

ECONOMIC ANALYSIS OF BROILER PRODUCTION IN A SELECTED UPAZILA OF MYMENSINGH DISTRICT

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ABSTRACT

This study aimed to determine the cost, return and profitability of broiler production in a selected area of Mymensingh district. It was mainly based on primary data of 60 samples, selected purposively from nine villages under Trishal Upazila. For the analysis of data, tabular and production function technique were used. This study revealed that the average raising cost of broiler per farm per year was estimated at Tk. 4,64,991. It was found that the variable cost per farm per year stood at Tk. 4,22,545 which accounted for 90.87 percent of total cost. The total fixed cost per farm per year accounted to Tk. 42,446. It is evident from the study that the gross return per farm per year stood at Tk. 5,90,491. The net return over total cost per farm per year was calculated at Tk. 1,22,500. Finally the findings revealed that broiler production was a profitable enterprise. Cobb-Douglas production function was also applied to explore the specific effect of the factors on broiler production. It was observed that most of the included variables had significant impact on broiler production. Out of six variables included in the function, three variables had positive impact on return.

Keywords: Variable cost, Total fixed cost, Gross return and Net return

INTRODUCTION

Agriculture still dominates the Bangladesh economy. Eighty percent of the 145.46 million inhabitants of Bangladesh depend on agriculture. The area of this country is 1,47,570 sq. km (BBS, 2007). As a developing country, poverty, unemployment and malnutrition are the major problems of Bangladesh. Forty four percent of this country's population live below the absolute poverty line and the number of landless poor people has been increasing by 3.7 percent per annum (GOB, 2009). Poultry is one of the most important sub-sectors of agriculture in Bangladesh. The rural people have been keeping indigenous chicken for centuries under semi-natural conditions mainly for their domestic consumption with very little commercial motives. At present, a large number of poultry farms have been established on commercial basis in and around the cities and towns and are operating under intensive management. Poultry meat can efficiently and rapidly fill in the shortage of body requirement. At present a total of 0.15 million commercial farms have been established throughout the country. About 6 million people are engaged directly and indirectly in poultry industry. About 3500 million of eggs, 250 million of broiler day-old chick, 25 million of layer day-old chick and more than 200 million tonnes of poultry feed are being produced per year in the country (Rahman,2004). A number of mills have started producing poultry feed by this time and more entrepreneurs are coming forward to establish feed mill and poultry processing plants.

Bangladesh is a densely populated country. Malnutrition and hunger are serious problems in this country. Fifty percent of the new born are low birth weight and more than 90 percent of the children (aged <5 years) suffers from mild to severe forms of malnutrition. Egg, meat and milk, the three

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important protein foods originate from the poultry and livestock sector. On an average every person should consume at least 100 eggs, 43.5 kg. of meat and 90 litre of milk per annum to prevent malnutrition. Therefore, it is essentially needed to increase the production of eggs, meat and milk and there are good prospects to increase the production of poultry and livestock products.

Broiler farming has a great potential for providing additional income to both male and female of rural and urban areas through creation of employment opportunities. Broiler, however, has a shorter life cycle and its production requires less capital compared to other meat producing animals. Since the majority of the people irrespective of caste or religion prefer chicken, its demand is very high. As a result, the prices of those products have gone up. Having received the signal of higher price and demand in home market, recently a tendency to establish small-scale commercial farm is observed among some people both in rural and urban areas. Poultry is no more a backyard farming now. It is shaping up as an industry. So an efficient production system is required for supporting commercial broiler farming in the country.

It is difficult to set up commercial dairy, sheep and goat farm for want of capital, inadequate lands for producing fodder, technological problems and so on. Raising of poultry can solve these problems to a significant extent. The relative merit of poultry raising are noted below:

- i) People are accustomed to raise a small number of poultry in their houses.
- ii) Poultry raising is one of the best ways for earning within the shortest possible time.
- iii) Unemployed youngmen, women and widows can look after poultry very easily.
- iv) Poultry farming can be started with small capital.
- v) Poultry can be adaptable very easily in all climatic conditions. Hence, high yielding variety of chicken for eggs and broiler can be imported from foreign countries.
- vi) Small area of land is required for raising chicken. Hence it would be one of the profitable business as for small farmers and landless labourers.
- vii) All by-products such as bone meal, blood meal, wheat and rice bran can more efficiently be used by raising poultry.

Only a few studies have been conducted on broiler farming like Tohura (2004) conducted a study on economics of small-scale commercial Broiler farming in Sadar upazila of Rangpur District. Bairagi (2004) examined contract farming in a form of production which establishes relationship between agribusiness firms and the farmers. The present study is therefore, exploring a new dimension which is very important at present situation to know the economic analysis of broiler production. Moreover, this study was conducted using latest data to get recent information regarding production and will help both the researchers and the farmers concerned with broiler farming.

