

# Measuring the Profitability of Small Scale Poultry Producers through Contractual System in Bangladesh

Anindita Saha<sup>1</sup>, Sajia Sharmin<sup>2,\*</sup>, Mashrat Jahan<sup>2</sup>

<sup>1</sup>Department of Agricultural Economics, Bangladesh Agricultural University, Mymensingh-2202, Bangladesh

<sup>2</sup>Department of Agricultural Economics, Bangabandhu Sheikh Mujibur Rahman Agricultural University, Gazipur-1706, Bangladesh

\*Corresponding author: [sajia@bsmrau.edu.bd](mailto:sajia@bsmrau.edu.bd)

Received July 22, 2021; Revised August 23, 2021; Accepted September 02, 2021

**Abstract** The present study was undertaken to assess the system of broiler production under contractual agreement of feed mill with the small scale broiler producer in different locations of Netrokona district in Bangladesh. The study also explored the causes why broiler farmers entering in this contractual system. The study evaluates the profitability of small scale broiler producers as well as the feed mills who were engaged in contract with the farmer. The present study was based on the primary data which were collected from five feed mills who are utilizing contracts and 60 contract broiler producers using stratified random sampling. Descriptive statistical techniques were used to estimate cost and returns of broiler farming. The study revealed that on an average, total cost of raising broiler per farm per year and per bird per batch were Tk. 10,90,389 and Tk. 175 respectively. The gross return from broiler production per farm per year and per bird per batch was Tk. 13,44,737 and Tk. 208 respectively. Net returns of broiler production per farm per year and per bird per batch were estimated at Tk. 2,54,348 and Tk. 33 respectively. Moreover, it is evident from the study that the benefit cost ratio of broiler farms was 1.23. So, it is clear from the study that production of broiler under contractual system was profitable and the contract farmers were getting benefit. On the other side, feed mill sales center who are engaged in contracts were also benefitted by keeping extra profit in all credited inputs of broiler production by practicing the system. Cobb-Douglas production function analysis was used to determine the major factors namely age, education, family size, feed cost, day old chick cost, labor cost, medicare and additives cost and training of the producer affecting the gross return of broiler production. But the main influencing factors for broiler production were feed cost, day old chick cost, medicine and vaccine cost, education and training of the broiler farmer. The study also identified some problems related to contractual system and, production and marketing system of broiler production. Finally on the basis of the findings, some recommendations were made for the development of poultry production in Bangladesh. It may be concluded that with effective management, contract farming system of feed mill's can be a means to develop production of broiler farming and marketing the output in a way that is profitable for the both farmer and the feed mill.

**Keywords:** poultry, profitability, contractual system

**Cite This Article:** Anindita Saha, Sajia Sharmin, and Mashrat Jahan, "Measuring the Profitability of Small Scale Poultry Producers through Contractual System in Bangladesh." *American Journal of Food Science and Technology*, vol. 9, no. 3 (2021): 90-95. doi: 10.12691/ajfst-9-3-4.

## 1. Introduction

Bangladesh is one of the high density countries of the world with the population of 160 million people within the area of 143,000 km<sup>2</sup> [1]. It has low productivity, chronic food shortage, external dependence, poverty, unemployment and malnutrition. About eighty percent people of this country still live in villages and are extremely poor [2]. Poultry farms, mainly chicken farms producing meat and eggs, can be highly specialized operations for solving these problems in the shortest possible time.

The development of poultry industry is not an ancient issue. Both the government and a variety of non-government organizations (NGOs) are actively

promoting poultry development at all levels. With a lot of ups and downs, now Bangladesh has a poultry population about 3074.68 lakh [3]. This industry has immense scope for the country through i) changing livelihood and food habit; ii) reduction of dependence of red meat, iii) ultimately has positive impact on GDP growth rate of the country as well as ensuring food security.

