

## **IMPACT OF FIELD FERTILITY CLINIC ON DAIRY PRODUCTION IN PERI URBAN AREAS OF CHITTAGONG DISTRICT**

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### **Abstract**

The study was undertaken to compare the relative profitability of dairy farming under Field Fertility Clinic (FFC) member and non-members. A total of 130 samples were selected randomly of which 100 were members and 30 were non-members. Total cost of raising dairy cow was estimated at Tk. 142.04 and Tk. 158.21/day for member and non-member farmers. Feed cost constituted about 71.64 per cent and 69.94 per cent of total cost for member and non-member farmers respectively. Concentrate occupied the largest share out of total feed cost. In case of member, net return per day per cow was Tk. 96.02 while in the case of non-member it was Tk. 65.94. Return from per dairy cow of the members was higher by Tk. 30.08 than the non-members. The average milk yield was 6.06 liters and 5.81 liters respectively for member and non-member farmers. Cobb-Douglas production function analysis was done to determine the effects of variables inputs such as concentrate feed, paddy straw, green grass, human labour, veterinary cost and FFC intervention on milk yield. The finding showed that all of the selected variables except paddy straw had significant impact on milk yield.

**Key words:** Field fertility clinic, Milk yield, Cobb-Douglas production function, Net return

### **Introduction**

Livestock (cattle, buffaloes, goat, sheep, chicken and ducks) is an integral part of the agricultural farming system in Bangladesh. The contribution of livestock sector to agricultural share of Gross Domestic Product (GDP) was 17.19 per cent during 2007-08 with an annual growth rate 2.41 per cent (Economic Review, 2008). Nevertheless, livestock helps earn foreign exchange through exporting hide and skin, bone etc., and also improved trade balance of payment (BBS, 2007). In Bangladesh most of the milk is produced by the small holder dairy farmers. Most of the owners have two or three cows which are used for dual purposes like draught and milk production. Gradually quite a significant number of small holders and fewer families have diverted to dairying to supplement their family income. Some large commercial capital intensive dairy farms have also come up over the years, a

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noticeable development has also taken place in breed improvement. Cross-breeding of local cows with Shahiwal, Frisian, Jersey etc, are often seen in the rural areas. These cross-breeds are found higher yield in terms of milk and meat. In our country, 25 per cent people directly and 50 per cent people indirectly depend on livestock sub-sector. Livestock supplies about 95.0 per cent draft power which is mainly used for crop production and post harvest operation (DLS, 1998). Dairy cows produce milk and meat for human consumption, which are very rich in nutrient contents essential for maintenance of human health. The other products of dairy cows such as hides and skins, bones and horns are used as industrial raw materials. The cowdung is essential nutrient for soil fertility maintenance. The productivity of dairy cow was very low due to insufficient veterinary services. Considering this issue, FFC has been developed through USDA Funded Project (BG-ARS-109) for improving veterinary services in the private sector. Individual farmers can neither get the veterinary services nor have access in the formal milk marketing. Bangladesh Milk Producer's Cooperatives Union has shown their success on cooperatives for delivering services and marketing of milk. Field Fertility Clinic (FFC) implemented veterinary service and feed management through farmer's cooperatives/associations. The cooperatives have been empowered so that they, by pooling their produces for a market push, become enabling to manage milk marketing and purchase the FFC services. The specific objective of the present study is to compare the cost, return, profitability and resource use efficiency between FFC and non-FFC farmers.

## Methodology

The farm survey was conducted to achieve the objectives of the study. The Patiya upazilla of Chittagong district was purposively selected for the survey. There are 200 dairy farmers exists under field fertility clinic covering the villages of Sikulbaha, Julda, Shamirpur, Ziri and Kusumpura of Sikulbaha union as registered members. A total of 100 samples were selected randomly from 200 dairy farmers under FFC and 30 samples were selected from non members of FFC. The researcher himself collected data through personal interview with the individual member and non-member farmers of the FFC during February to March 2009. After collection of data, all data were analyzed as per the objectives of the study. Simple statistical tools such as means, ratios, percentage etc, were applied to convert the data to meaningful form. Data were arranged in tabular form to unveil the interrelationship among factors. Finally, functional analyses were accomplished to estimate the efficiency of variable inputs used in milk production process.

