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Smallholder Farmers' Use of Recommended Technologies in Broiler Production

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Abstract

The main purpose of the study was to determine the extent of use of recommended technologies in broiler production by the smallholder broiler farmers. The study also aimed at exploring relationships between the smallholder broiler farmer's extent of use of the recommended technologies and their selected characteristics. Data were collected in sadar upazila under Mymensingh district from 82 randomly selected broiler farmers out of 164 broiler farmers. A structured interview schedule was used for collecting data during July to August, 2016. Thirty recommended technologies were selected under five aspects of broiler production namely, bio-security, feeding, medicine and vaccination, housing and infrastructure and operational management. Majority (74.4 percent) of the smallholder broiler farmers were found to have medium level use of recommended technologies followed by 19.5 percent having high use. Among the total 30 selected technology items under five aspects "measuring temperature and relative humidity by using thermometer and hygrometer" had the lowest use and "starter feed for broiler production" had the highest use in broiler production. Among the ten selected characteristics of the farmers five namely: educational qualification, broiler farm size, income from broiler, knowledge on broiler production and extension media contact showed significantly positive relationships with the farmers' use of recommended technologies in broiler production. Majority of the farmers (59.8 percent) faced high constraints in broiler production followed by 40.2 percent faced medium constraints, while no farmer was found facing low level constraints. A number of recommendations were put for policy implications that included undertaking appropriate extension strategies, regular extension programmes and field level motivational programmes for the smallholder farmers to increase their level of technology use in broiler production.

Key words: *Smallholder farmers, technology, broiler production*

Introduction

All over the globe, poultry meats and eggs are preferred to other kinds of animal food products for a variety of reasons. It is estimated that 30 percent of the world's meat supply is derived from poultry i.e. chicken, turkey, duck, geese, domesticated quail etc. and the production is increasing steadily. The trend has been more noticeable in the developing countries (Prabhakaran, 2009). According to the Bangladesh government statistics, the total chicken population is steadily increasing, from about 143 million birds in 2001 to 235 million birds in 2015 (BBS, 2015). Now in Bangladesh there are about ten poultry breeding companies who supply day old chicks, either from imported parent stocks or from imported hatching egg (Latif, 2014). Poultry plays a vital role in the agricultural economy of Bangladesh. It is recognized that the climatic condition of Bangladesh is congenial for poultry rearing.

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Land, the most important resource for the rural economy is gradually disappearing and fragmenting due to rapid increase of population. For scarcity of grazing land, the scope for development of industries of large animal is limited. Therefore, small scale poultry farming can significantly contribute in earning cash within shortest possible time and also removing malnutrition and unemployment of the poor people. The country suffers from an acute shortage of animal protein due to lower average production unit. Poultry sector plays an important role in Bangladesh to minimize the gap at a faster rate than any other sector. Bangladesh now has a large and rapidly expanding poultry sector. Expansion of poultry industry in Bangladesh is being driven by rising incomes of the consumers and a shift in industry structure towards integrated ownership and coordination of the input, production, and marketing operations involved in poultry production (Selim and Nahid, 2008). In the introduction of the National Livestock Development Policy document (GoB, 2013) it is pointed out that growth in the livestock sector is high in Bangladesh and in 2011-12 the growth rate in GDP for livestock was the highest of any sub-sector at 7.2% compared to 0.2% for crops and 3.7% for the fisheries sub-sector. Besides, the National Livestock Development Policy Document, prepared by the Government of Bangladesh (GoB, 2012), listed a number of constraints or weaknesses of the poultry sector of the country that need to be addressed. Small scale broiler farmers, operating up to 1500 birds in 1-3 sheds are the backbone of poultry production of Bangladesh. Although these smallholder farms are the major suppliers of the total poultry meat, they also face a numbers of problems. The production level and efficiency is low than potential (Alam, 2012). At the same time it is assumed that smallholder farmers level of use of recommended technologies are low. Use of recommended technologies is vital to develop poultry sector of Bangladesh. If the farmers cannot maximize their production and profitability from the poultry sector, the overall production scenario of the sector will not achieve the expected development goals. Although a huge number of smallholder farmers are now involved in broiler production, it is not clear to what extent they follow the recommended technology in the production system. It is of utmost important to know the level of recommended technologies is being used by the broiler farmers, especially by the smallholders. So, this research was conducted to fulfill the following objectives-

1. To determine the extent of use of recommended technologies as practiced by the smallholder farmers in broiler production.
2. To determine the characteristics of smallholder broiler farmers and explore the relationships of the selected characteristics with their extent of use of recommend technologies for broiler production.
4. To identify the problems faced by the smallholder farmers in broiler production.

