J. Bangladesh Agril. Univ. 5(2): 437–444, 2007 ISSN 1810-3030

Economic analysis of layer production under supervision of Aftab Bahumukhi Farm Limited and private management in selected areas of Kishoreganj district

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Abstract

The present study was undertaken to identify and compare the socio-economic characteristics of layer farm owners and to estimate and compare the costs and returns of layer production under supervision and private management Aftab Bahumukhi Farm Limited (ABFL). Samples were selected by using stratified random sampling technique to fit the objectives of the study. In total 50 layer farms were studied, in which 25 farms were under ABFL supervision and 25 farms were under private management. Costs and returns were calculated separately to find out the profitability of layer production. Total cost of layer farm per 1.5 years were Tk. 32,81,098 and 7,09,712 under ABFL supervision and private management farm, respectively which shared the major part of the total costs. Cash expenses of layer farm per 1.5 years stood Tk. 29,37,367 and 6,38,011for ABFL supervised farm and private management farm respectively. This accounted for 89.53 and 89.90 percent of their respective total costs. Total non-cash expenses of layer farm per 1.5 years amounted to Tk. 3,43,731 and 71,701 under ABFL supervision and private management farm respectively. Gross returns of layer farm per 1.5 years stood Tk. 62,66,456 and 10,08,381 for farms under ABFL supervision and private management, respectively. Return over full cost of layer farm per 1.5 years were Tk. 29,85,358 and 2,98,669. Cobb-Douglas production function analysis was done to determine the effects of some selected variables namely, feed and human labour on layer production. Findings suggested that the selected variables had significant impact on layer production under both the types of farms. The study also identified some problems and constraints associated with poultry production. Finally, on the basis of findings of the study, some recommendations were made for the development of poultry farming in Bangladesh.

Keywords: Cost and Returns, Economic Returns, Production function analysis

Introduction

Agricultural development is synonymous with the economic development of this country. Livestock sub-sector comprises an integral component of the country's crucial and largely subsistence economy. This sector provides essential animal protein for human nutrition, necessary draught power, cash income to the family, fuel for rural households, organic manure for crop production and feed for fish, earns foreign exchange and provides self-employment to the rural and urban people. The contribution of the livestock sector to the Gross Domestic Product (GDP) is 2.90 per cent in 2006-07 which accounts for about Tk. 10828 crores in which blood, bone, draught power, dung and hides and skins are not included. The growth rate of livestock product in Gross Domestic Products (GDP) is 5.85 in 2006-07 (Economic Review 2007).

There is a great possibility of growth and expansion of poultry enterprises in commercial level and it can be helpful for poverty alleviation in the country. Recently, the poultry enterprise has developed commercially and a large number of educated people have been already involved in poultry farming on a commercial basis.

Bangladesh is a densely populated country where per capita land is 0.67 hectare. Due to the limited availability of grazing land, the scope for development of livestock industries of large animal is limited here. Therefore, poultry enterprises have been developing on commercial basis. People from different corners are coming to operate poultry business as profitable venture.

According to Department of Livestock Service (DLS, 2001), the egg production in Bangladesh was 6.96 lacks in 2000-2001, which was about 20 percent of requirement. So the total deficit of eggs was 3.04 lacks (Alam, 2003). DLS also claimed that in Bangladesh the per capita intake of egg was 31 per year, but per capita requirement was 180 eggs per year (BBS, 2000, p.581). Production of eggs stood at 379 crore in 1999-00. In 2005-06, this figure increased to 607 crore (Economic Review 2006). Poultry eggs and meat contain an abundance of protein. They have large amount of high quality and easily digestible protein and contain all essential vitamins and minerals. Egg provides certain nutrients for well-balanced growth of children, women, farmers and industrial workers (Winter and funk, 1956, p. 53). Poultry enterprise creates various job opportunities for the unemployed people through the establishment of hatchery, feed industry, equipment manufacturing and marketing of poultry birds.