The overall objective of this research is to investigate various socio-economic aspects of broiler farming in a selected upazila of the country. The specific objectives of the study are as follows:

- i) To identify the major socio-economic characteristics of broiler farmers;
- ii) To determine the costs, returns and profitability of broiler enterprise;
- iii) To determine the factors affecting on returns and to measure resource productivity in broiler production;
- iv) To identify the social, economic and technical constraints faced by the broiler producers in practicing improved broiler farming; and
- v) To make some suggestions for policy guidelines and recommendations for development of broiler production.

The following hypotheses were considered and tested to direct the study:

- i) There is no effect of factors employed on gross returns of broiler production.
- ii) There is no inefficiency in allocating the resources for producing broiler birds.

MATERIALS AND METHOD

Data: For this study, primary data were used. To collect the primary data from the farmers of study area, a purposive sampling technique and personal interview method was followed. In total of 60 broiler farms were selected for the study. Considering the objectives of the study and limitations of the research with respect to time, manpower and other facilities, some areas of Trishal Upazila in Mymensingh, was purposively selected for the study. Recently a large number of commercial broiler farms have been developed in the selected areas. For this study the back-dated data were collected during the months from January to March, 2006.

Analytical Technique: The data were analyzed in accordance with the objectives of the study. Tabular analysis is a technique that is generally used to find the crude association or variations between variables. Tabular techniques were applied with the help of some statistical measures like the sum average, percentage, etc., to show the comparative performance of broiler farming. Profitability analysis was done on the basis of variable cost, fixed cost, etc. The following profitability equation was applied in the study.

$$\Pi = P_b Q_b + P_L Q_L - \sum_u^n (P_{X_i} X_i) - TFC$$

where,

Π = Profit (Tk./year/farm);

P_b = Per unit price of live broiler (Tk./kg.);

Q_b = Quantity of live broiler (Kg./year);

P_L = Per unit price of used litter and excreta (Tk./kg.);

Q_L = Quantity of waste litter (kg./year/farm);

P_{X_i} = Per unit price of i-th (variables) inputs used in the broiler farm (Tk.);

X_i = Quantity of i-th (variables) inputs used in kg.;

TFC = Total fixed cost involved in broiler farm (Tk./year).

Specification of the Cobb-Douglas production function

The Cobb-Douglas production function was used in the present study. Cobb-Douglas production function was used as this model provides a compromise between (i) adequate fit of the data, (ii) computation feasibility, (iii) sufficient degrees of freedom unused to allow for statistical testing. The model took the following shape:

The function was estimated as follows:

Where,

$$Y = a x_1^{b_1} x_2^{b_2} x_3^{b_3} x_4^{b_4} x_5^{b_5} x_6^{b_6} e^{U_i}$$

$$\ln Y = \ln a + b_1 \ln x_1 + b_2 \ln x_2 + b_3 \ln x_3 + b_4 \ln x_4 + b_5 \ln x_5 + b_6 \ln x_6 + U_i$$

Y = Gross return (Tk.)

a = Constant or intercept value

x_1 = Cost of feed for ith farm (Tk./kg./yr.)

x_2 = Cost of day-old chicks for ith farm (Tk./yr.)

x_3 = Cost of hired labour for ith farm (Tk./yr.)

x_4 = Veterinary expenses for ith farm (Tk./yr.)

x_5 = Cost of electricity for ith farm (Tk./yr.)

x_6 = Cost of litter for ith farm (Tk./yr.)

U = Error term

i = 1, 2, 3 ...60

$b_1, b_2, b_3, b_4, b_5, b_6$ = Regression co-efficient of respective variables.

In = Natural log.

RESULTS AND DISCUSSION

Socioeconomic Characteristics of Broiler Farmers: The socioeconomic characteristics considered in the present study were age, education, occupation, family size, land ownership, sources of family income, etc. Age distribution of Broiler Farm Owners: Age distribution of broiler farm owners is very important in maintaining profitable operation of a farm business. The selected broiler farmers were grouped into five categories according to their ages. The different age groups of the broiler farm owners are presented in Table 1.1.

Table 1.1 Age distribution of broiler farm owners

Age group (years)	No. of farm owners (N=60)	Percent
17.01-20.00	20	33.33
20.01-30.00	29	48.33
30.01-40.00	7	11.67
40.01-50.00	2	3.33
50.01-60.00	2	3.33

It is clear from the table that of the 60 sample owners none of the broiler farm owners belongs to the age below 17 years. The table also shows that the owners of these broiler farms were relatively young men. The highest part of the farm owners fell into the age group of 20.01 to 30.00 years which was 48.33 percent, while 33.33 percent of broiler farm owners fell into the age group between 17.01 to 20.00 years, 11.67 percent in 30.01-40.00 years and 3.3 percent of the broiler owner were same between the two groups.

Educational Level of Broiler Farmers: Education plays an important role for a broiler farm owner and helps a farmer to have day to day information about the existing modern techniques together with changes in various management practices. It enables a man more capable to manage scarce resources and hence to earn maximum profit (Miah,1990).

