

Impact of socio-economic factors on production performance of small and medium size broiler farming in Bangladesh

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Abstract - A survey study was carried out to assess the broiler production performances reared in different locations; Pabna, Rajshahi and Kishorgonj having 30 broiler farmers in each. Data were collected from a total of 90 broiler farmers by direct interviewing using a semi-structured questionnaire between January and August 2013. Data were edited and categorized as per farm sizes, such as 23% farmers of 500 broilers, 20% of 600, 16% of 700, 17% of 800, 14% of 900 and 11% farmers of 1000 broilers. The data were processed using mean, percentage and master tabulation sheet. Regression models were used to determine the relationship between some socio economic factors and broiler production performances considering net return. Broiler production performances were positively related with education, farm size, training, land size and age of the farmers and significant differences of education & farm size ($P < 0.01$), training & land size ($P < 0.05$) and age ($P < 0.001$) were found. On the other hand, in case of farmer's annual income had no significant relationship with the broiler performance. In terms of production performance, feed conversion efficiency was found to be better with an increasing in the size of the farms and significant difference ($P < 0.01$) was found among the farm sizes. The article also focuses on broiler production constraints, production systems, suggestions and recommendations for the improvement of broilers farming in Bangladesh. The major constraints are fluctuate price of chicks & live broiler, chick quality, marketing system, heat stress affecting productivity and survivability, lack of knowledge in disease outbreak and limited access to credit. The present study revealed that the socio-economic status of the broiler farmers affect broiler production as well as profitability.

Keywords: Broiler farmers / profitability / production system / farm size / constraints / net return

1. Introduction

Bangladesh is an agriculture based tropical country where more than 80% of the country's 150 million people are living in rural areas and highly dependent on agriculture. Poultry farming is one of the major activities in rural areas as it provides immense employment opportunities to the local communities especially for youth & women that helps in poverty reduction, ensures food security and improves the nutritional status of the people. Commercial broiler farming, currently, has become a promising and dynamic industry with enormous potential and serves as a tool for poverty reduction through self-employment and income generation for unemployed family members (Raha 2007). Due to a short life cycle, low capital investment and quick return in broiler farming may be a good source of income to rural farmers throughout the year (Bhende 2006). Broiler farming plays a significant role in improving the livelihood of the farmers that reflect to improve socio-economic conditions and increase women empowerment opportunity among rural people of Bangladesh (Rahman et al. 2006).



Approximately 70% of people are suffering from malnutrition and about 81% of families do not have their caloric requirements met in Bangladesh. In addition to that, about 60% of families in Bangladesh are not able to meet their protein requirements from their daily food. Consumption of protein of animal origin is much lower than some other countries of the world. This is also reported by Das et al. (2008) recently. As recent report, the average per capita availability of meat is 23.6 g/head/day in comparing against the standard human requirement of 120 g/head/day (BBS 2010). As a result, huge gap are observed between requirements and availability of meat. Above the scenario in Bangladesh, broiler farming can play a crucial role in meeting the nutritional deficiency to proper level. Broiler can efficiently and rapidly provide a source of protein because of less time and low capital.

Research on the major constraints and factors influencing the performance of fast growing small scale broiler farms under private management in rural areas is limited. In addition, the farmer's attitude and behavior towards expansion of farm size based on the household's income of broiler farming is yet to be investigated. In this case, farm size is an important factor for increasing growth performance as well as profitability. Some studies (Jaim and Islam 2008; Ali and Hossain 2010) have been done on production and profitability of poultry farming. But, Jaim and Islam (2008) worked on village based small farms and concluded that technical intervention as well as good maintaining bio-security could make a significant contribution to increase profitability that reduce rural poverty. Profitability of broiler farming is affected by a number of factors. Sometimes, rural farmer fail to manage their farms efficiently because of their limited resources, lack of knowledge and capital. As a result, their net profit is not in a static condition. Sometimes, they earn profit and other times they incur loss. A sharp rises in the price of chick and feed, and failure to obtain remunerative price of their products. Besides, some farmers are illiterate and they do not have adequate knowledge about the nature of input for having maximum profit. They do not have any financial analysis of their production units for further expansion of poultry farming considering net return/broiler. But the study did not consider all essential factors that affect the production performance as well as profitability. Therefore, the present study was undertaken to identify the relative factors influence production performances of broiler farming and make some recommendations and suggestions to promote broiler farming in Bangladesh.