Poultry however have a shorter life cycle and their production requires less capital and land compared to other animals such as cow, sheep, goat etc. The consumption of non-cereal foods is among the lowest in the world and therefore, there is need more production of eggs and meat. But no systematic study has yet been undertaken to determine the problems of various types of layer farming. Many people have no idea about the relative profitability of layer farming under ABFL supervision and private management. So the present study is justified on the ground that it will provide valuable information about layer farming and its level of profitability to the concerned persons.

The overall objective of the study is to analyze the economic performance of layer farms in an area of Bangladesh. The specific objectives are:

- To identify and compare the socio-economic characteristics of the owners of layer farms under Abtab Bahumukhi Farm Limited (ABFL) supervision and private management.
- To estimate and compare the costs and returns of layer production under ABFL supervision and private management.
- To identify the production and marketing problems and to make recommendation for better economic performance of layer farms.

Materials and Methods

The present study was based on a field survey where primary data were collected from individual layer farmers. It may be noted here that layer rearing under contract farming system was firstly introduced by Aftab Bahumukhi Farm Limited (ABFL) in February 1994 in ABFL of Bajitpur Upazila and its adjoining Upazilas. Finally, 6 Upazilas of Kishoreganj district, namely, Bajitpur, Kuliarchar, Kadiadi, Kishoreganj Sadar, Pakundia and Hossainpur Upazila were selected as the study area. Samples were selected by using stratified random sampling technique. In total 50 layer farms were selected, in which 25 farms were under ABFL supervision and 25 farms were under private management. The present study for layer farms covered a one-year period from January 2002 to December 2002. Data were collected by the

researcher himself during the months of February 2003 to May 2003 through direct interviews with layer farmers using a structured survey schedule by several visits. Four sets of survey schedule were prepared for collecting relevant data. The schedules were finalized after making necessary correction, modification and adjustment on the basis of the results of pre-testing. After preparing the survey schedule, the primary data were collected from the farm owners in a face-to-face interview. The data were analyzed with the help of tabular and statistical techniques.

In this study, costs and returns analyses were done on both variable and total cost basis. The following π (profit) equation was developed to assess the profitability of different categories of layer farms:

$$\pi = P_m Q_m + P_1 Q_1 - \sum_{i=1}^{n} P_{x_i} X_i - TFC$$

Where,

π = Profit
P_m = Per unit price of meat or egg (Tk/kg or Tk/egg)
Q_m = Quantity of meat or egg (kg or no.)
P_1 = Per unit price of used litter and excreta
Q_1 = Quantity of waste litter (sack)
Px_i = Per unit price of ith (variable) input
x_i = Quantity of i^{th} (variable) input
i = (1, 2, 3 ....., n) and
TFC = Total fixed costs

To determine the effects of the most important variables to the returns of layer farms, Cobb-Douglas production function was chosen as it is simple to calculate and the elasticity of production was directly obtained from the co-efficient. The following model was used in this study:

$$Y = a\ X_1^{b1}\ X_2^{b2}\ X_3^{b3}$$

The function was estimated by

$$\text{Log}Y = \text{Log}\ a + b_1 \log X_1 + b_2 \log X_2 + b_3 \log X_3 + U_i$$

Where,

Y = Gross return (Tk)
a = Constant or intercept value
X_1 = Cost of feed for i^{th} farm (Tk)
X_2 = Cost of day-old chicks for i^{th} farm (Tk)
X_3 = Cost of human labour for i^{th} farm (Tk)
U = Error terms
i = 1, 2, 3....., 25
b_1, b_2, b_3 = Regression co-efficients of respective variables.

Results and Discussion

The average family sizes for layer farms were estimated at 6.48 and 5.64 persons for the ABFL supervision farms and private management farms respectively. Highest number of layer farm owners in case of both ABFL supervision and private management farms fell into the age group of 25 to 34 years (Table 2). About 4 and 16 percent of farm owners had primary education, 40 and 28 percent had education up to SSC, 44 and 44 percent were HSC passed, about 8 and 12 percent were educated up to graduate level and about 4 and 0 percent had post graduate level education under ABFL supervision farms and private management farms respectively (Table 3).