Cobb-Douglas production function model was used to determine the effects of key variable inputs.

$$Y = aX_1^{b_1} X_2^{b_2} X_3^{b_3} X_4^{b_4} X_5^{b_5} D^{b_6} e^{u_i}$$

The function converted into logarithmic form. Thus the empirical specification of the function was as follow:

## *Field fertility clinic on dairy production*

In  $Y = a + b_1 \ln X_1 + b_2 \ln X_2 + b_3 \ln X_3 + b_4 \ln X_4 + b_5 \ln X_5 + b_6 D + u$

$Y$  = Value of average milk yield (per cow per day in Tk.)

$a$  = Constant / intercept

$X_1$  = Cost of concentrate feed (per cow per day in Tk.)

$X_2$  = Cost of paddy straw (per cow per day in Tk.)

$X_3$  = Cost of green grass (per cow per day in Tk.)

$X_4$  = Cost of human labor (per cow per day in Tk.)

$X_5$  = Cost of veterinary cost (per cow per day in Tk.)

$D$  = FFC intervention dummy (1 For FFC intervention and 0 for non-FFC Intervention)

## **Results and Discussion**

### **Feed cost**

Cost of feed included expenses on concentrate, (oil cake, bran, molasses, salt) paddy straw, green grass, and vitamin. The purchased feeds were valued according to the average prices actually paid by the farmers. Home supplied feeds were also charged as opportunity cost principle where the average prices prevailing in the market of the study areas. It is observed that most of the dairy cow owners produced green grass in unused lands (Bathan) in the study areas and these were used for grazing of animals. It is evident from the Table 1 that feed cost was the most important component in both the categories representing about 71.66 and 69.94 per cent of total cost for the members and non-member of FFC respectively. In case of FFC members, concentrates, paddy straw, green grass, and vitamin represented about 54.91, 6.18, 395 and 6.60 per cent of total cost respectively. However, in the case of non-members, about 52.44 per cent of total feed costs were attributable to concentrate, 5.80 per cent to paddy straw, 4.30 per cent to green grass and 7.40 per cent to vitamin cost of feed.

### **Labour cost**

Labour cost is an important cost in dairy raising and it has implication on income and employment generation. Table 1 shows that on an average per day labour cost per dairy cow amounted to Tk. 15.80 and Tk. 21.34 for members and non-members of FFC respectively which was about 11.13 and 13.49 per cent of total cost of raising dairy cow.

### **Housing cost**

In the study area, almost all the houses for dairy animals were made of tin. Generally a large number of animals were kept in a house. The cost of housing was calculated by taking into account the depreciation cost, interest on the average value of cattle shed, repairing costs and interest on repairing cost. It appears from Table 1 that the housing costs were 2.87 and 2.60 per cent of total cost amounting to Tk. 4.09 and 4.11 daily in case of member farmers and non- member farmers of FFC respectively.

**Table 1. Total costs per day per dairy cow of the members and non-members of FFC**

Contents	Members		Non-members	
	Total cost (Tk./day)	% of total	Total cost (Tk./day)	% of total
Total feed cost	101.77	71.64	110.65	69.94
Concentrate	78.00	54.91	82.97	52.44
Straw	8.78	6.18	9.18	5.80
Green grass	5.62	3.95	6.80	4.30
Vitamin	9.37	6.60	11.71	7.40
<b>Total labour cost</b>	<b>15.8</b>	<b>11.13</b>	<b>21.34</b>	<b>13.49</b>
Paid labour	8.90	6.27	11.67	7.38
Unpaid labour	6.90	4.86	9.67	6.11
Housing cost	4.09	2.87	4.11	2.60
Capital cost	10.24	7.21	10.46	6.62
Cost for dairy supplies	2.46	1.73	2.60	1.65
Veterinary cost	3.97	2.80	5.61	3.55
Miscellaneous cost	3.67	2.58	3.40	2.15
<b>Total cost</b>	<b>142.04</b>	<b>100</b>	<b>158.21</b>	<b>100</b>
<b>Total cost/litre/day</b>	<b>23.47</b>	<b>-</b>	<b>27.23</b>	<b>-</b>

### **Capital cost**

The capital cost was calculated on the average value of used capital. The interest on used capital was calculated at the present commercial bank rate for agriculture which was 8 per cent per annum. The cost was calculated by the following formula:

$$\text{Capital cost} = \text{used capital} \times \text{interest rate}$$

Capital cost per dairy cow was 7.21 and 6.62 per cent of total cost which amounted to Tk. 10.24 and Tk. 10.46 per day in case of member and non-members respectively (Table 1).