2. Materials and methods

According to the objectives of the study, Rajshahi, Pabna and Kishoreganj districts of Bangladesh were selected considering the higher concentration of broiler farms in that area. Data were collected randomly from a total of 90 broiler farms and 30 from each district between January and August 2013 on a regular basis. A semi- structured questionnaire was prepared, pre-tested and finalized before interviewing the farmers. Data were edited and categorized as per farm sizes, such as 23% farmers of 500 broilers, 20% farmers of 600 broilers, 16% farmers of 700 broilers, 17% farmers of 800 broilers, 14% farmers of 900 broilers and 11% farmers of 1000 broilers. These were treated as small and medium size broiler farmers.

3. Results and Discussions

3.1. Broiler production performance

Four (04) production performance parameters; marketable body weight (MBWT), feed consumption (FC), Feed conversion ratio (FCR) and survivability (S) were considered of broiler farming in the study which are presented in Table 1. Among those, FCR was an important factor to increase the production performance as well as profitability of broiler farming. FCR of different sized farm was determined as using the formula: average feed intake / average live body weight of the broilers in each farm. Farmers were sold their live broilers between at 33 and 35 days age with average marketable body weight 1.73kg/broiler in the study areas but it also depends on market price.

Table 1. Performance parameters of broilers in small and medium farm size.

Parameter	Farm size							P value and LS
	500	600	700	800	900	1000	All	
MBWT (kg/Broiler)	1.677± 0.158 ^b	1.722± 0.090 ^{ab}	1.707± 0.132 ^{ab}	1.726± 0.139 ^{ab}	1.785± 0.173 ^a	1.797± 0.168 ^a	1.73± 0.151	0.029*
Ave. marketing age	34.10	34.21	35.00	34.65	33.78	34.56	34.35	
FC (kg/Broiler)	3.12± 0.30	2.97± 0.13	3.11± 0.39	3.15± 0.32	3.03± 0.20	2.98± 0.27	3.06± 0.29	0.105 ^{NS}
FCR	1.87± 0.20 ^a	1.73± 0.08 ^{bc}	1.83± 0.24 ^{ab}	1.83± 0.23 ^{ab}	1.70± 0.14 ^{bc}	1.67± 0.18 ^c	1.78± 0.20	0.002**
Survivability	95.44± 2.96	94.56± 3.72	95.21± 2.69	96.33±1.56	94.91± 1.94	93.57± 4.20	95.03± 3.05	0.211 ^{NS}

FC, Feed consumption; MBWT, Marketable body weight; Ave, Average; LS, Level of significance; FCR, Feed conversion ratio; Values indicate ± SD, Means having dissimilar superscript differ significantly, **, P<0.01; *, P<0.05; NS, Non-significant.

Table 1 showed that marketable body weight increasing trends as the farms size increased. FCR showed better trends with an increasing in the size of the farms as reported by Ali et al. (2014) and similar result was found in the present study. It has been found that small-scale broiler farms were low performer than those of comparatively higher farm size. The production performance of broiler farms as well as FCR were largely dependent on farmers' contribution but their technical knowledge, level of education, training, were not sufficient enough for achieving better performance. Poor resource base farmers, insufficient technical knowledge, low level education, little or no training might have resulted in poor management practices in small- medium size farms that might be the reasons of higher FCR.

3.2. Economic Performance

Economic performance in broiler production was considered on the basis of net return/broiler. The net return was calculated using the formula below:

Net return= Total income – Total cost

Total cost= Recurring cost + non-recurring cost

Total income was calculated per broiler/batch from broiler farming during recent past year and total costs per broiler/per batch. The observed performance ranged from BDT 5.20-45.72 with the mean and standard error (SE) of 21.64 and 26.92 respectively (1 US\$= BDT 78). The broiler farms were classified into three categories on the basis of their performance in broiler production as shown in Table 2.

Table 2. Classification of the broiler producing farmers on the basis of their performance in broiler production.