The educational level of the broiler farmers was categorized into five categories, i.e. (i) illiterate, (ii) upto primary, (iii) upto SSC, (iv) upto HSC and (v) Graduate and above. The educational of the broiler farm owners of the study area is presented in Table 1.2.

Table 1.2 shows that most of owners of the selected broiler farms were well educated. It can be seen from the table that only 6.67 percent owners were illiterate; 21.66 percent owners had primary level; 36.66 percent owners were secondary level; 16.66 percent higher secondary level; and about 18.33 percent were educated upto graduate level.

Table 1.2 Educational level of the owners of broiler farms

Educational level	No. of farm owners	Percent
Illiterate	4	6.67
Upto primary	13	21.66
Upto SSC	22	36.66
Upto HSC	10	16.66
Graduate	11	18.33
All	60	100.00

Family Size of the Broiler Farm Owners: In the study area, family size has been considered as one which has a total number of people living together of the same head of the family. The family member includes wife, sons, unmarried daughter, father, mother and brother. The total number of persons of all families were divided into four age categories according to their family size. The different family size of broiler farmers is presented in Table 1.3. Table 1.3 indicates that 13.33 % families of broiler farm owners consisted of 1-3 members; 35% families consisted of 4-5 members, 43.33 % families consisted of 6-7 members, 8.33 % families consisted of 8+ members. in Trishal upazila. The average family size

Table 1.3 Family sizes of the broiler farm owners

Family members group	No. of farm family	Percent	Family members of broiler farm owners						Average family size
			Male		Female		Total		
			Number	Percent	Number	Percent	Number	Percent	
1-3	8	13.33	14	7.78	10	5.72	24	6.77	3.00
4-5	21	35.00	51	28.33	54	30.85	105	29.58	5.00
6-7	26	43.33	95	52.78	87	49.71	182	51.26	7.00
8+	5	8.33	20	11.11	24	13.72	44	12.39	8.80
All farms	60	100.00	180	100.00	175	100.00	355	100.00	5.95

of these categories of broiler farm families consists of 3.00, 5.00 and 7.00 members, respectively. The overall average family size was 5.95.

Occupational Status of the Broiler Farm Owners: The work in which a man is engaged throughout the year is known as his main occupation of that person (Ray,1998). In the selected area, the broiler farm owners were engaged in different occupations along with broiler farming. The occupational status of the study area of broiler farm owners is given in Table 1.4.

Table 1.4 Occupational status of the broiler farm owners

Sectors	Broiler farm owners	
	No. of farm owners	Percent
Agriculture	32	53.33
Business	17	28.34
Services	11	18.33
All	60	100.00

The occupational status of the selected broiler farm owners are presented in Table 1.4. The table suggests that about 53.33 percent of sample broiler farmers were engaged in agriculture. Moreover 28.34 % and 18.33 % farmers were involved in business and service respectively.

Income Level and Other Sources of Income: Annual family incomes of broiler farm owners are divided into two sources, i.e., (i) agriculture and (ii) non-agricultural source. Agriculture sources which included crops, fisheries, livestock (excluding broiler income), vegetables etc. and another non-agricultural sources which included business, services, etc. were the sources of income of broiler farm owners. Annual family incomes of broiler farm owners are shown in Table 1.5.

Table 1.5 Average Annual family income of broiler farm owners

Sources	Items	Income (Tk./yr.)	Percent
Agriculture	Crops	42,535	33.64
	Fisheries	37,733	29.84
	Livestock (excluding broiler income)	5,882	4.65
	Vegetables	1800	1.42
	Sub total	87,950	69.56
Non-agriculture	Business	17,000	13.44
	Services	17,390	13.76
	Others	4,100	3.24
	Sub total	38,490	30.44
All	-	126,440	100.00

Table 1.5 indicates that the family income derived from agricultural sources were greater than those of non-agricultural sources. On an average annual family income from agricultural sources for broiler

farm owners were Tk.87,950. On the other hand, average annual income from non-agricultural sources for broiler farms were estimated at Tk. 38,490.

Distribution of Operated Land under Own Ownership: According to Yang (1962), farm size is computed by the entire land area operated by a farmer. It is measured by adding the area rented and mortgaged-in from others and deducting the area rented and mortgaged-out to others. In the present study on the basis of land types the broiler farm owners were classified into eight categories, namely (i) homesteaded area, (ii) pond area, (iii) Garden, (iv) Own cultivated land, (v) rented in, (vi) rented out, (vii) mortgaged-in and (viii) mortgaged-out. Operational land areas of the owners of broiler farms are presented in Table 1.6.

Table 1.6 Land ownership patterns of the broiler farm owners

Land type	Average land area (decimal)	Percentage
Homestead	26	7.42
Pond	57	16.28
Garden	7	2.00
Own cultivated	235	67.14
Rented in	12	3.42
Rented out	(27)	-
Mortgaged in	13	3.71
Mortgaged out	(4)	-
Total	350	100.00

Source: Field survey, 2006. (Note: Rented out and mortgaged out land were excluded.)