In Bangladesh, small poultry farm can play an important role in economic development. It serves as a ready source of income among the farmer when they need money and creates the employment opportunity. The study will focus mainly broiler production due to time and fund constraints. The climate of Bangladesh is suitable for broiler farming, so the small farmer can raise broiler birds easily. Moreover, it has a shorter life cycle which requires less land and capital; and poultry meat is preferred by all

castes and religion, irrespectively. So, small farmers can involve themselves in poultry production to generate more income and meet protein requirement of the nation.

However, small farmers are excluding from poultry production due to price fluctuation as well as their lower production capacity. The main constraints of small farms are access to production resources and access to markets. Small farmers may lack the sufficient savings and their availability of external credit is limited. Again small farmers operating near subsistence level are more risk averse so they cannot earn high profit. Despites, public intervention (such as public extension service and policies) to promote commercial broiler production has less impact on small farmers.

Now it is a great matter of concern that how could the small farmer be included in commercial broiler production. One of the probable solutions could be contractual system through feed mill. Several farmers are interested to engage themselves in contractual arrangement. In small scale broiler farming, farmers can buy inputs from feed mill with credit and run their firm.

On the other hand, feed mill can expand their production capacity and enjoy more profit by practicing contract system. In Bangladesh, there are 130 hatcheries, 68 of which are fully functional and the rest are partially functional or closed. There are 52 registered feed mills of which 40 are fully functional [4]. In some cases, a single company may include both types of enterprises; of these, Kazi Farms, Paragon Poultry, Povita Poultry, BPC, BRAC and Nourish Feed operate formal input marketing contracts. Many specialized farms, hatcheries and feed mills are engaging themselves in contract farming with different terms and condition. So, contract farming is getting popularities with benefits not for the farmers but for the integrator also.

The present study is an attempt to find out the existing picture of broiler production through contract farming of our country. It would attempt to cover the cost and returns of contracted broiler farm and profit of feed mill engaged in operation. Further, the study would identify the major problems faced by contract broiler farmers and also find out probable solutions. Thus, the researcher strongly believe that this study would be helpful not for the broiler farmers but also for the policy makers.

The overall objective of the research was to assess the system of the broiler farm under the feed mill's contractual agreement. However, the specific objectives are as follows:

- i. To identify the major motivating factors of small scale broiler farmers entering in the poultry production under feed mill's contractual agreement and
- ii. to estimate the cost, return and profitability of small scale broiler farm and feed mills under contractual system;

The estimated mean technical efficiency of all sample farms was 94.06 percent according to Akhter and Rashid in 2008 [5] implies that the cost of broiler production per farm can be reduced by 9 percent keeping the output constant. The findings reveal that ABFL supervised farmers and own managed farmers were not significantly different in terms of efficiency. While Rahman (2007) conducted a study to analyze the performance of hatching

eggs production farms in terms of profitability and sustainability under contract growing system of AFBL in Bajitpur upazila of Kishorgonj district [6]. Jabbar *et al.* (2007) undertook a study on alternative institutional arrangements for contract farming in poultry production in Gazipur and Kishorgonj district and their impacts on equity. The goal of the study was to identify forms of market institutions that would allow smallholder poultry producers to commercially produce broilers and eggs to raise household incomes under rapidly differentiating livestock markets. Formal contract farms and broiler production were prevalent in Kishorgonj while informal or semi-formal contract farms and layer production was dominant in Gazipur. In case of layer farm contract layer farms performed much better than independent layer farms. Islam in 2006 conducted an economic study on broiler farming and its impact on livelihood improvement. Based on the study, gross return and net return indicated that broiler farming was profitable business [7]. The benefit cost ratios of broiler farming were 1.14 percent on variable cost basis and 1.11 percent on fixed cost basis. He found that broiler farming brought different types of positive changes in different livelihood assets, food intake, and change in health and sanitation in seventy-two percent of respondent. Begum made an assessment of vertically integrated contract poultry farming in Bangladesh in 2005 [8]. She says contract farmers get several incentives from vertically integrated firm such as credit, production and price risk reduction, marketing assistance, technical know-how etc. The study also found that the contract farmers were better off in their net income by getting the high net return from the poultry farms. Bairagi (2004) analyzed the supply chain management model used by the ABFL [9]. He also found that ABFL broiler supply chain management has proved to be reasonably successful in integrating numerous small producers with a chain linked to quality input supplies, medicare, safe broiler processing and ultimately consumer preference. The study also showed that the broiler farmers hired mainly female labor, which constituted 86.96 percent of total hired labor and the wage payment was approximately Tk. 920 per month, compared to the monthly wage payment of Tk. 2000 for male labor.