Categories of the farm as per economic performance (%)	Farm size (no. of broiler)							Mean ± SE
	500	600	700	800	900	1000	All	
	No. of farms							
Low performance (5.20-14.85)	21	18	14	15	12	10	90	21.64
Medium Performance (14.86-20.66)	76	67	70	51	38	35	55	±
High performance (20.67-45.72)	24	33	21	39	53	54	35	26.92
	-	-	09	10	09	11	10	

Table 2 is showing that majority of the farms (55%) had low performance, 35% had medium and only 10% had high performance and these performances increase trends with increasing the size of the farm. Net return/broiler also widened with increasing in the size of the farms as shown by Islam et al. (2010)

and similar result was found in the present study. In addition, other factors related to performance and constraints might also have affected the present findings.

3.3. Socio-economic factors affect the potentiality of broiler production

Seven socio-economic characteristics of broiler-producing farmers are presented in Table 2: age, family size, land size, education, family income, training and feed conversion ratio (FCR). Broiler farmer's education was measured in terms of formal years of schooling. Annual family income was measured by the total yearly earnings of members from different sources. Some characteristics including possible observed ranges, frequency, percentage, mean & standard error (SE) and categories of the said 07 selected factors of the broiler producing farmers are presented in Table 3.

Table 3. Some socio- economic characteristics of the broiler producing farmers in study areas.

Variable	Farm size (no. of broiler)							Mean ± SE
	500	600	700	800	900	1000	All	
No. of farms	21	18	14	15	12	10	90	
Farmer's age group (%)								
20-25 years	36	31	38	41	22	33	32	33.27
26-39 years	54	52	44	41	50	44	50	±
40 and above	10	17	18	28	28	23	18	1.98
Family size (%)								
Small up to 4	33	42	27	23	22	33	33	5.74
Medium 5-6	63	47	66	58	66	50	50	±
Large 7 and above	04	11	07	19	12	17	17	1.64
Framers education status (%)								
Can sign only	36	25	15	11	-	-	13	
Primary education level 1-5	30	31	35	35	04	10	25	
Junior school education level 6-8	08	11	10	14	06	06	10	6.71
Secondary education level 9-10	26	33	30	40	50	29	35	±
Higher secondary education level 11-12	-	-	10	-	20	35	10	0.431
Graduation (above 12)	-	-	-	-	20	20	07	
Farmers training received (%)								
No training exposure	96	90	77	76	66	61	80	1.47
Training exposure	04	10	23	24	34	39	20	± 0.09
Land size (Acres)								
Land less (0-0.49)	28	20	15	06	05	01	11	
Small (0.50-2.49)	45	50	52	41	52	50	50	2.67
Medium (2.50 – 7.49)	27	30	33	47	37	40	35	±
Large (7 and above)	-	-	-	06	6	09	04	0.38
Annual Income (%)								
Low income (BDT. 0-150,000)	20	47	38	29	06	-	23	
Medium income (BDT. 150,000-250,000)	40	21	11	41	44	50	36	235,000±
High income (BDT. 250,000 above)	40	31	51	30	50	50	41	107.62
Feed conversion ratio % (As per farm status)								
High performance (1.67-1.71)	10	14	25	25	18	26	19	1.78
Medium performance(1.72-1.80)	49	35	35	59	30	26	39	±
Low performance (1.81-1.87)	41	51	40	16	52	48	42	0.20

The average age of farmers in the study area was 33 years. None of the owners of the broiler farmer were below 20 years old. The highest number of owners (50%) was within the age group of 26-39 years. Indicate that majority of broiler producers were relatively young (Table 3). Owners of the small scale broiler farms were relatively so young reported by Akteruzzaman et al. (2009). Family size of small and medium size broiler farmers in selected areas range was found three to nine members. The average number of members in the farmer's family size was 5.7 which were higher than national average of 4.53

