

Small-Scale Broiler Farming at Rural Households with or Without Management Intervention during Rainy Season

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Abstract: The study was conducted to determine the productive performance and profitability of small scale broiler farming at rural households carried out with or without management intervention during rainy season . Twelve thousand six hundred day old chicks were procured from a commercial hatchery and distributed into 36 farms of which 18 farmers in six treatment groups (100, 200, 300, 400, 500 and 600 birds) were allowed to manage their farms in their own way while the other 18 were in six treatment groups (100, 200, 300, 400, 500 and 600 birds) trained on the basic principles of broiler farm operation, management and procedure of record keeping. Six groups, each of the three farmers (18 farmers) were provided training whereas another six groups, each of three treatment groups (18 farmers) were considered from non-trained section for comparison. Each and every trained farm owners took care of chicks providing improved management including feeds and feeding procedures, housing, disease prevention, medication, vaccination etc. as per instructions. Data were collected for productive performance, cost of farming and returns were used to determine the benefit cost ratio (BCR). Data were statistically analysed and comparisons of results were made between farms with intervention those were no intervention. Management intervention and flock size had some effects on broiler growth performance like FCR and survivability. Higher survivability and lowest FCR values found in improved management than the birds reared on traditional management. Feed efficiency improved as the flock size increased. BCR value increased with the increasing in flock size that is larger flock earns more profit than smaller counterpart. The farmers who followed improved management in rainy season also earned more profit than who had not practiced improved management. It was concluded, therefore, the satisfactory productive performance is achievable and profitability be improved from small-scale broiler farming at rural households of the farmers if management intervention is made.

Keywords: cost and return; flock size; management intervention; small-scale;

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I. Introduction

The independent small-scale broiler farmers always play a crucial role in economic development, the potential of increasing income and employment of small farmers. But they are operating their farms with great risk. In spite of resource constraints, it has been recognized that the farmers have great richness of knowledge about their resources; they are experimenters, risk takers, innovators, intensifiers, diversifiers and practitioners of great common sense (Thrupp, 1987). They have remarkable capacities to adapt and to overcome the constraints in evolving their techniques over time. Proper tuning of these resources may accelerate the productivity in the farming community. The technological intervention was a milestone for homestead nutrition, gender participation and employment generation for the rural poor. Small-scale broiler farming is also found to be successful in non-sophisticated rural environment and the enterprise has been expanded rapidly later on. As the mini commercial poultry farming is gaining popularity, therefore, employment opportunities are being created among the farmers, traders, various support service providers and businessmen. A large number of energetic and hardworking youths and entrepreneurs are participating and contributing to build their fortune with this enterprise. It also provides employment for the resource poor and unemployed people in Bangladesh. Management intervention (like training, feeding management, strict biosecurity practicing, and transfer of technological information to farmers, follow-up, monitoring etc.) could play a significant role for the rapid growth of poultry sector. Society formation and group membership serves to lower transaction cost, attributed to easy access to credit associated with the searching and lowering income risk from farmers. In addition, it may

raise farm profit by improving the quality of managerial inputs by speeding the transfer of technological information among the farmers or groups and by facilitating them to credit thereby permitting the adoption of advanced technology and market information. Well organized small farmers, however, provide necessary backward and forward linkages, and would appear to offer an important way in which poultry producers can run farm activities smoothly. Farmers who had adopted full management intervention package as recommended by extension service had higher productive performance (Alam, 1997, Jaim et al., 2008, Akteruzzaman et al., 2009, Ochieng et al., 2011). Among those Ochieng et al., (2011) studied only indigenous chicken in western Kenya, Alam (1997) studied impact of Smallholder Livestock Development Project (SLDP) intervention on broiler and layer rearing in rural community at different rural areas of Bangladesh and Jaim et al. (2008) dealt with village based small farms (100- 500) that were also categorized farms. But the impact of management intervention on independent small farms that rear fewer number of birds in a flock of 600 or less, were not studied to know their profitability status and the degree of their success. Therefore, the present study was designed i) to evaluate the productive performance, costs and returns and effects of management intervention on small-scale broiler farming in different seasons. ii) to identify the constraints of small-scale broiler farming.