The aspect of contract poultry farming is not new in Bangladesh but contractual agreement through feed millers is quite new on poultry production. Many studies have conducted on contract poultry farming but studies related to broiler farming through feed mill's contractual agreement is very rare in Bangladesh. The present study highlights the concept of contract system through feed miller, its applicability and profitability measurement. So, the present study is an addition to the stock of new knowledge, especially with respect to contractual system in small scale broiler production and marketing of quality broiler products by feed mill.

## 2. Methodology

In the present study, costs and return analyses were done on both variable and total cost basis. The following profit ( $\pi$ ) equation was developed to assess the profitability of broiler farm owner:

$$\Pi = P_{m1}Q_{m1} + P_{s1}Q_{s1} - \sum(Px_i \cdot X_i) - TFC \quad (1)$$

Where,

- Π = Profit per broiler farm per year (Tk.);
- P<sub>m1</sub> = Per unit price of meat (Tk./kg);
- Q<sub>m1</sub> = Quantity of live broiler (kg);
- P<sub>s1</sub> = Per unit price of sack (Tk.);
- Q<sub>s1</sub> = Quantity of sack (Tk./piece);
- Px<sub>i</sub> = Per unit price of the i th input used for broiler production (Tk.);
- X<sub>i</sub> = Number/Quantity of the i th input used;
- i = 1, 2, 3, ..... , n; and
- TFC = Total fixed cost involved in broiler farm (Tk./year).

The BCR is a relative measure, which is used to compare benefits per unit of cost. The BCR estimated as a ratio of gross returns and gross costs. The formula of calculating BCR (undiscounted) is shown below:

$$BCR = \text{Gross benefit} / \text{Gross cost}$$

Production function for all types of meat producing animal display physical relationships. Feed and day old chicks are the major cost in broiler production. To determine the effects of the most important variables in the broiler production process Cobb-Douglas production function model was chosen. The double log form of the Cobb-Douglas model proved to be a superior alternative on theoretical and econometric grounds.

The specification of the Cobb-Douglas production function model was as follows:

$$Y_i = \alpha X_{1i}^{\beta_1} X_{2i}^{\beta_2} X_{3i}^{\beta_3} X_{4i}^{\beta_4} X_{5i}^{\beta_5} X_{6i}^{\beta_6} X_{7i}^{\beta_7} X_{8i}^{\beta_8} e^{u_i} \quad (2)$$

By taking log in both sides the Cobb-Douglas production function was transformed into the following

logarithmic form because it could be solved by the ordinary least square (OLS) method.

$$\ln Y_i = \ln \alpha + \beta_1 \ln X_{1i} + \beta_2 \ln X_{2i} + \beta_3 \ln X_{3i} + \beta_4 \ln X_{4i} + \beta_5 \ln X_{5i} + \beta_6 \ln X_{6i} + \beta_7 \ln X_{7i} + \beta_8 \ln X_{8i} \quad (3)$$

