994-95 (BBS, 1997a). This sub-sector provides full time employment for about to 20 percent of the rural population (MOFL, 1990; Alam, 1995; GOB, 1997).

The domestic production of milk in Bangladesh is only 13.81 percent of minimum requirements (GOB, 1997). To bridge the gap, the country had to import 57273 metric tons of milk by spending Taka 2646 million of hard earned foreign exchange annually during the period 1985/86 to 1993/94 (Kabir, 1995). To reduce this dependency on imported milk the government of Bangladesh initiated a dairy industry promotion programme through the provision of direct support in cash to dairy farmers from the fiscal year 1992-93. Under this programme, dairy farms who had at least five cross-bred or local-bred (improved) milk cows received 20~25 percent of the value of these animals as a subsidy, depending on the size of farm. From early 1994 the government also decided to provide 100 percent financial support to meet the transportation cost of importing improved breeds of cattle. Further the import duty on powdered milk was raised to 40 percent in the 1993-94 budget.

In response to the subsidy programme, many private investors with relatively small capital came forward to establish new dairy farms. A total of 5356 dairy farms were established in 1993-94. Therefore, the intervention generated a positive impact on domestic milk production

and reduce milk imports from 45 thousand metric tons in 1991-92 to only 26 thousand metric tons in 1993/94 (BBS, 1997b). The annual growth rate in milk production increased from 1.26 percent for the period from 1987/89 to 1993/94 to 1.32 percent for the period from 1990/91 to 1993/94 (Alam, 1995).

Although the importance of dairying is increasing, studies on the economics of dairy farming are scanty in Bangladesh. A number of studies were conducted on the economics of raising dairy cattle as a supplementary enterprise. The major concerns of these studies were utilization and productivity of draught and non-draught cows (Islam, 1986), local and cross-bred cows (Alam et al., 1994; Jabbar et al., 1997), management practices (Majumder et al., 1992; Alam et al., 1995), and analysis of factors affecting milk production (Ashrafuzzaman and Rahman, 1995; Rahman, 1993). Akteruzzaman (1993) and Jahan (1995) evaluated the dairy development programmes of BRAC and BRDB (under the RD-12 project) respectively and observed substantial increase in income, employment and standard of living of the participant farmers in these programmes.

The present study was designed to assess the financial performance of newly established commercial dairy farms for one complete year of operation. The particular emphasis was given to analyse and compare the number of animals owned by the farmers, production and consumption of milk and employment in the farm household, before and after participating in the subsidy programme.

MATERIALS AND METHODS

Study area

Tangail district, a milk pocket area in Bangladesh, was chosen for the present study. A large number of farms were engaged in dairying in this region. The area represents almost similar environment of dairying to that in other pocket areas in the country except the *Bhathan* areas where intensive free grazing of cows is traditional. Therefore, the area widely represents the overall dairy

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industry of the country.

Sampling

The dairy farms were categorized into local breed, mixed local and cross breed, and cross breed farms. The local breed farms were raising only improved type native cows. The cross breed farms raised only cross-bred cows while in the mixed local and cross breed farms the proportion of improved native cows and cross-bred cows were more or less equal. In total 26 small scale dairy farms were selected purposively taking 7 each from local breed and mixed local and cross breed categories, and 12 from the cross breed category.

Data collection

From the selected dairy farms data were collected for 'before subsidy' and 'after subsidy' year. The year 1994 was taken as the 'after subsidy' year while any year from 1991 to 1993 was considered as the 'before subsidy' year for a farm. For the 'before subsidy' year data on the number of animals owned by the farmers, production and consumption of milk and labour employment per farm were collected from the farm records. Data on these parameters as well as on costs and returns of raising dairy cows for the year 1994 (the 'after subsidy' year) were collected through a farm survey. The schedule was developed in a simple manner so that accurate information could be obtained without repetition and misunderstanding.