### **Cost of dairy supply**

Dairy supplies included expenses on rope, bamboo, buckets, spade, mosquito net etc. It appears from Table 1 that dairy supplies costs per dairy cow were 1.73 and 1.65 per cent of total cost amounting to Tk. 2.46 and 2.60 daily in the case of member and non-members of FFC respectively.

### **Veterinary cost**

Table 1 showed that annual veterinary cost per dairy cow constituted 2.80 and 3.55 per cent of total cost amounting to Tk. 3.97 and Tk. 5.61 respectively for the members and non-

### *Field fertility clinic on dairy production*

members of FFC. Here non-member veterinary cost was higher than member farmers of FFC due to higher payment by the non-members.

#### **Miscellaneous cost**

Miscellaneous included expenses on electrical instrument, electrical bills, and feed transport cost etc. It appears from Table 1 that miscellaneous cost per dairy cow were 2.58 and 2.15 per cent of total cost amounting Tk. 3.67 and Tk. 3.40 daily in the case of member and non-member farmers of FFC.

#### **Returns from dairy cow**

The purpose of this section was to determine gross returns and net returns per dairy cow. The returns from dairy cow included milk production, cowdung, bonus and inventory change. The returns from milk were calculated on the basis of the average quantities of milk yield per dairy cow and average price received per litre of milk.

#### **Returns from milk**

Table 2 represents the per day return per dairy cow by the member and non-member of Filed Fertility Clinic. It is noted that on average return from milk per day per dairy cow were Tk. 202.87 and 194.58 respectively for the members and non-members of Field Fertility Clinic representing about 85.15 per cent and 86.80 per cent of total returns respectively.

#### **Returns from cowdung**

The average returns from cowdung per dairy cow per day were Tk. 8.21 for the member and non-member of FFC. The returns from cowdung were the 3.45 and 3.66 per cent for the members and non-members of the FFC.

**Table 2. Total returns per day per dairy cow by the members and non-members of FFC**

Contents	Unit	Member				Non-member			
		Quantity	Rate (Tk.)	Value (Tk.)	%	Quantity	Rate (Tk.)	Value (Tk.)	%
Milk	Litre	6.06	33.5	202.87	85.15	5.81	33.5	194.58	86.80
Cowdung	Kg.	16.43	0.5	8.21	3.45	16.44	0.5	8.21	3.66
Bonus	Tk.	6.06	1.0	6.05	2.54	-	-	-	-
Inventory change	-	-	-	21.09	8.85	-	-	21.37	9.53
Gross return /dairy cow	-	-	-	238.24	100	-	-	224.16	100

#### **Returns from bonus**

Every member got bonus Tk. 1.00 per liter who was included FFC as member. Table 2 shows that per day bonus was Tk. 6.06 in case of member farmers representing about 2.54 per cent of total returns.

### Returns from inventory change

Inventory change was defined as the difference between the total value of farm's cattle at the beginning of the year plus cattle bought and the total value of farm's cattle at the end of the year plus cattle sold, family consumption or otherwise disposed off. Thus inventory change = (Closing stock + Sold + family consumption) - (Beginning stock + Bought). Returns from inventory change are presented in Table 3. The table indicates that on an average per day return from inventory change per dairy cow were Tk. 21.09 and Tk. 21.37 for member and non-member farmers of Field Fertility Clinic representing about 8.85 and 9.53 per cent of total returns respectively.

### Profitability of dairy raising

Net returns from raising dairy cows were calculated by deducting total costs from total returns. Table 3 shows that the average net returns per day per dairy cow were Tk. 96.02 and Tk. 65.94 in the case of members and non-members of Field Fertility Clinic respectively. It represent that gross margin were per day per dairy cow were Tk. 110.57 and 80.56 respectively for the member and non-members of Filed Fertility Clinic. From the table it is also noted that on an average the undiscounted benefit cost ratio (BCR) was 1.68 and 1.42 for members and non-members of FFC respectively. Hence BCR of member farmer was higher than the non-member farmer.