II. Materials and Methods

Thirty six small-scale broiler farmers who had some facilities at their home in terms of farm inputs were selected from Bhabkhali and Baera union under sadar Upazila of Mymensingh district. Among them, 18 farmers were allowed to manage their farms in their own way while the other 18 were trained on the basic principles of broiler farm operation, management and procedure of record keeping. Management intervention was made for this later group during the course of farm operation. This group of farmers also received a short training before they started farming. Most (97%) of the broiler houses of farmers were made of tin-roof with bamboo-mat ceiling and 1-1.5 feet wooden or brick wall with wire net boundary. Floor type was kutcha (clay made) with cemented coating. Farmers repaired their broiler houses, cleaned, washed and dried, fumigated before the commencement of trial. A floor space of 900 cm² was provided for each bird in each flock. Clean new papers were spread over the litter, and the house was warmed up for at least 2 hours before the arrival of day old chicks (DOCs). Farms with small flocks in operation were conducted from 28 May to 30th June 2011. During this period, the maximum temperature was 31.6^oC and minimum temperature was 26.10^oC; maximum humidity was 97.57% and minimum humidity was 76.00%. There was a record of more than 1,525 mm of rain a year in the study areas. Twelve thousand six hundred DOC were procured from a commercial hatchery and distributed into six treatment groups (100, 200, 300, 400, 500 and 600 birds). Six groups, each of the three farmers (18 farmers) were provided training whereas another six groups, each of three treatment groups (18 farmers) were considered from non-trained section for comparison. Each and every trained farm owners took care of chicks providing improved management including feeds and feeding procedures, housing, disease prevention, medication, vaccination etc. as per instructions. Strict hygienic measures and appropriate sanitation programmes were carried out by the small-scale broiler farmers of different flock sizes during the whole trial period. Frequent visits were made to farmers' households and management intervention in terms of practical training and technical advice were provided to selected farmers on all sorts of rearing and management of the broiler flocks. Efforts were made to correct faults when found on the spot during visit. Activities in relation to management practices of flocks in improved and without improved management groups are shown in Table 1. Records were kept of initial body weight at one day old, weekly body weight, feed intake and mortality for each small flock. Economic performances of small flocks were estimated on both variable and total cost basis that is called tabular technique, which is easy to understand and simple in calculation. The total cost of these broiler enterprises were categorized into variable and fixed costs. Variable costs were those costs that varied with the size of the flock. Fixed costs are those costs that remain fixed whether production is zero or positive. This included interest on housing and equipment cost, depreciation of housing, depreciation of tools and equipment, land use cost and opportunity cost of family labour. Housing cost was estimated by unit cost basis (per piece of 1 sq.ft area) which is dependent on quality of housing materials. Costs of tools and equipment were determined multiplying the total number of equipment by the market price of equipment. Interest rate was calculated at the rate of 12% per annum because housing and few types of equipment are long term investment and it was charged after discussion with the Bangladesh Krishi Bank (BKB) officials. Depreciation cost of both house and equipment were assumed as 5% per year. Land use cost was estimated using 8% interest on value of land for 5 years lease. Opportunity cost of family labour accounted on the basis of labour use as part time job in another broiler farm. Gross return was estimated as the value of live weight, used litter and excreta and sale of gunny bags on the basis of market price. Gross margin and net return were estimated deducting from the gross return to variable cost and total cost, respectively. Finally, profitability as well as BCR was estimated from total gross return divided by total cost.

Table 1 Distinguishing features between intervene and non-intervene group of farmers

Factors	Without improved management	Improved management
Training	Farmers were not trained	Farmers were trained about the principles of broiler farming before commencement of the farm operation.
Society formation	Farmers were not united and managed their broiler feed by personal contact with feed seller.	During conduction of training, the farmers were advised to work unitedly, share practical knowledge among themselves and bring their broiler feed on co-operative basis.
Follow-up	Farmers' activities were not monitored by researcher/expert.	Farmers' activities were monitored by researcher/expert.
Biosecurity of the farms	Weak biosecurity. Farm owner, family members or even jointly reared their broiler flocks.	Strong biosecurity. Foot bath, farm dress and sponge were strictly maintained during farm operation. Visitors and other than farm owners were restricted, disinfectant sprayed inside and outside the farm.
Vaccination	Everybody used antibiotics indiscriminately, while somebody followed vaccination program.	Everybody followed vaccination schedule. No application of unnecessary antibiotics.
Data recording	Records were not maintained in an organized way.	Growth performance and cost return data were recorded in record register in an organized way.
Marketing	Farmers sold their broilers with the help of middlemen.	Farmers directly sold broilers to wholesale market without involvement of middlemen.