Table 1. Male Female ratio and average family size of the Owners of Layer Farms

Farm Category	Male	Female	Average family size
ABFL Layer farms	3.84 (59.26)	2.64 (40.74)	6.48 (100.00)
Private Layer farms	3.16 (56.03)	2.48 (43.97)	5.64 (100.00)

Table 2. Owners of layer farms by age group

Age group	ABFL layer farm	Private layer farm
18-24	1 (4.00)	2 (8.00)
25-34	9 (36.00)	8 (32.00)
35-44	7 (28.00)	7 (28.00)
45-54	6 (24.00)	7 (28.00)
55+	2 (8.00)	1 (4.00)
Total	25 (100.00)	25 (100.00)

Four and 16 percent of layer farm owners had primary education, 40 and 28 percent were up to SSC, 44 and 44 percent were HSC passed, about 8 and 12 percent were educated up to graduate level and about 4 percent had post graduate level education under ABFL supervision farms and private management farms respectively (Table 3).

Table 3. Educational status of the layer farm owner

Level of education	ABFL layer farm	Private layer farm
Illiterate	0 (0.00)	0 (0.00)
Up to primary	1 (4.00)	4 (16.00)
Up to SSC	10 (40.00)	7 (28.00)
Up to HSC	11 (44.00)	11 (44.00)
Graduate	2 (8.00)	3 (12.00)
Post graduate	1 (4.00)	0 (0.00)
Total	25 (100.00)	25 (100.00)

The family incomes derived from agriculture sources were greater than those of non-agricultural sources under both ABFL supervision and private management. On an average, annual family income from agricultural sources for layer farms were 1,53,400 under ABFL supervised farm and Tk.1,32,980 under private management farm. Average annual income from non-agricultural sources for layer farms were Tk.41,360 under ABFL supervised farm and Tk.87,200 under private management farm (Table 4). The cultivated land area owned by layer farm owners were 560.60 decimals under ABFL supervision and private management and 210.00 decimals under ABFL supervision and private management (Table 5).

Table 4. Annual family income of layer farms owners

Items	ABFL layer farm	Private layer farm
Agriculture	1,53,400 (78.76)	1,32,980 (60.40)
Non-agriculture	41,360 (21.24)	87,200 (39.60)
All	1,94,760 (100)	2,20,180 (100)

Table 5. Land ownership patterns of layer farm owners

Land types	ABFL layer farm (Decimal)	Private layer farm(Decimal)
Homestead area	28.40 (13.60)	16.92 (7.26)
Pond area	31.28 (14.98)	57.28 (24.56)
Garden	0.00 (0.00)	0.00 (0.00)
Own cultivated	560.60 (268.38)	210.00 (90.05)
Rented in	0.00 (0.00)	3.80 (1.63)
Rented out	152.40 (72.96)	80.60 (34.56)
Mortgage in	0.00 (0.00)	34.60 (14.84)
Mortgage out	259.00 (123.99)	8.80 (3.77)
Total	208.88 (100.00)	233.20 (100.00)

The total costs per farm per year and per bird were classified as cash and non-cash expenses. Cash expenses were those costs that the owners of the farms had to pay out of their pockets to acquire production inputs. Cash costs were estimated for feed, day-old-chicks, veterinary expenses, hired labour, transportation, electricity, and litter cost. Non-cash costs were estimated for family labour, housing, tools and equipment, interest on operating capital and land use cost. The gross return, return over cash expenses, return over full cost, return per taka invested on the basis of cash cost and full cost were worked out and analyzed to see the profitability.

Table 6 presents the total costs of layer farms under ABFL supervision and private management farm. Average, total costs per layer were estimated at Tk. 1177.04 and 611.55 under ABFL supervision and private management farm respectively. The respective total costs per farm per 18 months were Tk. 3281098 and 709712.

