Bangladesh J. Agric. Econs. XXII, 1 (1999): 77-88

Research Note

BROILER FARMING IN GAZIPUR DISTRICT: PRODUCTIVITY, PROFITABILITY AND VARIABILITY IN SUPPLY

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ABSTRACT

Present study examined production practices of broiler farming in Gazipur district and analyzed productivity, profitability and variability in supply. For measuring productivity, stochastic moment based production function was estimated following Generalized Method of Moment Procedure. It was found that the variable inputs of production like chick, feed and electricity were positively contributing to output but age, education of producers, medicine and vaccine were negatively contributing to mean production of broiler. Age and education of producers, chick cost, medicine and vaccine found to reduce variability in production and positively contributing to sustainable broiler production. While feed cost and electricity were adversely affecting sustainability of broiler production. The total cost of broiler production of 100 birds was TK 5851.81 on cash cost basis and non-cash cost basis it was TK 5277.31. Largest proportion of total cost was spent for both day-old chicks and feed that constituted 35.89 and 33.70 per cent, respectively. The return of the broiler production was estimated TK 7248.80 per 100 birds. BCR on full and cash cost basis were 1.24 and 1.37, respectively. It was found that seasonal variability in supply, demand and prices of broiler exist. It was found that the broiler producers were severely affected by the downward swing of price fluctuation.

1. INTRODUCTION

Poultry farming in Bangladesh, until recently was largely a backyard culture venture. Still under traditional culture, people keep indigenous chicken under semi-natural conditions mainly for their domestic consumption with very little commercial motive. They keep poultry of indigenous type and practically nothing is spent for such backyard farms. It is being carried without sound technical know-how and management principles. The farm households as a supplementary enterprise generally raise poultry birds. Specialized poultry breeding has started with the invention of incubators and adoption of artificial methods of raising chickens of hybrids. Poultry farming on commercial and scientific line was started in 1970 in Bangladesh (DLS, 1997).

The poultry industry serves a very important part in converting grains and other product into egg and poultry meet for nutritional benefit of mankind (Jull, 1984). The protein consumption

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from animal origin in Bangladesh is significantly lower than in other countries of the world. In a country where more than 90 per cent children suffer from malnutrition, about 60 per cent of them from the acute type and 30,000 of them go blind every year; the scarcity of livestock surely has something to do with the situation.

From the economic poiut of view the importncce of pultry is very significant. Broiler in fact, has a shorter life cycle and its production requires relatively less capital and land compared to other meat-producing animals such as cattle, sheep and goats.

With the rapid increase in total population and urbanization, the demand for poultry products has been increasing. To meet the growing demand, a well development poultry industry is very important. In response to increased demand for meat broiler farms are gradually increasing in number. The present paper analyzed and discussed productivity, profitability and variability in output supply of broiler farms in Gazipur district's.

2. SOURCES OF DATA AND ANALYTICAL TECHNIQUES

Selection of the study area

On the basis of available information three broiler producing areas viz, Gazipur sadar, Sreepur and Kapasia thanas were chosen for the selection of broiler producers as respondents.

Sampling procedure and data

The broiler farmers of the selected areas and broiler traders in the selected markets were considered as the population of this study. In this study 30 producers were selected randomly for interview. Out of 30 broiler producers 10 farms taking each from Sreepur, Kapasia and Gazipur sadar thanas were selected. Out of 21 markets of broiler in Gazipur district 4 were selected randomly. These were Joydebpur Chowrasta (Chandona Bazar), Joydebpur market, Tongi market and Sreepur Bazar. Only the retailers are the available traders in the selected markets. Out of 20 retailers in the selected markets *8* were taken from Joydebpur, 6 from Tongi, 3 from Gazipur Chowrasta, 3 from Sreepur.