Where,

- Y<sub>i</sub> = Gross return (Tk./year/farm);
- α = Constant or intercept of the function;
- X<sub>1</sub> = Cost of feed (Tk./year/farm);
- X<sub>2</sub> = Cost of day old chick (Tk./year/farm);
- X<sub>3</sub> = Cost of human labor (Tk./year/farm);
- X<sub>4</sub> = Medicare and additives cost (Tk./year/farm);
- X<sub>5</sub> = Age of the broiler farmer;
- X<sub>6</sub> = Family size;
- X<sub>7</sub> = Education of the broiler farmer;
- X<sub>8</sub> = Training of the broiler farmer;
- β<sub>1</sub>, β<sub>2</sub>, β<sub>3</sub>, ..., β<sub>8</sub> = Coefficient of the respective variables;
- ln = Natural logarithm;
- i = 1, 2, 3, ..... , n;
- e = Base of natural logarithm; and
- u<sub>i</sub> = Error term;

### 3. Result and Discussion

Cost and returns were calculated to find out the relative profitability of the contract broiler producer. The total cost of raising broiler birds per farm per year and per bird per batch were calculated at Tk. 10,90,389 and Tk. 175 respectively. The estimated variable cost was the major cost of raising broiler birds which was Tk. 9,98,457 accounted for the 91.57 percent of the total cost for per farm per year and when calculated for per bird per batch basis it was Tk. 154 which accounted for 88.14 percent of the total cost.

Table 1. Annual average cost of contract broiler farms

Particulars	Unit	Price per unit (Tk.)	Per farm per year		Percentage of total cost	Per bird per batch		Percentage of total cost
			Average quantity	Value (Tk./Year)		Average quantity	Value (Tk./bird)	
<b>A. Variable Cost</b>	Tk.	-	-	998457	91.57	-	154	88.14
a. Feed Cost	Kg.	44	14564.43	646969	59.33	2.24	97.60	55.71
b. Day old chick Cost	No.	37	6465	240827	22.08	-	37.00	21.19
c. Labor cost	Man-days	200	166	33200	3.04	0.029	5.02	2.86
d. Medicare and additives cost	Tk.	-	-	37400	3.43	-	5.55	3.17
e. Electricity cost	Tk.	-	-	11410	1.05	-	1.85	1.06
f. Litter cost	Tk.	-	-	19626	1.80	-	3.28	1.87
g. Transportation cost	Tk.	-	-	12650	1.16	-	2.10	1.20
h. Repairing cost of housing	Tk.	-	-	6475	0.59	-	1.20	0.68
<b>B. Fixed cost</b>	Tk.	-	-	91932	8.43	-	21	11.85
a. Depreciation of housing cost	Tk.	-	-	19470	1.79	-	5.00	2.85
b. Depreciation of tools and equipment cost	Tk.	-	-	4805	0.44	-	4.00	2.28
c. Salary of the permanent labor	Tk.	-	-	7750	0.71	-	2.50	1.43
d. Interest on operating capital	Tk.	-	-	59907	5.49	-	9.27	5.29
<b>C. Total cost (A+B)</b>	Tk.	-	-	1090389	-	-	175	100.00

Source: Field survey, 2015

Note: 1) Average birds/year were 6277 and average batch per year were 8.55 for contract farm.  
2) Feed, day old chick, and medicare and additives are provided by the feed mill on credit.

**Table 2. Gross return from broiler production**

Items	Unit	per farm per year			per bird per batch	
		Price per unit	Quantity	Value (Tk./year)	Quantity	Value (Tk./bird)
Live broiler	Kg.	136.07	9467.65	1288263	1.53	207.66
Sack	No.	16.7	294	4889.67	0.05	0.77
Total	Tk.	-	-	1344737	-	208

Source: Field survey, 2015.

The main cost for broiler production is feed cost. In the return side, the average gross return from per farm per year was estimated at Tk. 13,44,737 and per bird per batch was estimated at Tk. 208. The gross margin of a broiler farm was Tk. 3,46,280 in per year and per bird was Tk. 54 in per batch. Net returns of broiler production per farm per year and per bird per batch were estimated at Tk. 2,54,348 and Tk. 33 respectively. Moreover, it is evident from the study that benefit-cost ratio of contact broiler per farm per year was 1.23 which assured that broiler production under contract is profitable.