All recorded and calculated parameters of biological trials were for a 2 rearing systems × 6 flock sizes were analyzed following factorial experiment in a Completely Randomized Design (CRD) for general analyses of variance (ANOVA) using SAS 9.1.3 (2007) package program. When parameter showed significant difference, least significant difference (LSD) was calculated to make comparison among treatment groups.

III. Result and Discussion

3.1 Growth performance and flock size

The performance of small-scale broiler units of 100, 200, 300, 400, 500 and 600 birds that were achieved under rural condition with or without improved management is presented in Tables 2 and 3. Table 2 shows that the feed consumption was highest in F₁ group (flock size 100) and lowest in F₆ but the result showed no significant differences among the flock sizes. FCR decreased significantly with increasing flock size, indicating that larger flock sizes utilized feed efficiently than smaller ones. It was seen that feed consumption and FCR had decreasing trends with increasing size of the flock. Poor live weight achieved in smallest flock size compared to other increasing flock sizes was probably due to inadequate technical knowledge on broiler management that might have been arisen from their inherent educational background resulting from poor technology receiving ability. Chowdhury *et al.* (2010) stated that most of the small-scale broiler farmers had only primary level of education, which explained their difficulty in understanding the science and technology related to poultry production and their inability to apply scientific knowledge in practice during their farm operation which resulted low growth performance in terms of FCR. Present findings partially similar with the result of Fouzder (2006) and Farming System and Environment Study (FSES) (2002a) where no marked differences among farm categories in feed consumption, FCR and survivability of broilers were found. Both body weight and survivability were unaffected whatever may be the size of flock (P>0.05). The flock size had effects on feed consumption and FCR of broilers in small-scale broiler farming at rural households.

Table 2 Effect of flock size on growth performances of small-scale broiler farming during rainy season

Parameter	Flock size						SED	Level of significance
	100	200	300	400	500	600		
Body weight (kg/bird)	1.492	1.504	1.482	1.475	1.488	1.497	0.033	NS
Feed consumption (kg/bird)	2.822 ^a	2.756 ^{ab}	2.669 ^{ab}	2.619 ^{ab}	2.586 ^{ab}	2.566 ^b	0.073	*
FCR	1.89 ^a	1.83 ^{ab}	1.80 ^{bc}	1.78 ^{bcd}	1.74 ^{cd}	1.72 ^d	0.025	**
Survivability (%)	94.75	95.18	95.42	95.09	96.18	95.23	0.847	NS

Means bearing superscripts not in common in a row differ significantly; *, P<0.05; **, P<0.01; NS, Non-significant FCR, Feed conversion ratio; SED, Standard error of difference.

3.2 Growth performance and flock management

Table 3 shows that body weight and survivability significantly increased (P<0.01) when farmers followed improved management. Previously, Kawsar *et al.* (2011) found satisfactory productive performance in rural areas with improved practices. In this study, FCR values were comparatively higher in the absence of management intervention. Low productivity and high mortality was also observed in non intervened groups due to dampness of litter and poor bio-security measures which were taken in their small flocks during the rainy season. It might be the results of less technical skills of poultry management of the farmers which seemed to be

improved significantly by the trained farmers. Muhammad *et al.* (2010) concluded that the training of farmers increased their broiler survivability and growth than who did not receive training due to their better management which was reflected in the present study. Farmers of small flock sizes need technical support and well planned bio-secure environment to get better performance (Chowdhury, 2013). FCR values of the present study at field level in improved management were 1.70 in comparison with 1.89 obtained from farmers that received no technical support or training. This result is also in conformity with the result obtained during summer season by Kawsar *et.al* (2017) as stated FCR and survivability both were significantly improved when birds were received improve management.