in the rural area of Bangladesh (BBS 2010). About 50% of the farmers had medium sized family, 33% of farmers had small sized and the remaining 17% had large sized family. In terms of land size, the farmers of the study area were categorized as landless, small, medium and large on the basis of total land holdings as stated in BBS (2011). Most of the broiler farmers (50%) were small land size farmers. Landless and medium farmers constituted 11% and 35% respectively in table 2. As per land size most of the farmers were under small category. Similar result was found by Islam et al. (2010). In case of education, the average year of schooling of the farmers was 7. Around 87% poultry farm owners were educated, and 13% could only sign their names. Of the farmers, about 25% of all poultry farm owners had primary education, 10% had junior school education, 35% secondary, 10% higher secondary level education and 7% graduation. The other survey study showed 52% of the small-scale broiler farmers had only a primary level of education (Chowdhury et al., 2010). Such a low level educational background causes difficulty in understanding and applying scientific knowledge in practice, even to participate in training programmes. Consequently, productivity and profitability are suffered seriously and creates dissatisfaction among the farmers. The expectations to this were those farmers who had at least a secondary level of education and who received training on poultry rearing. Chowdhury et al. (1993) clearly indicated that secondary level (class VI to X passed) is the appropriate level of education for trainees who were backyard poultry raisers. Chowdhury et al. (2011) suggested that small and medium enterprise (SME) farmers must have at least Junior School Certificate (JSC) for taking trainings on commercial poultry farming. Michael et al. (1992) reported that education is not only an important factor for adopting an innovation but necessary tool for successful innovation of profitability. Training had an impact on the increased farm size. Similar results were found on the report of Akteruzzaman et al. (2009) who reported increased flock size, and land area to a greater extent as compared with non-trained farmers. The farmers received training on feeding, management and health care of poultry that reflection on productive performance. Most of the broiler farmers (80%) were not trained in broiler farming. Technical knowledge of farmers on broiler rearing was not satisfactory even it was poor reported by Bandara and Dassanyake (2006).

Source of income and income level of the farmers are very important for socio-economic characteristics. The average annual income of farmers was estimated by adding all income generating activities of the household. (Table 3) The average annual income of farmers in the study area was BDT 235,000 (BDT 78 = US\$ 1.00). The low income was 23% and medium and high both were 77%. Farmers, who earned more profit they have the capacity to invest more on broiler production, consisted with the finding of Islam et al. (2009).

FCR is an important factor that affects profit that depends on the quality of feed and chicks and management techniques of the farms. Average FCR in the study area was 1.78. The 39% and 42% farms were observed medium and low performance of FCR. Lower FCR could contribute to increase profitability as well as broiler production performance. Similar result was observed by Kawsar et al. (2011) and Jaim and Islam (2008) they reported the negative relationship between the size of farm and cost of broiler production. Chand et al. (2009) suggested that profitability is enhanced if the farmers are properly trained up to improve FCR, reduce production cost when bio-security is strengthened as well, which will reduce mortality under field conditions. These results are also in agreement with the result of Badubi et al. (2004) they reported that a better-trained class of farmers, who can effectively seek out and process new information and keep accurate financial records, earned higher profit.

3.4. Factors influencing the performance of the broiler farmers

Regression analysis was done to determine the relationship between some socio-economic factors of farmers and their broiler production performance on the basis of net return/broiler. A regression analysis was formulated in the following way:

$$Y = f(X_1, X_2, X_3, X_4, X_5, X_6, X_7)$$

Where:

Y = Broiler production performance in terms of net return/broiler (BDT)

X₁ = Age (years), X₂ = Education (years), X₃ = Family size (number of persons in the household), X₄ = Land size (acres), X₅ = Annual income (BDT in thousand), X₆ = Training received and X₇ = Farm size

Broiler production performances were positively related with Socio-economic factors in Table 4.

Table 4. Relationship between socio-economic factors and broiler production performance.

Variable	Regression co-efficient	Standard error	t- value	Level of significance
Constant	-40.123	16.559	-2.423	.018
X1= Age	.297	.173	1.720	.089***
X2= Education	1.206	.448	2.694	.009**
X3= Family Size	-3.764	1.616	-2.330	.022*
X4= Land size	6.872	3.192	2.153	.034*
X5= Annual income	.011	.015	.746	.458 ^{NS}
X6= Training received	1.778	.862	2.064	.042*
X7= Farm size	.079	.013	6.066	.000**

R square = 0.556, Adjust R square= 0 .518, F= 14.654**, df= 89,*Significant at 5% level, ** Significant at 1% level, *** Significant at 0.1% level, ^{NS} Non- significant

Table 4 shows that significant differences were found 1%, 5% and 0.1% level in case of farm size, education, training, land size, family size and age respectively in relation with broiler performances. It is logical that training exposure with higher education tend to be more efficient in broiler production. Within this study clearly observed that farm size is a factor to increase the production performance. Comparatively larger broiler farm size could improve their overall performance resulting profitability would be increased.