**Table 3. Gross margin, net return and BCR for per farm per year and per bird per batch of all broiler farms**

Items	Unit	Per farm per year	Per bird per batch
A. Gross return	Tk.	1344737	208
B. Variable cost	Tk.	998457	154
C. Total cost	Tk.	1090389	175
D. Gross margin (A-B)	Tk.	346280	54
E. Net return (A-C)	Tk.	254348	33
F. BCR (Undiscounted)	Tk.	1.23	1.19

Source: Field survey, 2015 and author's estimation.

Benefit cost ratio (undiscounted) was used to see the profitability of production. Benefit cost ratio of per broiler farm per year was 1.23 and per bird per batch was 1.19. Here, BCR in per bird per batch was a higher than per farm per year which reveals that producing broiler in a flock or batch more profitable than producing in per bird basis. Another studies related to broiler farming in Bangladesh revealed BCR 1.13 [10] and 1.10 [11]. So, if broiler farmer come to the contractual arrangement through feed mill their economic condition will be better off.

**Table 4. Estimated values of coefficients and related statistics of Cobb-Douglas production model**

Explanatory variables	Coefficient	Standard error	t-value
Intercept	1.543***	0.243	6.348
Feed cost ( $X_1$ )	0.348**	0.152	2.289
Day old chick cost ( $X_2$ )	0.379**	0.163	2.331
Human labor cost ( $X_3$ )	0.003	0.025	0.918
Medicare and additives cost ( $X_4$ )	0.100**	0.054	1.867
Age ( $X_5$ )	0.0003	0.0004	0.697
Family size ( $X_6$ )	0.002	0.003	0.799
Education ( $X_7$ )	0.003**	0.002	2.224
Training ( $X_8$ )	0.023*	0.014	1.639
$R^2$	0.96		
F-value	227.34**		
Returns to scale ( $\sum \beta_i$ )	0.83		

Source: Author's estimation, 2015

\*\*\* Significant at 1 percent level

\*\* Significant at 5 percent level

\* Significant at 10 percent level

Cobb-Douglas production function model reveals that the key variables such as feed cost, day old chick cost, labor cost, medicare and additives cost, age, family size, education, training of the broiler farmer included in the model were individually or jointly responsible for variation in gross return of broiler. The main influencing factors for broiler production were feed cost, day old chick cost, medicare and additives cost, education and training of the broiler farmer.

### 3.1. Profit of the Feed Mill in Contractual System

In the contractual system of feed mill, feed company authorized agent control all the production activities of contract farmer from starting a new flock or batch to the selling of the live broiler in the market. Such farm activities may also be defined in terms of the principal-agent theory where the principal (feed mill) anticipates how the agent (broiler farmer) will respond to each strategy it proposes. The feed mill maximizes profit subject to two constraints: farmers will accept the contract and abide by its terms (it must give them greater profits than they can derive from the next best alternative). The feed mill practices contractual system for the sake of profit by taking risk of their output selling. But the feed mill agent does not reveal the certain percent of profit margin from contractual system to the contract farmer. Despite, the feed mill agent accepts the fact that they earn much profit than retail selling. Moreover, contract farmer sometimes does not abide by contract rules. The feed dealer claimed that sometimes contract farmer sold their output to another wholesaler or retailer not informing the feed mill agent, earned extra profit and informed the dealer that most of the birds in the batch was died. At that time, feed mill agent faces great loss and the contract agreement break down. So, here comes the main question what are the profit of feed mill and in what ways the profit come by practicing contracts in operation. Since the contract is non-written and feed mill agent have to wait for the money until the live broiler get sold in the market, the agent is uncertain about the debited money as well as profit which is great matter of risk to the feed mill company. Table 6 revealed the profit margin earn by the above mentioned feed mill practicing contract in percentage from retail price to contracted price.