The data for the present study were collected from both the primary and secondary sources. The first author himself collected primary data through face to face interview with the selected respondents in the study areas. The collected data were checked and cross checked for 'ensuring their reliability, accuracy, adequacy and thereby meaningful for the study. The survey schedule was designed to collect information in local units. However, local units were converted later on into standard units. Secondary data like year-wise production, number of poultry farms in private and public sector, contribution of livestock sub-sector in national income etc. were collected from various sources viz., books, journals, reports, official records, document of Fifth Five Year Plan and Statistical Year Books of Bangladesh.

Period of the Study

For the present study the primary data were collected for the period of January 1997 to December 1997.

Seasonal index

The Simple Average Method (SAM) was used to compute monthly indices in the following manner

$$I_n = \frac{\text{The quantity (or price) of each n month}}{\text{Average quantity (or price) of the 12 months}} \times 100$$

Where, I_n = Seasonal index of nth month. For estimating supply and purchases indices the quantity of broiler was measured in kg and Tk per kg, respectively.

Production function analysis

The moment-based approach to production economics has a rigorous theoretical foundation. First, output distribution can be approximated in the nth degree using the first n moments (Antle 1987 and 1988; Malangkit 1993 and Islam 1995).

The Method of Moment procedure has some advantages over traditional OLS method in that it can handle problem of heteroscedasticity by using weighted regression technique. Moreover, first moment can be used for accounting for productivity of inputs on mean output level and the second moment can be used to measure effects of inputs on output variability. The moments of the output distribution can be expressed in general forms as functions:

$$\mu_1(x) = \int yf(y/x)dy$$

$$\mu_i(x) = \int (y-\mu_i)f(y/x)dy, \quad i \geq 2 \qquad (1)$$

Thus, the moments are functions of inputs X which expressing the functional relationship between the stochastic structure of the production function.

Following Just and Pope (1985) and Islam (1995) we specified the production function as more general model with an additive heteroscedastic error of the form:

$$Y = f(x,\beta) + h(x,\Omega)^{1/2} \qquad (2)$$

This model allows inputs to have distinct effects on the means $f(x,\beta)$ and the variance $h^2(x,\Omega)$ $E(e^2)$ of output. Where:

Y= Production of broiler in kg per 100 birds,

$f(x, ß)$= Deterministic component of the production,

X_1= Age of producers in years,

X_2= Education in number of schooling years,

X_3= Chick cost in Taka per 100 birds,

X_4= Feed cost in Taka per 100 birds,

X_5= Medicine and vaccine cost in Taka per 100 birds,

X_6= Electricity cost in Taka per 100 birds,

$h(x, \Omega)$= Stochastic component of the production function, and,

e^u= Error term, where $u \approx N(o,\sigma^2)$

The moment based estimation of production function

The moment functions given in equations (1) are written in linear form as:

$$\mu_{1j}(X_j) = X_j\Phi_1$$

$$\mu_{ij}(X_j) = X_j\Phi_i, \quad i \geq 2$$

In this study, the moment function is specified as linear in-parameters functional form. The output is random and $E(Y) = \mu_{ij}$, so the first moment function can be written as the regression equation:

$$Y_j = X_j\Phi_1 + U_j, \; E(u_j) = 0 \qquad (3)$$

Where U_j is assumed to be independently distributed, similarly, noting that

$$E[(Y_j-\mu_{ij})^i] = E(U_j^i) = \mu_{ij}, \; i \geq 2 \qquad (4)$$

The ith moment function is written as the regression equation

$$U_j^i = x_i\Phi_i + v_{ij}, \; (v_{ij})=0, \; i \geq 2 \qquad (6)$$

Here we have to estimate the Φ_i parameters which relate inputs to moments. The least squares estimate Φ_1 is consistent.