Table 1.6 indicates that cultivated area owned by broiler farm owners were 235 decimals which was 67.14 percent of total land. It is measured by the own cultivated area, adding with the area of rented in and mortgaged in land excluding the rented out and mortgaged out land.

Profitability of Broiler Farming: In the present study, the total cost of broiler production was estimated at Tk. 4,64,991 per farm per year. Table 2.1 represents the total costs of broiler production. Total variable cost and total fixed cost were Tk. 4,22,545 and Tk. 42,446 that were 90.87 and 9.13 percent of total cost, respectively. On the other hand total costs of raising broiler per farm per year were estimated at Tk.4,64,991. The item-wise costs of broiler production are discussed below.

Variable Cost

Feed cost: It was the largest cost item of broiler farms. In this study the average feed cost per farm per year was calculated. Most of the farmers used ready made feed which included fish meal, bone meal, rice bran, wheat bran, oil cake, oyster shell, minerals, salt, vitamin, etc. and some used hand made feed. The purchased feeds were valued according to the average prices actually paid by the owners of the broiler farm. It is evident from the table that feed cost was the major important component which was Tk. 2,42,862 and covering 52.23 percent of total cost (Table 2.1).

Day-old chick cost: Day-old chick cost was another crucial cost item for broiler raising. The farmers of the study areas mainly collected day-old chick from hatcheries through their local agents. The local hatchery imported parent stock from breeder farm and produced hybrid chicks for local commercial farms. It appears from Table 2.1 that the annual expenditure on day-old chick were calculated at Tk. 1,40,093 which covered 30.13 percent of total cost. The farm gate price of per day-old chick was estimated at Tk. 17.47 (Table 2.1).

Labour cost: Labour cost is an important component in broiler enterprise and this has implication for income and employment generation. In calculating the cost of farm operation, the services of both hired and family labour were taken into consideration. Family labour includes the operator himself and other working members of the family while the hired labour includes permanent hired labour, labour employed on daily contract basis. The cost of family labour was estimated on the basis of the principle of opportunity cost. It is revealed from Table 2.1 that the cost of hired labour per farm per year for 8,018 birds was Tk. 1,499 which covered 0.32 percent. On the other hand, family labour cost was calculated at Tk. 2,245 which covered 0.48 percent of total cost.

Veterinary expenses: The broiler farm owners in the study area were very careful about the possibility of their broiler diseases. Vaccine, medicine, doctor's fees were the major component of veterinary expenses. Table 2.1 shows that average veterinary cost per farm per year was Tk. 22,922 for 8018 birds comprising 4.93 percent of the total cost.

Electricity cost: It is another important cost for broiler enterprise. Electricity is needed for maintaining temperature inside the broiler house or for protecting the birds from hot and cold climate. It is evident from the Table 2.1 that the annual electricity cost was Tk. 3,499 which covered 0.75 percent of total costs.

Litter cost: Litter cost is another important item for broiler production. In selected areas paddy husk was used as litter. The average litter cost per farm per year amounted to Tk. 6,096 which was 1.31 percent of total cost.

Table 2.1 Total costs of broiler production per farm per year

Cost items	Unit	Unit price	Per farm		Percentage of total cost
			Quantity	Total cost	
A. Variable cost				422,545	90.87
a) Feed cost	Kg.	17.00	14,286	2,42,862	52.23
b) Day-old chick cost	No.	17.47	8,018	1,40,093	30.13
c) Hired labour	Man-day			1,499	0.32
d) Veterinary service and medicine cost	Tk.			22,922	4.93
e) Electricity cost	Tk.			3,499	0.75
f) Litter cost	Tk.	38.00/bag	160	6,096	1.31
g) Transportation cost	Tk.			5,574	1.99
B. Fixed cost				42,446	9.13
h) Housing cost	Tk.			35,792	7.69
i) Family labour	Tk.			2,245	0.48
j) Tools & equipment cost	Tk.			2,782	0.60
k) Interest on land value	Tk.			1,627	0.35
Total costs (A+B)	Tk.			4,64,991	100.00

Table 2.2 Feed cost per farm per year

Types of feed	Broiler farm (per year)		
	Quantity (kg.)	Price (Tk./kg)	Total cost (Tk.)
Starter	5,043	17	85,731
Grower	7,143	17	121,431
Finisher	2,100	17	35,700
Total	14,286	17	2,42,862

Transportation cost: Cost of transportation included expenses on transportation for purchasing day-old chicks, feed collection, paddy husk collection, veterinary services, collection of market information, etc. It is evident from Table 2.1 that transportation cost per farm per year stood at Tk. 5,574 which covered 1.99 percent of total cost.