The feed mill charges price for broiler feed bag containing feed of 50 kg ranges by the five feed mill from Tk. 2150 to Tk. 2250 in the study area in contract system. But this price differs from retail sell price from Tk. 40 to Tk. 50. Table 5 represents that Provita, Nourish, Enam, BRAC and Sunny earned 2.38, 2.27, 1.86, 1.85 and 2.33 percent profit respectively from retail to contractual system. But this profit vary according to the company feed demand and supply around the year.

**Table 5. Profit of the different feed mill's in contract system**

Particulars	Provita	Nourish	Enam	BRAC	Sunny
Retail feed price (Tk. per 50 kg bag)	2100	2200	2150	2160	2150
Contacted feed price (Tk. per 50 kg bag)	2150	2250	2190	2200	2200
Profit margin (Tk.)	50 (2.38%)	50 (2.27%)	40 (1.86%)	40 (1.85%)	50 (2.33%)
Retail day old chick market price (Tk.)	36	38	35	38	38
Contracted day old chick price (Tk.)	38	42	38	40	40
Profit margin (Tk.)	2 (5.56%)	4 (10.53%)	3 (8.57%)	2 (5.26%)	2 (10.53%)
Retail price of medicine and vaccine (Tk. per batch of 1000 birds)	5500	4500	5000	4500	4500
Contracted price of medicine and vaccine (Tk. per batch of 1000 birds)	6000	5000	5500	5000	5000
Profit margin (Tk.)	500 (9.09%)	500 (11.11%)	500 (10%)	500 (11.11%)	500 (11.11%)
Selling price of the live broiler	Same as market price	Same as market price	Same as market price	Same as market price	Same as market price

Source: Field survey, 2015 and author's estimation

Note: Figures within the parentheses indicate the percentage from retail price to contract price.

**Table 6. Sharing of responsibilities by both the feed mill and the contract farmer**

Particulars	Feed Mill	Contract Farmer
Broiler Feed	Credit	
Day old chick	Credit or Due payment	
Medicine and vaccine	Credit	
Veterinary doctor provision	Yes	
Land, housing, tools and equipment		Yes
Fuel, electricity and litter		Yes
Labor supply for production and maintenance		Yes
Transportation cost of all input		Yes
Transportation cost of output	Yes	
Production risk		Yes
Timely sell of output	Yes	
Output price risk		Yes

Source: Field survey, 2015.

The contract farmers are bound to buy the contracted feed mill company owned day old chick. In charging the day old chick price feed mill keeps Tk. 2 to Tk. 4 more than retail selling price. In terms of medicine, vaccine and additives cost contract farmers paid Tk. 4500 to Tk. 5500 for a batch containing 1000 birds to the contracted feed mill. This cost goes higher if the present batch is affected by any kind of diseases but they are bound to buy any kind of medicine, vaccine and additives from the respected feed mill. All 5 Feed mills enjoyed 9.09, 11.11, 10, 11.11, and 11.11 percent profit respectively from retail to contractual system.

When the broiler birds are ready to sell in the market the feed mill agent sells it to the market in the existing market price. The agent does not bear the output price risk. As broiler price in Bangladesh fluctuate almost regularly small broiler farmers sometimes faces loss and the contract does not provide any kind of help in the price risk.

### 3.2. Responsibilities Shared by Feed Mill and Contract Farmer in Contract System of Feed Mill

According to the agreement, contract farmer get input such as feed, day old chick and medicine and vaccine on credit. But some feed mill start or renew the contract with some amount deposit. All other inputs such as land, labor, housing, electricity, fuel, transportation cost of all input bears by the contract farmer. Feed mill agent bears the

transportation cost of live broiler from farm house to market. Here, production risk is mainly a result of the death or loss of birds and output price risk is the price fluctuation of live broiler. The feed dealer helps contract farmer in loss by starting a new batch on credit sales of input but they does not share the loss.