The data were collected by the researcher (the first author) himself through personal interview with the individual dairy farmers. The farmers were interviewed at their leisure time. Before actual interview, the farmers were given short briefing regarding the nature and purpose of the study. The questions were asked systematically and explanations were made whenever it was felt necessary. The information supplied by the farmers were recorded directly on the interview schedule and checked carefully before leaving the farms.

Analytical technique

The collected data were tabulated and analysed to arrive at meaningful conclusions regarding profitability and the impact of the subsidy on dairy farming. The profitability of dairying was analysed with activity budget technique as described by Dillon and Hardaker (1993). Descriptive statistics such as mean, percentage and ratio were used for better interpretation of the data.

Estimation of cost

The procedure used in estimating the cost of production is given follows :

1) Fixed cost

Housing cost and interest on animal value constituted fixed costs. Fixed costs were estimated for one year. Housing cost was calculated by taking into account the depreciation cost, repair cost and interest on the average

value of the cattle shed. In estimating interest on the value of the animals, the average value of beginning and closing stock was considered.

2) Variable cost

The variable costs included the costs for feed such as paddy straw, green grass, concentrates, feed additives, labour, miscellaneous cost items (veterinary and artificial insemination charges and milk marketing costs), and interest on operating capital.

The total cost of raising animals was calculated per farm and per unit of animal. For this purpose the number of animal in cow-equivalent was calculated by using the conversion factors: 1 calf = 0.40 cows and 1 heifer = 0.80 cows.

Estimation of return

The return from dairy farming was calculated in terms of gross return, gross margin and net return.

Gross return

In calculating gross return, sale proceeds from milk and cowdung and net change in inventory (appreciation in the value of calves and heifers in the herd during the year) were taken into account.

Gross margin

Gross margin was calculated by deducting variable cost from gross return and was calculated on per farm and per unit of yield basis.

Net return/net margin

Is the difference between gross return and total cost of production and was calculated on per farm and per unit of yield basis (Amir and Knipscheer, 1989).

Statistical test

To confirm the results regarding the impacts of the subsidy programme, paired t-tests were performed.

Interest rate used

For calculation of interest on housing cost, animal value and operating capital, interest rate was set at 10 percent per annum.

RESULTS AND DISCUSSION

Receipt of subsidy and livestock inventory

The sample local, local and cross, and cross-breed farms received Taka 37500, Taka 33036 and Taka 47917 per farm respectively as subsidy, representing an average of Taka 41105 per farm for the whole sample. Table 1 shows the differences in the number of animals owned by the farmers before and after receipt of the subsidy. The table reveals that ownership of animals per farm increased by 5.36 units or 39.27 percent after receipt of the subsidy. The rates of increase in ownership were much higher in the mixed local and

Table 1. Possession of livestock in the sample dairy farms

Particulars	Average numbers of animals by category					
	Milk cow	Dry cow	Heifer	Bull	Calf	All animal
Local-breed farms						
In Dec. 1994	2.29	4.00	0.86	0.71	4.71	12.57
Before intervention	2.14	3.29	0.86	0.71	3.71	10.71
Difference	0.15 (7.01)	0.71 (21.58)	0.00	0.00	1.00 (26.95)	1.86 (17.37)
Mixed local and cross-breed farms						
In Dec. 1994	2.43	3.43	1.29	1.00	5.71	13.86
Before intervention	1.86	2.57	1.43	0.86	3.22	9.72
Difference	0.57 (30.65)	0.86* (33.46)	-10.14 (9.79)	0.14 (16.28)	2.71* (90.33)	4.14* (42.59)
Cross-breed farms						
In Dec. 1994	4.08	6.50	2.92	0.94	8.92	23.36
Before intervention	3.25	5.17	1.50	1.00	4.50	15.42
Difference	0.83 (25.54)	1.33 (25.73)	1.42* (94.67)	-0.06 (6.00)	4.42* (98.22)	7.94* (51.49)
All farms						
In Dec. 1994	3.15	5.00	1.93	0.89	6.92	19.01
Before intervention	2.58	4.04	1.31	0.88	3.88	13.65
Difference	0.57 (22.09)	0.96 (23.76)	0.62 (47.33)	0.01 (1.14)	3.04* (78.35)	5.36* (39.27)

* Significant at 5% level.