Table 2.3 Annual veterinary expenses per broiler farm per year

Items	Veterinary expenses (Tk./yr.)	Percentage
Vaccine	5,861	25.68
Medicine	14,461	63.37
Doctor's fee	2,500	10.95
All	22,822	100.00

Fixed cost

Housing cost: Farm house plays an important role in broiler farming. The aim of housing is to protect broiler birds from sunshine, rainfall, cold weather, storms, wild animals and also for comfort. In the study areas most of the farm houses were tin shed pucca floor fenced by the iron net. Table 2.1 shows that total housing cost per broiler farm was Tk. 35,792 representing 7.69 percent of the total cost.

Tools and equipment cost: For successful broiler farming tools and equipment are necessary. The major tools and equipment used by the broiler farmers were feeds brooder, spade balance, electrical instruments, syringe. Tools and equipment cost was determined by applying straight-line depreciation method. The tools and equipment cost per farm per year was Tk. 2,782 which covered 0.60 percent of the total cost.

Interest on land value: It is evident from table 2.1 that interest on land value per farm per year was Tk. 1,627 which covered 0.35 percent of the total cost

Return from Broiler Production: The main aim of the commercial broiler farms, like all other business is to earn profit by selling broiler birds. The subsidiary aim of these farms is to meet the demand for home consumption of meat. In this chapter gross return, gross margin, net return and benefit cost ratio have been calculated.

Gross return: Gross return was determined by adding income earned from sale of live broiler, used litter and birds excreta.

Table 2.4 represents that on an average, price per kg. live broiler received by the broiler owners was Tk. 64.84. On the other hand, prices per sack used litter and excreta were Tk. 11.00. The gross returns per farm per year for 8018 birds were Tk. 590,491.

Table 2.4 Gross return from broiler production per farm per year

Items	Unit	Unit price	Per farm/year	
			Quantity (Kg.)	Value (Tk.)
1. Live broiler	Kg.	64.84	9,090	5,89,413.00
2. Used litter & excreta	Sack	11	98	1,078.00
Total (1+2)	-	-	-	5,90,491.00

Gross margin: Gross margin is defined as the difference between gross return and variable costs. It is evident from Table 2.5 that gross margins per farm per year were Tk 167946.

Table 2.5 Gross margin, net return, benefit cost ratio broiler farm per year

Margins & Returns	Per farm/ Year	Percent
A. Gross return	590491	
B. Total variable cost	422545	90.87
C. Total cost	464991	100.00
D. Gross margin (A-B)	167946	
E. Net return (A-C)	122500	
F. Return per taka invested (Variable cost basis) $A \div B$	1.397	
G. Return per taka invested (Total cost basis) $A \div C$	1.269	

Net return: Net return on total cost was arrived at by deducting all the costs from the gross return. Table 2.5 shows that net return per broiler farm per year stood at Tk 1,22,500.

Benefit cost ratio: Table 2.5 shows that on an variable costs and total costs were 1.397 and 1.269. It is evident from the study that the benefit-cost ratios of broiler farming were 1.39 on variable cost basis, and 1.27 on total cost basis. The figures imply that broiler farming generates 39 percent profit

on variable cost basis and 27 percent profit on total cost basis. Thus it emerges that broiler farming is a profitable enterprise.

Functional Analysis The estimated Co-efficient and related statistics of the Cobb-Douglas production function for broiler production are presented in Table 2.1. Major characteristics of the models are noted below:

- i) For testing the significance level of individual co-efficient 1 and 5 percent probabilities were used.
- ii) Total variation of output was measured by multiple co-efficient of determination (R^2).
- iii) Goodness of fit for different types of inputs was measured by F-values.

Table 3.1: Estimated values of co-efficient and related statistics of Cobb-Douglas production function for Broiler farms (N=60)

Explanatory variables	Broiler farm	
	Co-efficient	t-value
Intercept	0.61	0.49
Feed (X_1)	0.59**	3.37
Day-old chicks (X_2)	0.28*	2.24
Hired labour (X_3)	0.02	0.25
Veterinary expenses (X_4)	0.24*	3.17
Electricity (X_5)	-0.25	-1.88
Litter (X_6)	0.12	1.13
R^2	0.713	
Adjusted R^2	0.680	
F-value	21.963 **	
Returns to scale	1.00	

Note: ** Significant at 1% level and * Significant at 5% level

Interpretation of the estimated Results: Feed (X_1): It can be seen from Table 3.1 that the regression co-efficient of feed (X_1) cost was positive and significant at 1 percent level. This indicates that there is an opportunity to increase the gross return per farm by spending additional amount of money. An increase of 1 percent in money spent on feed keeping other factors remaining constant, would result in an increase of return by 0.59 percent (Table 3.1).

Day-old chicks (X_2): The regression co-efficient of expenditure on day-old chicks cost was positive. The co-efficient was significant at 5 percent level for broiler farms. The result of the analysis indicated that 1 percent increase in day-old chicks cost, keeping other factors constant, would result in increase in the gross return by 0.28 percent for broiler farms (Table 3.1).

Hired labour (X_3): The regression co-efficient of hired labour (X_3) cost was positive and insignificant. Since labour is used redundantly, this type of result does not seem to be unusual.