Table 3 Effect of management intervention on growth performances of broiler during rainy season

Parameter	Flock management		SED	Level of significance
	Without improved management	With improved management		
Body weight (kg/bird)	1.437	1.541	0.019	**
Feed consumption (kg/bird)	2.720	2.619	0.042	NS
Feed conversion ratio	1.89	1.70	0.014	***
Survivability (%)	94.29	96.33	0.497	**

, P<0.01; *, P<0.001; NS, Non-significant, SED, Standard error of difference.

3.3 Costs of broiler production

The total costs of the enterprise were categorized into fixed and variable costs. Findings revealed that fixed cost being influenced by the labour cost differed significantly with an increase in flock sizes. It covered 1.60 to 2.86% of total cost depending on the flock sizes that was the major portion of the fixed cost. Highest fixed cost (3.88%) was computed in smallest unit and lowest (1.97%) in largest one. It may be due to the differences in equipment cost and also house cost as flock size varied from farmers to farmers according to their financial status. Fixed costs were approximately similar to the results of the previous study (2.07-3.73%) that was in agreement with Begum (2004) and Fouzder (2006). Management intervention did not show any significant effect on fixed cost though labour cost, land utilization cost and both depreciation cost and its interest differed significantly.

Table 4 Effect of flock size on profitability of broiler farming

Parameter	Flock size						SED	Level of significance
	100	200	300	400	500	600		
Fixed cost	3.88 ^a	3.05 ^b	2.49 ^c	2.78 ^c	2.21 ^d	1.97 ^f	0.080	***
Variable cost	96.11 ^d	96.95 ^c	96.98 ^c	97.21 ^{bc}	97.80 ^{ab}	98.04 ^a	0.228	***
Total cost (Tk./Br)	175.26 ^a	168.52 ^{ab}	162.60 ^{bc}	160.98 ^{bc}	157.82 ^c	156.83 ^c	2.883	***
Return (Tk./Br)	188.96	190.36	188.01	187.42	189.17	190.40	4.068	NS
Sac return (Tk./Br)	0.44	0.55	0.69	0.65	0.60	0.56	0.029	NS
Droppings return (Tk./Br)	1.72	1.69	1.74	1.73	1.74	1.72	0.035	NS
Gross return (Tk./Br)	191.12	192.70	190.41	189.79	191.51	192.68	4.076	NS
Net return (Tk./Br)	15.86 ^c	22.21 ^{bc}	27.81 ^{ab}	28.81 ^{ab}	33.69 ^a	35.85 ^a	2.569	***
Net return (Tk./kg)	10.32 ^d	14.59 ^c	18.40 ^{bc}	19.14 ^b	22.15 ^{ab}	23.53 ^a	1.419	***
Benefit cost ratio	1.09 ^d	1.15 ^c	1.18 ^{bc}	1.18 ^{bc}	1.22 ^{ab}	1.23 ^a	0.015	***

Means bearing superscripts not in common in each row differ significantly; ***, P<0.001; NS, Non-significant; Br Broiler; SED, Standard error of difference.

3.5 Return from broiler farming

During rainy season cultured fish, vegetables or meat is not widely available in the market with only little exception like *hilsa* fish or limited vegetables items. Therefore, there was a moderate demand for broiler resulting a price of live broiler not so high or low. Gross return of broiler in this season among the size of the flock showed non-significant (Table 4). A gross return Tk. 198.74 was obtained from improved management that was significantly higher than that of without improved management, Tk. 184.00 (Table 5). Training, continuous follow-up and advice to the broiler farmers motivated their attitude, knowledge, farming efficiency that might have significantly increased higher body weight, better feed utilization, livability of the broiler (Table 2) and consequently, higher return was achieved (Table 5). Net return per broiler or per kg significantly (P<0.001) differed among the flock sizes and between flock management. Net return per broiler per batch in a year were Tk.10.32, 14.59, 18.40, 19.14, 22.15 and 23.53 for F₁, F₂, F₃, F₄, F₅ and F₆ respectively. Net income significantly increases with an increase in the flock sizes. Highest net return (Tk. 23.53/kg) was earned from