Figure in the parentheses indicate percent changes after intervention.

cross-breed category, and in the cross-breed category farms, for all type of animals, compared to the rates in local-breed farms. The major changes occurred in the ownership of calves, heifers and cows in all categories of farms. The results of the t-test confirmed that, the number of dry cows and calves in the mixed local and cross-breed farm category and the number of heifers and calves in the cross-breed farm category had increased significantly after receipt of the subsidy. However, in the local-breed farm and in many cases in the two categories of farms, the changes in number of animals were not significant.

Cost of maintaining animals

The annual cost of maintaining dairy animals is presented in table 2. It can be noticed from the table that the highest cost of production was Taka 158782 per farm in the cross-breed farms, with an average of Taka 115412 per farm. However, the share of variable cost was the highest (83.70 percent) in the local-breed farms and the lowest (79.20 percent) the in cross-breed farms. Feed cost alone accounted for more than 50 percent of total cost in all categories of farms. The shares of variable cost and feed cost to total cost were corroborated by the results obtained in the studies of Alam et al. (1994) and Alam et al. (1995) while the corresponding results obtained by Ashafuzzaman and Rahman (1995) and Jabbar et al. (1997) were a little higher.

The analysis of cost components showed that the highest cost (33.34 percent) was incurred for concentrate

Table 2. Annual cost of raising dairy animals in the sample dairy farms

Cost Items	Local-breed farms		Mixed local and cross-breed farms		Cross-breed farms		All farms	
	Cost/farm (Taka)	% of total cost	Cost/farm (Taka)	% of total cost	Cost/farm (Taka)	% of total cost	Cost/farm (Taka)	% of total cost
Feed cost:	39186	51.81	42614	52.72	86786	54.66	62078	53.78
Paddy straw	9729	12.86	10029	12.41	16217	10.21	12804	11.09
Green grass	5963	7.88	5925	7.33	12533	7.89	8985	7.78
Concentrate	21995	29.08	25620	31.69	56085	35.32	38705	33.54
Feed additives	1499	1.98	1041	1.29	1951	1.23	1584	1.37
Labour cost	18620	24.62	18585	22.99	26915	16.95	22439	19.44
Miscellaneous	2493	3.30	2690	3.33	6066	3.82	4196	3.64
Int. on operational cost	3015	3.99	3194	3.95	5988	3.77	4436	3.84
Variable cost (VC)	63314	83.70	67083	82.99	125755	79.20	93148	80.71
Housing cost	2624	3.47	2672	3.31	5279	3.32	3862	3.35
Int. on animal value	9702	12.82	11079	13.71	27748	17.48	18402	15.94
Fixed cost (FC)	12326	16.30	13751	17.01	33027	20.80	22264	19.29
Total cost (TC)	75640	-	80834	-	158782	-	115412	-
Number of animals (cow equivalent)	8.86	-	9.18	-	16.48	-	12.46	-
Variable cost/animal	7146	-	7308	-	7631	-	7476	-
Total cost/animal	8537	-	8805	-	9635	-	9263	-
Cost of milk:								
Full cost (Taka/kg)	12.99	-	12.21	-	13.63	-	13.23	-
Variable cost (Taka/kg)	10.87	-	10.13	-	10.80	-	10.67	-

followed by human labour (19.44 percent), interest on animal value (15.94 percent) paddy straw (11.09 percent), green grass (7.78 percent), interest on operational capital (3.84 percent), miscellaneous items (3.64 percent), housing (3.35 percent) and feed additives (1.37 percent).

It is evident from table 2 that the share of many of the cost items to total costs increases as more cross-breeding is undertaken. A similar trend was observed in variable and total costs per animal. However, use of paddy straw and labour showed the opposite directions. Ashrafuzzaman and Rahman (1995), Alam et al. (1994) and Jabbar et al. (1997) observed relatively higher shares of paddy straw and labour in total costs of raising local-bred cows compared to the respective shares for cross-bred cows.