Methodology

Locale, Population and Sample

The study was conducted at sadar upazila under Mymensingh district. This upazila was purposively selected as the study area because broiler farming has become a long practice among different kind of farmers in

Mymensingh district. In particular, sadar upazila is considered as a major broiler producing area of the region and many farmers adopted broiler production as their profession. Smallholder broiler farmers of the sadar upazila under Mymensingh district were the population of the study. According to the official categorization followed by the Department of Livestock Services (DLS), farmers producing up to 1500 birds (in 1-3 heads) are termed as smallholder broiler farmers. A list of total 164 smallholder broiler farmers was collected from the Upazila Livestock Office. Following the random sampling method 82 farmers (i.e., 50 percent of the population) were selected as the sample of the study.

Data collection instrument

A structured interview schedule was used to collect data from the farmers under the sample of the study during the period from July to August, 2016. The major draft schedule was pre-tested by interviewing a few farmers of the study area. On the basis of the experience of the pre-testing final interview schedule was prepared with necessary rearrangement and modifications.

Measurement and analysis

Smallholder farmers' use of recommended technologies in broiler production was the focus variable. Ten characteristics of the farmers were selected and use to explore relationship with the focus variable. These selected characteristics were age, educational qualification, household size, farm size, experience in broiler production, broiler farm size, knowledge of broiler production, annual income, income from poultry and extension media contact. These were measured by employing standard methods as followed by some researchers.

Five aspects of farmers relating to using of technologies: bio-security, feeding, medicine and vaccination, housing and infrastructure, and operational management were considered to have a comprehensive understanding of the focus variable. On the basis of available literature, consultation with livestock experts, 30 recommended technologies were finally selected for developing an appropriate scale to measure the variable. Each of the five aspects of broiler production constituted of six technologies. A respondent broiler farmer was asked to indicate his extent of use of each of the technology by checking any of the five options such as "very good", "good", "average", "below average" and "not at all" for a technology and weights were assigned to these response as 4, 3, 2, 1 and 0 ,respectively. Thus, the possible range of obtained scores for each technology could be 0 to 4. An overall technology use score obtained by a respondent was computed by summing his obtained scores for all 30 selected technologies. Similarly, five aspects of broiler farming were compared by the separate aspect wise scores obtained by adding one's scores recorded in all six items (technologies) under the concerned aspect. For comparison among the technology use scores for 30 individual items as well as five aspects, concerned scores were used. Therefore, range of respondent scores for 30 technologies could range from 0 to 120. In this case, 0 indicated no technology use and 120 indicated highest level of technology use.

A total number of 13 constraints items were considered to measure constraints faced by the smallholder farmers in broiler production. Each farmer was asked to indicate the extent of difficulty caused by each of the constraints by checking any of 4 responses such as 'high', 'medium', 'low', 'not at all' and weightage were as 3, 2, 1 and 0, respectively.

Descriptive statistical measures such as range, frequency, number, percentage, mean, standard deviation and rank order were used for describing the variables. Correlation coefficient (r) was used for testing the relationships between the concerned variables.

Results and Discussion

Overall technology use by the broiler farmers

The respondents overall technology use score could range from 0 to 120, where 0 indicating no technology use and 120 indicating highest level technology use. However, the observed technology use scores ranged from 32 to 104 with an average of 70.46 and standard deviation of 14.46. Based on their overall technology use scores, the respondents were classified into three categories as presented in Table 1.

Findings of Table 1 indicate that an overwhelming majority (74.39 percent) of the respondents had medium use of recommended technology for broiler production; while 19.5 percent had high level technology use and only 3.7 percent had low technology use in small scale broiler production.