Islam and Karim (1998) showed that a feasible GLS estimator for Φ_1 can be obtained by the weighted regression

$$Y_j/W_{ij} = X_j\Phi_1/W_{ij} + U_j/W_{ij}, \qquad (6)$$

and a feasible GLS estimator for any Φ_i, $i \geq 2$ can be obtained by the weighted regression

$$U_j^i/W_{ij} = X_j\Phi_1/W_{ij} + U_j/W_ij \qquad (8)$$

These estimators are asymptotically normally distributed. Therefore, standard large sample test statistics can be used. In present study, the first, second and third moments of production were estimated using the weighted GLS regression procedure.

3. RESULTS AND DISCUSSION

Production Practices of the Broiler Farms

Production practices of broiler farms varied by age of broiler. The production practices followed by sample farms are briefly discussed below:

Chick

The producers purchased one day old chicks from the near by hatchery farms such as Phoenix, Paragon, Biman poultry complex, etc. It is evident from Table 3.1 that about 56.67 per cent of the respondent-producers chose the strain of 'master grace' because of less mortality, and high disease resistance, etc. Less mortality means that the ratio of number of death chicks to live chick could be lower. Most of the hatcheries produced this strain. Also a few proportion of the respondent-producers chose Vancob, Arbar acre, Kik bock, Hubbard and Starbro because of good performance of the chick for growth and body weight.

Brooding

The farm operators properly scrubbed and cleaned the brooder house at least a week before the chicks arrival. They also applied lime, spray and $Cacl_2$ to protect the brooder house from infections. The brooder area is covered with a chick guard which is made of hard board, tin, wood, bamboo, etc. The chick guard that the operator normally used is 75 cm far from chick and 45 cm in height from floor. A hanging electric brooder is placed in the middle of each chick-guard where a number of electric bulbs are set to provide necessary heat. The height of the electric brooder can increase or decrease if necessary. Rice bran or saw dust of two or four inch in depth are supplied to make good litter.

Table 3.1 Distribution of broiler producers by strain

Strain	Number	Per cent	Rank
Master greece	17	56.67	1
Vancob	5	16.67	2
Arbar acre	3	10.00	3
Starbro	2	6.67	4
Hubbard	2	6.67	4
Kik bock	1	3.37	6
Total	30	100.00	

Amount of feed and water for broiler production

The broiler producers bought one day old chicks from any reliable hatchery. At first, the beak of the chicks is touched with sugar or glucose mixed water, then the chicks were put into the brooder house. After one hour fine maize bran feed was supplied to the chicks. At the early stage of the chicks, the broiler producers did not follow any time schedule for feeding. At that time, they supplied feed to the chicks whenever feeds come to an end. The quantity of feed and water per 100 birds per day during 1st to 6th week of age are presented in Table 3.2. The producers provided 1.25 kg feed and 2.3 liter water in the first week. With the increase of age of the chicks the quantity of feed and water supply also gradually increased. It happened because as the age of the chicks increase their body weight also increase and it required increased feed and water consumption.

Table 3.2 Age-wise daily intake of feed and water per 100 birds

Age (Week)	Quantity of feed (kg)	Quantity of water (liter)
1st	1.25	2.3
2nd	2.5	5.5
3rd	4.0	9.1
4th	5.8	12.7
5th	6.5	16.0
6th	8.9	20.0

Temperature and light

Too low and high temperature was harmful for chicks which could result poor growth and performance of chicks. The operators kept temperature 35°c in the brooding house during first week thereafter as the chicks' age increased they reduced temperature by 3°c in every week until it came an comfortable situation or up to sale of broiler from the farm. Sufficient light was needed for chick to see the feed pot and water pot. The operators controlled temperature through proper lighting. When there was no electricity supply they usually used kerosene lamps for heating of chicks and lighting of broiler shed.

Health care

The farm operators applied BCRDV vaccine at the age of 2 to 8 days and the age of 21 to 25 days, and D-78 or Bur-766 vaccine applied at the age of 12 to 18 days, and at the age of 27 to 28 days. In each 6 weeks, vitamins were also used by the producers for increasing weight of broilers.