On the basis of the above discussion, it could be concluded that contract system of broiler production is profitable for both the broiler production and feed mill. Both the farmer and feed mill are gaining profit from the agreement. From this prevailing contractual system, small farmers can buy broiler input such as feed, day old chicks and medicine, vaccine and additives on credit from the feed mill sales center which is high cost input item in broiler production. Again small farmer deliver their live broiler to the dealer for selling the output in the market as a result they minimize their risk of selling output in market. So, productivity and profitability of broiler production can be improved through contract farming system practiced by feed mill. On the other side, feed mill is also expanding its business and adding high profit in the business from contract payment. Thus, broiler farming could generate potential income and employment in the country.

## 4. Conclusion

Broiler farming is a helpful tool for poverty alleviation especially for the women and small household owners. It

is evident from the present study though contractual system of feed mill has some negativity, contract broiler producer are enjoying profit from their enterprise by practicing contract system in production. Moreover, broiler meat has a raising demand in market that influencing the producer for making profit from this business. So, it could be concluded that broiler production through well organized contractual system of feed mill poultry farming could be a feasible approach to increase the broiler production in Bangladesh and by following this system various problem of running commercial small broiler farms will be solved. The broiler farming has huge potentiality for expansion and the contractual system is well established in developed countries and has to be spread in all over Bangladesh if we have to take advantage to meet the domestic meat requirement and also for export market.

## References

- [1] BBS, 2014. Yearbook of Agricultural Statistics of Bangladesh. Bangladesh Bureau of Statistics, Ministry of Planning, Government of People's Republic of Bangladesh, Dhaka.
- [2] Islam, M.K., Uddin, M.F., Alam, M.M., 2014. Challenges and Prospects of Poultry Industry in Bangladesh. *European Journal of Business and Management*. Vol.6, No.7.
- [3] BER, 2014. Bangladesh Economic Review. Finance Division, Ministry of finance, Government of People's Republic of Bangladesh, Dhaka.
- [4] Jabbar, M.A., Rahman, M.H., Talukdar, R.K., Raha, S.K., 2007. Alternative Institutional Arrangements for Contract Farming in Poultry Production in Bangladesh and Their Impacts on Equity. ILRI (International Livestock Research Institute), Addis Ababa, Ethiopia. Research Report No. 7.
- [5] Akhter, S., Rashid, M.H.A., 2008. Comparative Efficiency Analysis of Broiler Farming under Aftab Bahumukhi Farm Limited Supervision and Farmers' Own Management Progress. *Agric.* 19(2): 195-204.
- [6] Rahman, M.B., 2007. An Economic Analysis of Broiler Production under Contract Farming System in a Selected Area of Bangladesh. MS Thesis, Department of Agricultural Economics, Bangladesh Agricultural University, Mymensingh, Bangladesh.
- [7] Islam., 2006. An economic study on broiler farming and its impact on livelihood improvement. MS Thesis, Department of Agricultural Economics, Bangladesh Agricultural University, Mymensingh, Bangladesh.
- [8] Begum, I.A., 2005. An Assessment of Vertically Integrated Contact Poultry Farming: A Case Study in Bangladesh. *International Journal of Poultry Science*, 4 (3): 167-176.
- [9] Bairagi, S.K., 2004. An Economic Analysis of Contract Broiler Farming with Reference to Supply Chain Management. MS Thesis, Department of Agricultural Economics, Bangladesh Agricultural University, Mymensingh, Bangladesh.
- [10] Halcyan, H.P., 2011. A Socioeconomic Study on Household Poultry Rearing in Some Selected Areas of Mymensingh District. MS Thesis, Department of Agricultural Economics, Bangladesh Agricultural University, Mymensingh, Bangladesh.
- [11] Masud, M., Real, I. I., 2013. Economic Benefit of Farmers from Small Scale Broiler and Layer Farming in Thakurgaon District in Bangladesh. ISSN: 1998-2003, Volume: 8, Issue: 4, Page: 191-195.



© The Author(s) 2021. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<http://creativecommons.org/licenses/by/4.0/>).