Veterinary expenses (X_4): The regression co-efficient of veterinary expenses (X_4) was positive and significant at 5 percent level. The regression co-efficient of veterinary expenses implies that 1 percent increase in veterinary expenses, keeping other costs constant, would result in an increase of gross return by 0.24 percent.

Electricity (X_5): For electricity cost, the regression co-efficient was negative and insignificant.

Litter (X_6): The regression co-efficient of litter cost (X_6) was insignificant.

The Co-efficient of Multiple Determination (R^2): The co-efficient of multiple determination (R^2) was 0.71. It suggests that 71 percent of the variation in the gross returns was explained by the independent variables included in the model.

F-value: The F-value of broiler production (21.96) was highly significant at 1 percent level implying that all the included explanatory variables were important for explaining the variation of income of broiler production.

Returns to scale: Returns to scale of broiler farms were computed by adding co-efficient of regression of broiler farms. The sum total of all the production co-efficients of the equation for broiler production was 1. This indicates that the production exhibited constant returns to scale.

The overall performance of Cobb-Douglas production function model for broiler farms was satisfactory as indicated by the estimated R^2 and F-value. The estimated values of the model, however, confirm that the variables like feed, day-old chicks, veterinary expenses, etc. had significant impacts on the gross return of broiler farms.

Resource Use Efficiency: To accomplish the aim of profit maximization i.e., for efficient allocation of resources, one should use more of the resources, so long as the value of the added product is greater than the cost of added amount of the resources in producing it. The resources are considered to be efficiently used to maintain the maximum profit when the ratio of marginal value product (MVP) to marginal factor cost (MFC) approaches one; or MVP and MFC are equal for each input. The marginal value product (MVP) is obtained when the marginal physical product (MPP) is multiplied by the product price. The price of one unit of input is called marginal factor cost (MFC). The optimum use of a particular input would be ascertained by the equality condition of MVP and MFC:

The marginal productivity of a particular resource represents the additional to gross returns in value term caused by an additional one unit of that resource with other inputs being held constant. The most variable, perhaps the most useful estimate of MVP is obtained by taking resources (X_i) as well as gross return (Y) at their geometric means (Dhawan and Bansal, 1977). Since all the variables of the model were measured in monetary unit in the function represented the MVP, which was computed by multiplying the production co-efficient (elasticity, in this particular case) of a given resource with the ratio of geometric means of the output and input variables.

$$\therefore \frac{dy}{dx_i} = b_i \frac{Y(G.M)}{X_i(G.M)}$$

Y = Mean value (GM) of gross return in Tk.

X_i = Mean value of i th input in Tk.

$i = 1, 2, 3, 4, 5, 6$

where,

G.M = Geometric mean

Hence, this MVPs indicate the value product in Taka. Per Taka input cost can be used to express the ratio of MVP and MFC. The criteria of resource use efficiency is that a ratio equal to unity indicates the optimum use of that factor, a ratio more than unity indicates that the gross return could be increased by using more of the resource and the value of less than unity indicates excess use of

$$\frac{MVP}{MFC} = 1$$

$$\text{Therefore MVP } (X_i) = b_i \frac{Y(G.M)}{X_i(G.M)}$$

resource which should be decreased to minimize the loss. The estimated MVP of different inputs are presented in Table 3.2.

Table 3.2 Marginal value products (MVP_{xi}) and marginal factor cost (MFC_{xi}) of different inputs included in production function

Variables (Tk.)	Geometric mean	Co-efficient	MFC	Ratio of MVP_{xi} to MFC_{xi}
Gross return (Y)	463846.98			
Feed cost (X_1)	234040.62	0.594	1.00	1.177
Day-old chick cost(X_2)	127249.75	0.283	1.00	1.03
Hired labour (X_3)	1389.09	0.029	1.00	9.68
Veterinary service and medicine (X_4)	18910.10	0.249	1.00	6.107
Electricity cost (X_5)	2869.73	-0.250	1.00	-40.40
Litter cost (X_6)	4023.16	0.1227	1.00	14.06

Table 3.2 indicates that the ratios of MVP_{xi} of feed, day-old chick, hired labour, veterinary services and medicine and litter cost in broiler production were positive and more than one which indicated that more profits could be obtained by increasing feed, day-old chick, hired labour, veterinary service and medicine, litter cost use, etc.

On the other hand, the ratios of MVP_{xi} and MFC_{xi} of electricity cost was negative and more than one which indicated that the level of profit will be reduced by the application of these inputs.

Problem and Some Suggestions: In this section, an attempt has been made to identify the major problems faced by the selected broiler farm owners. This chapter also shows the suggestions made by the selected farm owners.