Estimates of the production function

A three moment approximation to the production functions of broiler in present environments of Bangladesh were consistently estimated using the econometric procedures described in the methodology and SAS programme was used.

The parameter estimates of the production distribution moment function of broiler are presented in Table 3.3. These estimates were obtained by using the three stage generalized Method of Moment procedure in order to account for productivity measures and decision making in resource use for sustainable broiler production. All three functions are statistically significant as judged by the R^2 and F-statistic. All the variable inputs, except age, education, medicine and vaccine, had positive sign in the first moment of output. This implies that chick cost, feed cost and electricity were positively contributing to mean production of broiler.

Feed cost contributing the highest in the mean production followed by chick cost, while electricity was the third contributor. Age, chick cost, medicine and vaccine were found to reduce variability in production. Hence, they were positively contributing to sustainable broiler production in the study area. On the other hand, education, feed cost and electricity were adversely affecting sustainability of broiler production as indicated by their positive sign in the 2^{nd} moment function of output.

Table 3.3 Estimates of moments of Cobb-Douglas production function of broiler farm of Gazipur, 1997

Parameters	Moments		
	1st	2nd	3rd
Constant	-2.2221	-0.1558	0.0042
	(1.9680)	(0.1138)	(0.0162)
Age	-0.0864 *	-0.0015	0.00004 **
	(0.0271)	(0.0014)	(0.0002)
Education	-0.0148	-0.0086	0.0004
	(0.0183)	(0.0012)	(0.0002)
Chicks cost	0.2696 **	-0.0086	-0.0002
	(0.1361)	(0.0065)	(0.0009)
Feed cost	0.6503 *	0.0300 **	0.0015
	(0.1927)	(0.0120)	(0.0017)
Medicine and vaccine	-0.0361	-0.0032	-0.0015
	(0.0606)	(0.0044)	(0.0009)
Electricity	0.0593 *	0.0003	0.0002
	(0.0201)	(0.0012)	(0.0002)
R^2	0.9999	0.7714	0.8422
F	9.99	8.68	12.96

* Significant at 1% level, ** Significant at 5% level, Figures in parentheses are standard errors

The third moment indicates the skewness of the distribution. Age, education, feed cost and electricity had positive skewness which meant the distribution was said to be skewed to the right. On the other hand, chick cost, medecine and vaccine had negative skewness or said to be skewed to the left.

Costs of Broiler Production

The cost items in broiler production is presented in Table 3.4. The total cost per 100 birds was classified into cash and non-cash cost. Cash cost was expressed for which the broiler producers had to pay out of their pocket to acquire inputs. Non-cash cost was computed for home supplied inputs such as family labour, housing, interest on capital. The total cost (full cost basis) of broiler production was TK. 5851.81 per 100 birds and in cash cost basis it was TK. 5277.31 per 100% birds. (Table 3.4).

The higher cost of broiler production was due to higher costs of both chicks and feed (Table 3.4). Of the total cost, main cost involved was chicks (35.89%) followed by feed (33.70%). Medecine and vaccine (7.19%), hired labour (6.58%), family labour (6.58%) and miscellaneous (2.57%)

Return from Broiler Production

In this study, gross return was calculated by multiplying the total amount of broiler produced by the respective price that the producers received. Gross margin was calculated by subtracting the variable costs of broiler production from gross return. It was found that on average the weight of a live bird was 1.3 kg and its average price received by the producer was TK. 55.64 per kg and retailers' price was TK. 65.76 per kg which indicated a marketing margin of the broiler of TK. 10.12 per kg. From Table 3.5 it can be seen that the return above full cost basis was TK. 1396.99 while in cash cost basis it was TK. 1971.49 per 100 birds.