Table 6. Economic return from Layer farm

Particulars	ABFL layer farm		Private layer farm	
	Per farm per batch (Tk)	Per bird (Tk.)	Per farm per batch (Tk)	Per bird (Tk.)
Gross return	62,66,456	2,263.08	10,08,381	900.74
Cash cost	29,37,367	1,053.57	6,38,011	560.15
Full cost	32,81,098	1,177.04	7,09,712	611.55
Return over cash cost	33,29,089	1,209.51	3,70,370	340.59
Return over full cost	29,85,358	1,086.04	2,98,669	289.19
Benefit-cost ratio (cash cost basis)	2.13	2.13	1.58	1.61
Benefit-cost ratio (full cost basis)	1.91	1.92	1.42	1.47
Return per Taka investment (cash cost basis)	1.13	1.14	0.58	0.61
Return per Taka investment (full cost basis)	0.91	0.92	0.42	0.47

The cash expenses per layer farm per 18 months under ABFL supervision and private management were at Tk. 2937367 and 638011 respectively, which accounted for 89.53 and 89.90 percent of their respective total costs. To determine the gross return from layer farming, it was necessary to calculate all the returns earned from selling live layer, eggs and pullet, and used litters and excreta. The average prices of meat per kg were Tk. 52.00 and 52.30; the average prices of egg per piece were Tk.3.00 and 2.71 for farms under ABFL supervision and private management farm respectively. The respective prices of litters and excreta per sack were Tk.10.00 and 10.00 for layer farms. Gross returns per batch per layer farm were Tk. 6266456 and 1008381 under ABFL supervision and private management,

respectively (Tables 6). Return over cash cost was the difference between gross return and cash cost. The argument for using the return over cash cost analysis is that the farmers are interested to maximize returns over cash cost. Tables 6 reveal those returns over cash cost for layer farms, per bird per 1.5 years and per farm per 1.5 years were Tk. 209.51 and 340.59, and Tk. 33,29,089 and 3,70,370 under ABFL supervision and private management, respectively. Return over full cost was determined by deducting all costs from the gross return. In case of layer farm return over full cost per farm per batch and per bird stood at Tk 2985358 and 298669, and Tk. 1086.04 and 289.19 under ABFL supervision and under private management, respectively.

Return over full cost was determined by deducting all costs from the gross return. In case of layer farm return over full cost per farm per batch and per bird stood at Tk 2985358 and 298669, and Tk. 1086.04 and 289.19 under ABFL supervision and under private management, respectively.

Cobb-Douglas production function has been chosen to determine the effects of selected inputs on layer production. Factors affecting are used in the production as well as gross returns. Production function was used for analytical purpose and the inputs selected were feed (X_1), day-old chick (X_2) and human labour (X_3) etc.

$$Y = a X_1^{b_1} X_2^{b_2} X_3^{b_3}$$

Where, Y = Return (Tk.)
a = Constant or intercept of the function.
X_1 = Cost of feed for ith farm (Tk.).
X_2 = Cost of day-old chicks for ith farm (Tk.)
X_3 = Cost of human labour for ith farm (Tk.).
b_1, b_2, b_3 = Regression co-efficients of respective variables.

Estimated values of the co-efficient and related statistics of the Cobb-Douglas production functions of layer farms are shown in Table 7. For testing the significance level of individual co-efficient 1, 5 and 10 percent probabilities were used. Total variation of the output was measured by multiple co-efficient of determination (R^2). Goodness of fit for different types of inputs was measured by F-values.

Table 7. Estimated values of co-efficient and related statistics of Cobb-Douglas production function

Explanatory variables	Estimated values of co-efficient	
	ABFL layer farm (N=25)	Private layer farms (N=25)
Intercept	-0.477 (2.258)	0.575 (1.700)
Feed (X_1)	1.261*** (0.290)	0.393*** (0.105)
Day-old chick (X_2)	0.442** (0.209)	0.608*** (0.128)
Labour (X_3)	-0.651* (0.352)	0.226** (0.099)
R^2	0.72	0.79
Adjusted R^2	0.68	0.76
F-Value	18.076***	26.807***
Returns to Scale	1.052	1.227

Note:
*** Significant at 1 percent level.
** Significant at 5 percent level.
* Significant at 10 percent level.
N stands for sample size.
Figures in parentheses indicate standard error.