Financial performance of dairying

Table 3 shows the relative financial performance of dairy farming across different categories of farms. The table reveals that the estimated annual gross return stood at Taka 90103 per farm for the local-breed farm, Taka 102608 per farm for the mixed local and cross-breed farm and Taka 216956 per farm for the cross-breed farm, with an average of Taka 152017 per farm for all farms. As was expected, production of milk was the highest in the cross-breed farm (11647.50 kg per farm) for all farms. The shares of milk in gross returns ranged between 77.58 percent in the cross-breed farm to 80.64 percent in the local-breed farm, representing 78.35 percent for the whole sample. The share of the value of change in inventory and cowdung were estimated at 16.94 and 4.71 percents respectively for all farms. However, the shares of milk and value of change in inventory were found to be slightly lower in the studies of Alam et al. (1994) and Alam et al. (1995).

The analysis showed that, for all sample farms, gross margin and net return per farm were respectively Taka

58869 and Taka 36605, and Taka 6.75 and Taka 4.19 per kg of milk. Gross margin and net return per farm (Taka 91201 and Taka 58173 respectively) and per kg of milk (Taka 7.83 and 4.99 respectively) were found to be the highest in the cross-breed farms. On the other hand, both gross margin and net return per farm (Taka 26789 and Taka 14463 respectively) and per kg of milk (Taka 4.60 and Taka 2.48 respectively) were found to be the lowest in the local-breed farms. The ratio of gross return to variable cost and to total cost were calculated at 1.63 and 1.32 respectively for all sample farms.

Cost and price analyses showed that the selling price of milk was Taka 13.65 per kg for all farms against the production cost of Taka 13.23 per kg. Cost of milk per liter was found to be much higher (Taka 22.02) by Alam et al. (1994) but the cost estimated by Alam et al. (1995) was only Taka 9.59 per liter of milk while the estimated price per litre of milk in the respective studies were Taka 11.00 and Taka 11.00 respectively.

It is evident from the above findings that milk production in all categories of farms was profitable and the economic performance of milk production was better in the farms having more cross-bred animals. The better performance was due to the better genetic characteristics of animals. Milk production was also found to be profitable by Majumder et al. (1992). Ashrafuzzaman and Rahman (1995) and Jabbar et al. (1997) while a negative return was found by Alam et al. (1994).

Change in production and consumption of milk

Table 4 shows the change in daily production and consumption of milk in the sample dairy farms after receipt of the subsidy. In all categories of farms production and consumption of milk increased significantly after receipt of the subsidy. Average daily production of milk increased by 6.45 liter per farm or 36.94 percent for all farms, by 3.53, 3.86 and 9.66 liters

Table 3. Economic analysis of dairy farms

Particlars	Local-breed farms	Mixed local & cross-breed farms	Cross-breed farms	All farms
Milk production (kg/farm)	5824.29	6621.43	11647.50	8726.54
Value of milk (Taka/farm)	72661 (80.64)	81213 (79.15)	168305 (77.58)	119107 (78.35)
Value of cowdung (Taka/farm)	4628 (5.14)	4823 (4.70)	9984 (4.60)	7153 (4.71)
Change in inventory (Taka/farm)	12814 (14.22)	16571 (16.15)	38667 (17.82)	25758 (16.94)
Gross return (Taka/farm)	90103 (100.00)	102608 (100.00)	216956 (100.00)	152017 (100.00)
Gross margin (GM) (Taka/farm)	26789	35525	91201	58869
Net return (NR) (Taka/farm)	14463	21773	58173	36605
Gross margin (GM) (Taka/kg)	4.60	5.37	7.83	6.75
Net return (NR) (Taka/kg)	2.48	3.29	4.99	4.19
Ratio of gross return to VC	1.42	1.53	1.73	1.63
Ratio of gross return to TC	1.19	1.27	1.37	1.32
Price of milk (Taka/kg)	12.48	12.27	14.45	13.65

Figures in the parentheses indicate percentage of gross return.

per farm in local, mixed local and cross, and cross-breed farms respectively. Daily milk consumption, on an average, increased by 0.14 litres in local-breed farm and by 0.50 litres in both mixed local and cross, and cross-breed farms. The average increase in milk consumption was 0.40 litres per day or 34.48 percent for all farms. Except in the local-breed farm, daily milk consumption was found to have increased significantly. Better performance of dairy farms after receipt of the subsidy was attributed to both an increase in the number of cows and improved management practices by the farmers.