Table 3.4 Costs of broiler production (Taka per 100 birds)

Items	Price(Tk.)	Quantity	Total value(Tk.)	Per cent of gross cost
I. Cash costs:			5277.31	90.18
a. Chicks (No.)	21.00	100	2100	35.89
b. Feed (Kg)	11.50	171.47	1971.91	33.70
c. Water pot	-	-	12.00	0.21
d. Feed pot	-	-	25.00	0.43
e. Hired labour (Man-days)	55.00	7	385.00	6.58
f. Medicine and vaccine	-	-	420.00	7.19
g. Electricity	-	-	110.00	1.88
h. Transportation	-	-	80.85	1.37
i. Equipment and machinery	-	-	22.00	0.38
j. Miscellaneous	-	-	150.65	2.57
II. Non-cash costs:			574.45	9.82
a. Family labour (Man-days)	55.00	7	385.00	6.58
b. Housing	-	-	144.00	2.46
c. Interest on operating capital	6.5	7000.00	45.50	0.78
Total= I+II			5851.81	100.00

Undisconnted Benefit Cost Ratio (BCR) was calculated by dividing gross return by costs of production. Moreover, the study revealed that the BCR on full cost basis was 1.24. If the broiler producer's investment was TK. 100 for the broiler production then he got a return of 124. Furthermore, when BCR was calculated on cash cost basis, it was 1.37 (Table 3.5).

Table 3.5 Return from broiler production (Taka per 100 birds)

Items	Value (Tk.)
Gross Return	7248.80
Cost of Production:	
Full cost basis	5851.81
Cash cost basis	5277.31
Gross Margin:	
Full cost basis	1396.99
Cash cost basis	1971.49
Benefit Cost Ratio:	
Full cost basis	1.24
Cash cost basis	1.37

Seasonal Variation in Supply and Purchases

Most of the business activities were influenced by seasonal factors. Since seasonal variations were short-term fluctuations that occur within a year, they were present in the broiler supply, purchase and price data recorded on daily, weekly, monthly or quarterly basis.

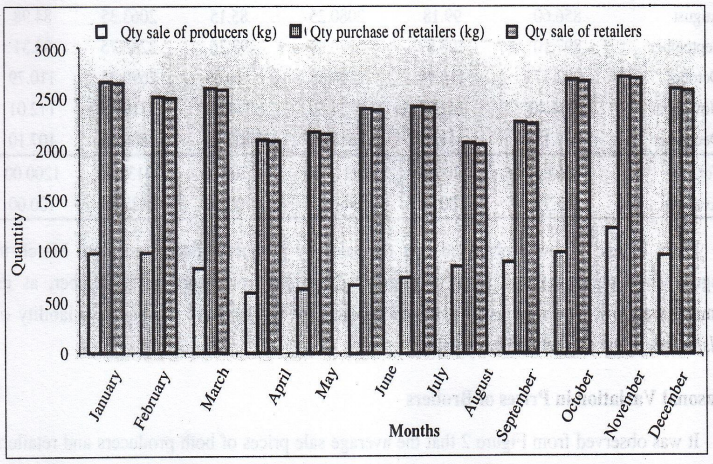

Fig. 1 Seasonal variation in quantities of broiler supplied by producers and purchases and sales by retailers in different months

Seasonal variations were induced by nature and were due to climatic changes. Seasonal variations were also induced by man-made factors such as hortal, political disturbance etc. There were monthly fluctuations in the producers' supply of broilers and retailers' sale. The producers' supply and retailers' purchases and sales were higher in the month of October to March than other months (Fig. 1). However, the seasonal indices of producers supply and retailers purchases in other months (March to August) were less than 100 (Table 3.6). The volume of purchase and sale of broilers varied over months because of variation in production. Most of the festivals like picnic and marriages etc. happened in winter season, which created high demand of broiler in those months (October-March), thus causing seasonality in supply and demand.