The regression co-efficients of feed cost were significant and positive for all farm categories. For layer farm the co-efficient was significant at 1 percent level for both ABFL supervised farm and private managed farm. The regression co-efficients indicate that 1 percent increase in feed cost, keeping other factors constant, would result in an increase in the gross returns by 1.261 and 0.393 percent for layer farms under ABFL supervision and private management, respectively.

The regression co-efficients of day-old chick cost were significant and positive for all farm categories. For layer farms the regression co-efficients were significant at 5 and 1 percent level for ABFL supervision farm and private management farm, respectively. The regression co-efficients indicate that, keeping other factors constant, 1 percent increase in the day-old chick cost would result in 0.442 and 0.608 percent increase in the gross returns for layer farms under ABFL supervision and private management, respectively. The regression co-efficients of human labour were negative and significant at 10 percent level, and positive and significant at 5 percent level for layer farms under ABFL supervision and private management, respectively. The regression co-efficients indicate that 1 percent increase in the labour cost, remaining other factors constant, would result in 0.651 percent decrease in the gross returns of ABFL supervised layer farms and 0.226 percent increase in the gross returns of private management layer farms. The co-efficients of determination (R^2) were 0.72 and 0.79, that is, 72 and 79 percent of the variations in the gross returns were explained by the independent variables included in the models for layer farms under ABFL supervision and private management, respectively.

The F-values of the equations of ABFL supervised farms and private management farms were significant at 1 percent level of confidence implying good fit of the equations. The summations of all the regression co-efficients of the equations were 1.502 and 1.227 for layer farms under ABFL supervision and private management, respectively. This indicates that in case of private management layer farms the production function exhibited increasing returns to scale. In ABFL supervised layer farms the production function exhibited decreasing and increasing returns to scale. That is if all the inputs specified in the function increased by 1 percent the returns would increase by 1.502 and 1.227 percent for farms under ABFL supervision and private management, respectively. The overall performance of Cobb-Douglas production function model for ABFL supervised farms and private management farms were satisfactory as indicated by the estimated R^2 and F-values. The selected variables had positive effects on the gross returns.

Conclusion

The findings of the study reveal that average family size made ABFL was to be 6.48 and private farms was 5.64 persons for layer farm owners. No member of any family was below 18 years. The highest number of layer farm owners fell in the age group of 25 to 34 years for both ABFL farm and privately farm. No layer farm owner either under ABFL or private management was illiterate. An equal percent (44%) of ABFL farm owners and private management farm owners were educated up to HSC.

The average cash costs per batch per layer farm for ABFL supervised farms Tk. 6,07,177 and 6,38,011 for privately managed farms, respectively. They respectively accounted for 92.84 and 89.90 percent of their respective total cost. Average gross returns per layer farm per batch was Tk. 62,66,456 under ABFL and 10,08,381 under private management. The returns over full cost per layer farm per batch was Tk. 29,85,358 under ABFL supervision and Tk. 2,98,669 under private management.

Cobb-Douglas production function analysis was used to determine the effects of some selected variables, namely, feed, day-old chick and human labour on poultry production. The regression co-efficients of feed and day-old chick cost were significant and positive for all farm categories. But the regression co-efficients of human labour were negative and significant at 10 percent level, and positive and significant at 5 percent level for layer farms under ABFL supervision and private management, respectively. The co-efficients of determination (R^2) were 0.72 and 0.79, that is, 72 and 79 percent of the variations in the gross returns were explained by the independent variables included in the models for layer farms under ABFL supervision and private management, respectively.

Owners of poultry farms faced various problems like high price of feed and non-availability of feed, non-availability of day-old chick at proper time and high price of day-old chicks, lower selling price of meat or egg, high price of medicine and vaccine, outbreak of diseases, electricity problem and complicated procedure in sanctioning institutional credit.

Sustainable development of this poultry enterprise a well-developed marketing system is needed, because an efficient marketing system can play an important role in improving the poultry enterprise and thereby raising the income of farmers as well as traders.

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