Economic Problems

a) Money problem: Cash capital is an important input for establishing and operating broiler farming. Table 4.1 represents that 58 % broiler farmers mentioned this problem. Some farmers borrowed money from other people or ‘mahajan’ against high interest. For this reason farmers faced the problem of loan repayment.

b) High price of day-old chick: High price of day-old chick was another problem of broiler farming. Table 4.1 shows that 95 % farm owners reported this problem. In the study area the average cost for day-old chick(DOC) incurred by farmers was Tk. 17.47 per chick but farmers expected that price in the range of Tk. 12 to Tk. 13.

c) Higher price of feed: Higher feed price is one of the major problems of broiler farming. Table 4.1 shows that 92 % of farmers reported this problem. Farmers were collecting feed from local agents. Local agents give feed against high rate price. Because the farm owner paid money for feed after he gets gross return.

d) Uncertainty of profit: Farmers are not sure of their profit margin. Risk and uncertainty is a major factor for broiler production. Table 4.1 represents that 37 % farm owners reported this problem.

e) Lack of credit institution: Farmer did not receive institutional credit. They had to solve this problem by receiving loan from individuals with high interest rate. Table 4.1 represents that 80 % farm owners could not expand their poultry farm due to lack of financial resources.

Marketing problems

a) Rumour: The broiler farmers of Bangladesh are affected by various rumour. For this reason the popularity of broiler is decreasing. Now a days it was affected by the rumour of bird flu. As a result demand for broiler decreased unexpectedly and price of broiler fell down. The owners of broiler farms had to incur tremendous losses. Table 4.1 shows that 97 percent farmers reported about this problem.

b) Power price of broiler: Lower price of broiler is the most important marketing problem. Farmers complained that they were not getting reasonable price. Sometimes the price of broiler was lower than the cost of production. Table 4.1 shows 90 percent farm owners reported this problem.

c) Late payment: Late payment is another problem of broiler farming. The owners bought inputs from various intermediaries who did not pay all value of the product in cash. For this reason they could not start the activities for next batch. Table 4.1 shows that 42 % farm owners faced this problem.

Table 4.1: Problems faced by the broiler farm owners

Problems	Number of responding farmers (N=60)	Percent (%)	Ranking
A. Economic problems:			
a) Money problem	35	58	4
b) High price of day-old chick	57	95	1
c) Higher price of feed	55	92	2
d) Uncertainty of profit	22	37	5
e) Lack of credit institution	48	80	3
B. Marketing problem:			
a) Rumor	58	97	1
b) Lower price of broiler	54	90	2
c) Late payment	25	42	3
C. Technical problems:			
a) Growth problem	53	88	1
b) Electricity problem	35	58	2
c) Lack of training facilities	28	47	4
d) Broiler housing problem	21	33	5
e) Non-availability of parents stock	19	32	6
f) Non-availability of day-old chicks	32	53	3
D. Social and natural problems:			
a) Problem of theft	2	3	4
b) Out break of diseases	45	75	1
c) Pollution of environment	37	62	2
d) Predatory animals	4	7	3

A. Technical problems

a) Growth problem: Broiler birds are very sensitive to weather. If the birds are affected by diseases, they ultimately lose weight. Most of the farmers (88%) were facing the same growth problem (Table 4.1).

b) Electricity problem: It is another important factor of poultry farming. Some farmers use oil lamp and some use electricity of Rural Electrification Board (REB) and the Bangladesh Power Development Board (BPDB). Table 4.1 represents that 58 percent farmers faced this problem in broiler raising. Load shedding is an important problem for hampering better production.

c) Lack of training facilities: The broiler farmers reported that they lacked modern knowledge on broiler farming. Farmers' performance would be improved if they could be trained by livestock officials.

d) Housing problem: Farmers did not know how to make proper housing facilities. For this reason birds did not get good aeration and faced too many crises. Proper housing facilities could help to attain better production. It was revealed that 33 % of broiler farmers felt that they had poor conception about poultry housing (Table 4.1).

e) **Non-availability of parent stock:** Parent stock was not available as many hatcheries failed to easily parent stock. For this reason supply of day-old chick ultimately decreased. Table 4.1 shows that 32 % hatchery owners faced this problem. This problem was faced by broiler farm owner indirectly.

f) **Non-availability of Day-old chicks:** Non-availability of adequate number of day-old chicks is another important problem. Table 4.1 shows that 53 % of farmers reported this problem.

B. Social and natural problems

Social and natural problem was the most important problem of broiler farming. The farm owners of broiler were facing some social and natural problems. These are:

a) **Problem of theft:** It is evident from Table 4.1 that 3 % farm owners reported this problem.

b) **Outbreak of diseases:** Outbreak of diseases is a serious problem for the development of broiler farming. During the last few years, a number of broiler diseases were observed in Bangladesh. In the area the farmers faced in very dangerous diseases. Such as, Gumboro, Ranikhet, Fowl pox, Fowl cholera, Coccidiosis. Most often broiler farm owners had to bear a tremendous loss due to Ranikhet and Gumboro. Table 4.1 shows that 62 % of farmers reported this problem.

c) **Pollution of environment:** In the selected area the broiler farm owners faced this problem that the chicken polluted the whole environment of the surrounding areas of broiler farms. It generates bad smell which leads to a quarrel with the owners of farm. Table 4.1 shows that 62 % of broiler farmers faced this problem.

d) **Predatory animals:** It is evident that from the Table 4.1 that 7 % farm owners faced the problem.