**Table 3. Profitability of sample dairy farmers per cow per day basis**

Contents	Unit	Member	Non-member	Net change	% of net change
Gross return	Tk.	238.24	224.16	14.08	5.91
Total cost	Tk.	142.04	158.21	-16.17	(11.38)
Variable cost	Tk.	127.67	143.60	-15.93	(12.48)
Gross margin	Tk.	110.57	80.56	30.01	27.14
Net return	Tk.	96.02	65.94	30.08	31.33
BCR (undiscounted)	-	1.68	1.42	0.26	15.48

### Factors influencing milk return

The estimated values of the coefficients and related statistics of the Cobb-Douglas production function of milk are shown in Table 4. The interpretations of the values and the major findings are presented below:

#### Concentrate feed ( $X_1$ )

The regression coefficient of concentrate feed ( $X_1$ ) was significant and positive for milk production. Coefficient of concentrate feed ( $X_1$ ) 0.443 for milk production and significant at 1 per cent level. It indicated that keeping other factors constant, 1 per cent increase in

expenditure on concentrate feed would increase the return of milk by 0.443 per cent (Table 4).

#### **Paddy straw ( $X_2$ )**

The regression coefficient of paddy straw ( $X_2$ ) for dairy cow was positively significant at 5 per cent level, indicating 1 per cent increase in expenditure on paddy straw, keeping other factors constant, would result in an increase of milk yield by 0.05 per cent.

#### **Green grass ( $X_3$ )**

The regression coefficient of green grass ( $X_3$ ) for dairy cow was positively significant at 5 per cent level, indicating 1 per cent increase in expenditure on green grass, keeping other factors constant, would result in an increase of milk yield by 0.241 per cent.

#### **Human labour ( $X_4$ )**

The regression coefficient of human labour ( $X_4$ ) for dairy cow was positively significant at 5 per cent level. This indicates that an increase in expenditure 1 per cent on human labour, keeping other factors constant, would result in an increase of milk yield by 0.120 per cent.

#### **Veterinary cost ( $X_5$ )**

The regression coefficient of human labour ( $X_5$ ) for dairy cow was positively significant at 5 per cent level. This indicates that an increase in expenditure 1 per cent on veterinary cost, keeping other factors constant, would result in an increase of milk yield by 0.050 per cent.

#### **FFC intervention dummy (D)**

In the case of FFC intervention dummy, 1 was assumed for those farmers who used FFC intervention (feeding and veterinary intervention) and 0 for those who did not use FFC intervention in their farm. The coefficient of the variable FFC intervention Dummy for dairy cow was statistically significant at 5 per cent level. This implies that gross return increase by 0.065 per cent where FFC intervention was made.

#### **Value of $R^2$**

The coefficient of multiple determination,  $R^2$  was 0.937 for dairy cow, which indicated that about 93 per cent of the variations in milk yields were explained by the independent variables included in the model.

#### **F-value**

The F-value of the equation was highly significant at 1 per cent implying that all the variation in milk yield depends mainly upon the explanatory variables included in the model.

#### **Return to scale**

The sum of all the production function coefficients (production elasticity) of the equation for dairy cow was 1.025. This indicates that the production function exhibited increasing return

to scale for dairy cows. That means there is scope for further improvement in resource allocation.

**Table 4. Estimated value of co-efficient and related statistic of the Cobb-Douglas production function**

Variable/Parameters	Co-efficient	Standard error
Intercept	1.475	
Concentrated feed ( $X_1$ )	0.443*	0.187
Paddy straw ( $X_2$ )	0.053**	0.057
Green grass ( $X_3$ )	0.241**	0.057
Human labour ( $X_4$ )	0.120**	0.064
Veterinary cost ( $X_5$ )	0.050**	0.930
FFC intervention dummy (D)	0.065**	0.135
R <sup>2</sup> (Adjusted)	0.937	
F-value	135	
Return to scale	1.025	

\* = Significant at 1 per cent level, \*\* = Significant at 5 per cent level

### Concluding Remarks

The study revealed that dairy farming is a profitable business. The policy makers should, therefore extend more policy support which will encourage expansion of dairy farming and thereby will contribute to increase milk production in the country as a whole.

Based on the results of this study, the following conclusions may be drawn:

- After intervention of FFC services total milk production, total return and net return per farm have been increased which indicated the positive impact for dairy development in the study area.
- After using the FFC services, the net change of farm income has been increased.
- FFC intervention was found a positive effect on total return from milk production.

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