Table 3. 6 Seasonal variations in quantity sale by producers and purchase and resale by retailers in different periods

Months	Qty sale of producers (kg)	Seasonal index	Qty purchase of retailers (kg)	Seasonal index	Qty sale of retailers	seasonal index
January	975.80	112.98	2665.60	109.10	2650.45	109.16
February	978.10	113.24	2516.10	102.99	2500.15	102.97
March	830.77	96.19	2600.55	106.44	2587.45	106.56
April	590.33	68.35	2102.60	86.06	2091.35	86.13
May	629.00	72.82	2180.85	89.26	2158.20	88.88
June	667.50	77.28	2404.05	98.40	2391.65	98.50
July	745.47	86.31	2431.30	99.51	2418.85	99.62
August	856.60	99.18	2080.25	85.15	2063.35	84.98
September	897.10	103.87	2280.85	93.36	2265.75	93.31
October	992.37	114.90	2704.35	110.69	2690.25	110.79
November	1234.40	142.92	2734.50	111.92	2719.55	112.01
December	967.17	111.98	2617.00	107.12	2600.65	107.10
Total	10364.61	1200.00	29318.00	1200.00	29137.75	1200.00
Average	863.72	100.00	2443.17	100.00	2428.15	100.00

From Figure 1 it was observed that the sales by producers decreased from March to August while purchases and sales of retailers decreased from April to September, as its demand was low. The reasons of declined demand for broiler were the high availability of *Hilsha* fish in the market and hot weather.

Seasonal Variation in Prices of Broilers

It was observed from Figure 2 that the average sale prices of both producers and retailers were higher above average in the months of November to March and low (below average) in the month of April to October. Figure 2 also shows that the average sale price of broiler

producers and retailers varied from month to month. High prices of broiler in the month of October to March might be happened because of demand for broiler in these months.

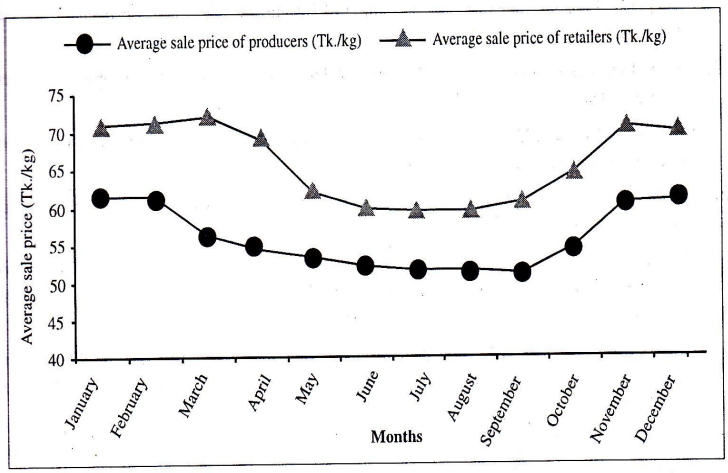

Fig. 2 Seasonal variation in sale price of broiler by producers and retailers in different months

4. CONCLUSION AND POLICY IMPLICATION

It can be concluded from the findings of the study that production and marketing of broiler is profitable business. The return from broiler is very quick which require only six to eight weeks. Moreover, broilers are produced throughout the year in Bangladesh. The production of broiler requires less land and capital. In this study, the variable inputs of production like chick cost, feed cost and electricity were positively contributing but age and education of producers, medicine and vaccine were negatively contributing to mean production of broiler. Age and education of producers, chick costs, medicine and vaccine were found to reduce variability in production and positively contributing to sustainable broiler production. On the other hand, feed cost and electricity were adversely affecting sustainability of broiler production.

Respondent producers viewed that lack of operating capital, credit facilities, insufficient electricity supply, death and loss were some of the problems for the broiler production. The broiler producers were severely affected by the downward swing of price fluctuation. The retailers not affected by downward price fluctuation because they could purchase comparatively at lower price and could resale it by adding a margin with the purchase price. However, downward price fall could reduce profitability of the producers. Proper measures for solutions of these problems will help to develop broiler farming which in turn will increase meat, additional income and also employment opportunities in the country.

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