Table 4. Change in production and consumption of milk after intervention

Particulars	Local-breed farms	Mixed local & cross-breed farms	Cross-breed farms	All farms
Milk production				
Before intervention	12.43	14.29	22.25	17.46
In 1994	15.96	18.14	31.91	23.91
Increase	3.53* (28.40)	3.86* (27.01)	9.66** (43.42)	6.45* (36.94)
Milk Consumption				
Before intervention	1.57	1.00	1.00	1.16
In 1994	1.71	1.50	1.50	1.56
Increase	0.14 (8.92)	0.50** (50.00)	0.50** (50.00)	0.40** (34.48)

* Significant at 5% level; ** Significant at 1% level.

Figures in the parentheses indicate percent change after intervention.

Change in employment

Table 5 shows annual labour employment in the sample dairy farms and change in employment after receipt of the subsidy. On average, the labour requirements for the study year were 531 man-days (adult equivalent) in cross-breed farms. In all categories of farms, feeding, milking, milk marketing, washing and cleaning were the major items of labour requirement. After receipt of the subsidy, labour employment increased by 136 man-days per farms or 26.84 percent for all farms. The use of both family supplied and hired labour increased substantially in all categories of farms. Family labour use increased significantly within a range of 62 to 107 man-days or 77 percent to 93 percent after receipt of the subsidy. The use of hired labour was recorded to have increased by 31 to 68 man-days but the change was not significant in any category of farms. The overall increase in labour use was due to the increase in number of animals in the farm on the one hand and better care and management of animals on the other. Thus the subsidy programme contributed substantially to poverty alleviation by offering more employment opportunity, both to family and hired labour.

Table 5. Change in employment after intervention in the sample dairy farms

Employee	Employment (man-days/farm)		Change in employment after intervention	
	In 1994	Before intervention	Absolute (man-days/farm)	Percent
Local-breed farms				
Family labour	245.71	138.57	107.14*	77.32
Hired labour	285.71	254.29	31.43	12.36
All	531.46	392.86	138.57*	35.27
Mixed local and cross-breed farms				
Family labour	128.57	66.43	62.14*	93.54
Hired labour	402.14	367.14	35.00	9.53
All	530.71	433.57	97.14*	22.40
Cross-breed farms				
Family labour	184.58	96.25	88.35*	91.79
Hired labour	584.17	516.25	67.92	13.16
All	768.75	612.50	156.25*	25.51
All farms				
Family labour	185.96	99.61	86.35*	86.69
Hired labour	458.81	405.58	49.23	12.14
All	640.77	505.19	135.58*	26.84

*Significant at 5% level.

CONCLUSION

Government intervention in the form of subsidy on dairy cows helped small scale dairy farmers to expand their size. The intervention resulted in significant increase in milk production and consumption by farm families. It also provided opportunities for increased employment of persons in dairy businesses. Dairying with all breeds of cows was a profitable business. However, profit was greater with cross-bred than with local-bred cows. Increased production and consumption of milk and employment may be taken as an index of increased welfare brought about by the policy intervention. The impression gained from the field visits suggests that financial support provided by the government has given remarkable stimulus to the small private investors to undertake dairy farming particularly for those having capital constraints. Therefore, further expansion and careful implementation of the incentive programme is expected to contribute more to production and consumption of milk and employment generation in the country. However, sustainability of the outcomes will depend largely on the assured supply of accompanying inputs such as feed and veterinary services at reasonable prices, and provision of improved milk marketing facilities closer to the doorsteps of farmers.

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