largest flock (F₆) and lowest income (Tk.10.32/kg) earned from smallest one (F₁). Increasing total number of broilers reared in a flock reduced variable cost and total cost, side by side increased the rate of return with a consequent marked improvement in BCR. Maximum cost was incurred in variable cost of which major cost involved in feed item for broiler production. Thus, the profitability of individual farms depends on feed utilization as well as FCR by the broiler. Reduction of FCR might improve the profitability which was reflected in flock size as shown in Table 5 Kawsar *et al.* (2017) also suggested that profitability is enhanced if farmers are properly trained to improve FCR value, thereby reducing production cost and if bio-security is strengthened to reduce mortality under field condition. Management intervention had a significant (P<0.001) effect on BCR (Table 5). In improved management farmers earned more money (Tk. 26.31/kg) than that of traditional management (Tk.9.71/kg). It may have been due to the differences of technical knowledge between the farmers and adoption of necessary technical practices as per advice of the experts. Higher BCR (1.26) was found in improved management than that found in without improved management group (1.08). This might have resulted from skill and technical knowledge of the farmers which was more for achieving better performance in FCR as indicated in Table 3. These results coincided with the earlier findings of Kawsar *et.al* (2017) and Islam *et al.* (2010), who concluded that comparatively larger farms achieved higher economic efficiency due to better cost economy and better technical performance of the flocks. From the Table 4, it appeared that, BCR was calculated to be Tk.1.09 for F₁, 1.15 for F₂, 1.18 for F₃ and F₄, 1.22 for F₅ and 1.23 for F₆. Therefore, profitability of boiler flock containing 600 (F₆) birds is more than those of F₁, F₂, F₃ and F₄ and little bit higher than 500 (F₅) flock size at farm level. Highest BCR was found in largest one and the trend indicated that BCR increased when the flock size is increased. These results are closely related to the observation of Kawsar *et.al* (2017) and Nair and Ghadoliya (2000) where they found that as the flock size is increased, the BCR also increased. Fixed cost decreased with increasing size of the flock due to economies of large scale of flock. On the other hand, average variable cost per bird was increased with the increase in flock sizes (Table 4). The reasons being that comparatively large flock owners paid more attention towards feeding strategy, vaccination of birds and they used high quality disinfectants to disinfect the flock ultimately the production performances significantly increased as the flock size increased with a consequent increase in profitability. Higher BCR value was (1.26) achieved from better growth performance of broilers (Table 3) in improved management due to farmers better knowledge that is received from training and technical advice. Whereas significantly lower BCR value (1.08) was attributed due to absence of improved management when farmers were deprived of training and technical advise.

Table 5 Effect of flock management on profitability of broiler farming

Parameter	Flock management		SED	Level of significance
	Without improved management	With improved management		
Fixed cost	2.679	2.784	0.046	NS
Variable cost	97.14	97.22	0.132	NS
Total cost (Tk./Br)	169.98	157.36	1.665	***
Return (Tk./Br)	181.61	196.49	2.349	***
Sac return (Tk./Br)	0.66	0.50	0.017	NS
Droppings return (Tk./Br)	1.73	1.72	0.020	NS
Gross return (Tk./Br)	184.00	198.74	2.353	**
Net return (Tk./Br)	14.02	40.72	1.483	***
Net return (Tk./kg)	09.71	26.31	0.819	***
Benefit cost ratio	1.08	1.26	0.009	***

, P<0.01; *, P<0.001; NS, Non-significant; Br, Broiler; SED, Standard error of difference

IV. Conclusion

Management intervention and flock size had some effects on broiler growth performance like FCR and survivability. Higher survivability and lowest FCR values found in improved management than the birds reared on traditional management. FCR had decreasing trends with an increase in the flock size indicating that larger flock sizes efficiently utilized feed as compared to their smaller counterparts. Body weight and survivability decreased significantly (P<0.01) when there was a breakthrough in management. Size of the flock had a negative relationship with a cost of raising broiler. Cost and return affected both input and output cost of the broiler farming. BCR widened with an increase in the size of the flock. The farmers who followed improved management during rainy season also earned more profit than who had not practiced improved management. It is therefore concluded that training to the small-scale broiler farmers, introduction of improved management practices, regular monitoring with adequate poultry extension services are the key elements to get satisfactory result from broiler farming. These might enhance better productive performance as well as maximize profitability. High humidity, dampness of litter, disease infestation, natural calamities in rainy season such as drizzling and power break is the main constraints in rainy season.

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