Measures Suggested by Broiler Farm Owners

In order to overcome the problems of broiler rearing and to make the broiler farming more profitable the broiler farmers put forward some suggestions.

i) In a selected area the farm owner said that feed cost was the largest cost item for the broiler farm. In this situation Government should control the high price of feed. Government should give incentives to the private feed manufacturing factories as it becomes necessary to reduce the high price of feed.

ii) Many farmers faced the availability of Day-old chick problem. They went to the local agent for the day-old chick. But the day-old chick was not available. Most of respondents suggested to set up mini hatcheries and necessary arrangements should be made for easy availability of day-old chicks.

iii) To get rid the problem of shortage of fund, the providing of short term loan for broiler farming should be made on easy terms and conditions by government and NGO's.

iv) Government and private research centers should come forward to identify the reasons for not taking desired weight of broiler and they should give suggestions on the basis of the research findings to solve this problem.

v) Most of respondents suggested that government should increase veterinary services by supplying necessary vaccine and medicine at lower price and by establishing new veterinary care centers.

vi) In the selected area the farmers suggested that public media's like television, radio, news paper should play active role against the rumours regarding broiler birds.

vii) Government should take steps to ensure the stable and reasonable price of broiler by ceiling price schemes and providing price incentives.

viii) The respondents suggested that government and NGO's, BRACK, should take proper steps like training of broiler rearing, especially young boys and girls, providing fund to rural disadvantages for broiler rearing.

CONCLUSION

Raising of broiler was a profitable business in the study area. On the other hand, there is a wider scope for the development of broiler farming in this country. The financial benefits obtained from broiler farming suggests that the enterprise is helpful in employment generation and poverty alleviation which

are now the major concern of the planning process of the country. From the outset of the large-scale commercial poultry revolution in Bangladesh, this segment of livestock sub-sector is playing a key contribution to the national economy in the forms of generating local income, poverty alleviation employment creation for the unemployed youths and destitute women and improving the nutrition level of the low-income people. A number of problems and difficulties were found in keeping broiler birds in study area. To overcome the difficulties of broiler keeping and to make the business of broiler keeping more profitable in the country, the following recommendations are put forward for the improvement of existing production of live broiler.

- i) Government does not have any framework to step up the poultry sub-sector. To achieve and enhance the present growth of poultry industry and fulfill the need of private entrepreneurs and NGOs formulation of a separate “National Poultry Development Policy” is required to formulate immediately.
- ii) Feed standardization and quality control act of poultry feed need to be formulated immediately.
- iii) Necessary steps need to be taken to reduce the price of day-old chicks. Again government should give adequate financial support to establish more hatcheries throughout the country.
- iv) Price stabilization and/or floor price schemes should be chalked out to make sure that broiler producers receive the minimum level of profits.
- v) Production, monitoring and formation of quality control system for local hatcheries are needed by government department to ensure the higher quality of day-old chick.

REFERENCES

- Bairagi SK. 2004. An economic study of contract broiler farming with reference to supply chain management. MS. Ag. Econ. thesis, Department of Agricultural Economics, Bangladesh Agricultural University, Mymensingh.
- BBS 2007. Statistical Year Book of Bangladesh, Bangladesh Bureau of Statistics, Statistical Division, Ministry of Planning, Government of the People’s Republic of Bangladesh, Dhaka.
- Dhawan KG and Bansal PK. 1977. Rationality of the use of various factors of production on different sizes of farm in the Punjab; *Indian Journal of Agricultural Economics* 32(3): 121-130.
- GOB 2009. Bangladesh Economic Review, Economic Adviser’s Wing Finance Division, Ministry of Finance, Government of the People’s Republic of Bangladesh.
- Miah MTH. 1990. Economics of commercial poultry farming in Bangladesh, Report No.21, Bureau of Socioeconomic Research and Training, Bangladesh Agricultural University, Mymensingh.
- Rahman M. 2004. Muktagone Poultry Babshaider Shomabesh. *Poultry Khamar Bichitra* (Mondhly Magazizne), 188, Elephant Road, Hatirpool, Dhaka-1205, March 2004.
- Ray SK. 1998. A study on vegetables seed marketing in some selected areas of Bangladesh, An unpublished M.S. Ag.Econ. thesis, Department of Agricultural Economics, Bangladesh Agricultural University, Mymensingh.
- Tohura S. 2004. Economics of small-scale commercial broiler farming in Sadar upazila of Rangpur district. MS. Ag. Econ. thesis, Department of Agricultural Economics, Bangladesh Agricultural University, Mymensingh.
- Yang WY. 1962. *Methods of Farm Management Investigation for Improving Farm Productivity, Food and Agriculture Organization of the United Nations, Rome.*