Family size had a negative significant relationship with broiler production performance as well as profitability on the basis of net return in broiler production. It was found that family size to be a factor for impact on the production performance and sowing the co-efficient(-3.764). Negative relationship signifies that net return reduces as the family size increases. This agrees with Okike (2000) who reported that family size have negative influence on the production performance. Larger family size having economic inefficiency is acceptable considering the value of farm products that could be sold but are consumed by the households. On the other hand, family annual income had no significant relationship with broiler production performance.

3.5. Major constraints of small and medium scale broiler production

- **Fluctuate price of chicks and live broiler :** The cost of day old chicks is relatively unstable throughout the year. During 2013, it varied from BDT 18/- to BDT 67/- per DOC. Live broiler was also relatively unstable in the same year. It varied from BDT-90/- to BDT 120/- per Kg live broiler at producer level. This variation made farmers unhappy and serious frustration. Price instability of both chicks and live broiler was second constraints (Kawsar2014). Fluctuation of market price of broilers affected the profitability, consisted with some researchers (Raha 2007; Begum and Alam 2009).
- **Variability in chick&feed quality :** Lack of chick's quality is a common complaint to the farmers. Chick quality was the highest in scoring among the constraints of the farmers (Kawsar et al., 2013 and Chand et al., 2009). A number of factors relate to breeder farm and hatchery management affects the quality chick's production (Chowdhury 2013). The chicks are delivered to dealers and agents after so called grading. Chicks of different grades like A, B,C, etc. clearly indicate variation in quality (Chowdhury 2011). Consequently, farmers are receiving different

quality chicks which affect performance. This makes farmers unhappy during management and marketing. Having quality feed in time may become a challenge for broiler production.

- **Marketing system** : Since the farmers are not well organized and there is no regulatory body for them, they have to follow the traditional system of marketing which permits this chance little bargaining. Farmers are deprived from legal prices of their products frequently. The middlemen exploit. Marketing of live broiler was also a problem, and 37% broiler production is affected of small scale broiler farming (Emaikwuet al., 2011).
- **Summer stress affecting productivity and survivability** : Exotic high yielding strains of broiler chicks are not heat tolerant. The problems are arisen in summer because of temperature raised 35-42°C. Therefore, productivity and survivability are decreased. So, some strategies should be applied against heat stress (Lin et al., 2006). Das et al. (2008) also reported that small farmers kept their broilers in open sided house for minimizing heat stress.
- **Treatment of diseases** : Although prevention is the key to make success in combating diseases (Chowdhury 1984). Treatment of diseased birds may be applied in some cases. However, the quacks and nonqualified personnel should not be involved in veterinary practices that may affect negatively in poultry farming as well as profitability.
- **Limited access of farmers to credits** : Since the outbreak of Avian Influenza in 2007, access of SME farmers to credit facilities has decreased considerably (Chand et al., 2009). Financial institutions reduced interest to encourage farmers for poultry farming as well as their recovery of their credit.

3.6. Existing small scale broiler production system

- **Housing** : Farmers have been using open sided houses with wire-net partition in floor management system for flocks of different sizes. Most of the broiler houses at rural areas were built in east-west direction air movement and also to prevent entering direct sunshine in the shed at morning and at late afternoon. About 58% houses or sheds had a herring floor brick, 12% concrete made with brick and 30% soiled floor which was attached to residence. In case of concrete floor and herring floor, the wall was made of brick with 1.5 feet height. Above the brick sidewalls, mesh wire stretched up to the roof level. The roof was usually made of corrugated tin (iron sheet). The house was 10 feet height in the center and 7 feet height at the corner. In general, floor space of 1-1.5 sq. feet/bird was maintained. Rice husks were used as litter materials for broiler operations. But the majority of the broiler producers (65%) were found to use sawdust because of the shortage and high cost of rice husk. During the summer season, ambient temperatures can increase up to 42°C with a high humidity in Bangladesh. Therefore, to minimize heat stress, open-sided house is essential for broiler rearing in Bangladesh.
- **Broiler strain** : The majority (74.5%) of the broiler producers used Cobb 500 strain and the 25% producers are rearing other strains such as Hubbard MPK, Arbor Acres, ISA i575 etc. The day old broiler chicks were procured from a local private hatchery. Generally, most of the small-scale broiler farm owners bought their day-old chicks through middlemen like dealers or agents by advance booking. The local hatcheries sometimes are not able to meet their demand for day old chicks.
- **Brooding practices** : The brooding of young chicks is very important to reduce early chick mortality as well as better returns. The main source of heating for brooding was electricity. But irregular supply of electricity was the common problem for brooding of DOCs. Chicks were brooded for a period of 2-3 weeks. The 3 electric bulbs of 100 watts or 1000 watts heater were used for brooding of chicks. In absence of electricity, kerosene was used in hurricane or rice husk or sawdust was burnt in earthen pot or jars for brooding of chicks in rural area.
- **Feeding practices** : The birds were fed a broiler starter diet for the first 2 weeks (1-14 days) and finisher diet during the remaining period (15-35 days).

- **Disease prevalence:** The diseases those are frequently prevalent in broiler farms which were Newcastle Disease (ND), Infectious Bursal Disease (IBD), Mycoplasmosis, Salmonellosis, Colibacillosis etc. A majority of the producers (74%) reported Newcastle disease as a major concern of their farms. The majority of the small-scale broiler farmers (61%; n=55) followed treatment of diseases rather than practicing vaccination from day old to sell at village level. Some farmers followed vaccination schedule in their farms. Lack of quality control of vaccines during storage and transportation were major problems for failure of vaccines. A routine vaccination schedule is normally followed to prevent the common diseases. However, maintaining strict hygienic measures and bio-security can reduce the disease outbreak in the farm and risks (Islam 2003). 'Bio-security' is now a common word familiar to the most farmers. Nowadays avian influenza is called as a disaster to the poultry sector, resulted close down of the commercial broiler farms. This is a great loss for the nation.

3.7. Suggestions and recommendations

Small & Medium Enterprise farmers must have at least Junior School Certificate (JSC) for poultry husbandry practices. Farmers should be trained periodically on various aspects of husbandry and disease control so that they can apply their knowledge for the operation of broiler farming successfully. Non trained farmers should not be registered for farming.

The poultry dealers and agents are the representatives of broiler farmers for providing feeds and chicks. Their contribution in commercial poultry production is essential. Training of such dealers and agents need be taken for maintaining the quality of inputs. Their educational level must be at least JSC level.

The minimum farm size should be 700 to have optimum profit. This should be followed strictly to ensure sustainability by minimizing cost of production for favor of maximum profit.

Smallholder farmers should come forward to form "market group" for the intervention of marketing channel that will ensure price of their products.

Efficient summer management of broilers is the necessary to combat acute heat stress in broiler production. Different feeding strategies; diurnal feeding patterns, choice feeding from different feed ingredients (rich in protein or in energy), wetfeeding etc. may be applied to reduce the effects of heat stress.

A policy should be developed by the government to remove unexpected growth promoters and antibiotics in case of poultry production. Awareness should be developed against the use of such Antibiotics /Antibiotics growth promoters.

4. Conclusions

The study has highlighted the socio-economic characteristics of broiler farmers and its production performance as well as profitability. The study revealed that farm size, education, training, land size and age have directly influenced on the production performance of broiler while family size has negative influence. Socio-economic characteristics as farm size, education, training and land size are responsible for influencing the performance of broiler farm. Around 80% farmers were not trained up in this regard resulting low production as well as less profitability in broiler farming. Illiterate or non-trained farmers should not be registered for farming. Government should organize training programme on poultry farming.

A number of constraints are exists for commercial broiler farmers in Bangladesh such as fluctuate price of chick and live broiler, non-availability of quality chicks and feed, marketing system, treatment of diseases and vaccines that may affect productivity and profitability. All these constraints may be addressed by the experts from government, research institutes, universities, NGOs and other relevant sectors in collaborative manner to ensure sustainability of broiler production.

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