Table 1 Distribution of the broiler farmers according to their extent of technology use

Categories	Range		Respondents (n=82)		Mean	Standard deviation
	Possible	Observed	Number	Percent		
Low use (up to 40)			3	3.70		
Medium use (41--80)	0-120	32-104	61	74.39	70.46	14.463
High use (81-120)			16	19.51		

The mean value (70.46) clearly indicates that the farmers' of the study area had medium level technology use in broiler production. It may be lack of technological knowledge of the smallholder broiler farmers. It means that there remains ample scope in the study area to increase production efficiency of broiler production by providing training to the farmers to make them efficient to use recommended technologies. Such a target could also be achieved by proper resource management of the smallholder broiler farmers.

Categorizations of the farmers based on of five aspects of broiler production

Data in Table 2 indicated that technology use was high regarding the aspect of housing and infrastructure as well as in feeding of broilers by their higher mean value. On the other hand, farmers seem to have relatively low attention on medicine and vaccination use on proper way and necessary operational management practices.

Table 2 Distribution of the respondents according to their extent of technology use across five aspects of broiler production

Aspects of broiler production	Categories and score range	Respondents (n=82) No	Percent	Mean	Standard deviation
Bio-security	Low use (0-8)	17	21.2	13.99	4.446
	Medium use (9-16)	46	56.1		
	High use (17-24)	26	31.7		
Feeding	Low use (0-8)	0	0.00	16.44	3.190
	Medium use (9-16)	41	50.0		
	High use (17-24)	41	50.0		
Medicine and Vaccination	Low use (0-8)	25	30.5	11.00	3.604
	Medium use (9-16)	54	65.1		
	High use (17-24)	3	4.40		
Housing and Infrastructure	Low use (0-8)	2	2.40	17.61	3.906
	Medium use (9-16)	25	30.5		
	High use (17-24)	55	67.1		
Operational management	Low use (0-8)	26	31.7	11.43	4.375
	Medium use (9-16)	49	59.8		
	High use (17-24)	7	8.50		

Comparison among the individual technology use

For having the better understanding of farmers' use of recommended technology in broiler production, it was necessary to have an idea about the extent of use of individual technology. Table 3 presents the data regarding use of individual technology in broiler production. Findings indicated that "using starter feed within 1-7 days" was top ranked as the smallholder broiler farmers' expressed with a mean value of 3.73. Feed is the vital indicator of the broiler production because broiler is the meat type birds, which convert feed to meat. So, good quality feed is very much important for high production of broiler. "Use of measuring temperature and relative humidity by using thermometer and hygrometer" was least ranked as indicated by the mean value of 0.54. Most of the farmers were not conscious about the modern technologies mainly because of lack of knowledge and understanding of importance of making appropriate level of technologies in broiler production.

Table 3 Rank order of 30 selected technologies under five aspects used by broiler farmers

Name of the recommended technologies	No. of responses by extent of use VG	G	A	BA	NAA	Mean	Rank order
Using starter feed within 1-7 days	68	10	2	0	2	3.73	1
Spacing of bird	66	10	4	0	2	3.68	2
Using grower feed within 8-21days	67	9	3		3	3.67	3
Use of BCRD vaccine	62	14	4	1	1	3.65	4
Use of sacs and non-polythene materials as curtain	56	15	7	3	1	3.49	5

Table 3 (Contd.)

Name of the recommended technologies	No. of responses by extent of use					Mean	Rank order
	VG	G	A	BA	NAA		
Use of drinker	63	6	3	4	6	3.41	6
Use of Gambaro vaccine	56	14	5	1	6	3.38	7
Avoid tin shed roofing system for overheating problem	41	23	9	8	1	3.16	8
East-west position of housing	31	34	13	2	2	3.11	9
Use of standard feed (Not handmade feed)	39	20	18	2	3	3.10	10
Maintaining buffer zone	11	41	24	5	1	2.68	11
Use of foot bath	11	36	31	4	0	2.66	12
Selection of high land for housing (free from water logging)	20	22	30	9	1	2.62	13
Maintaining proper interval between two batches (10-14 days)	22	27	13	17	3	2.59	14
Avoiding in the mass gathering place for housing	13	29	23	5	2	2.56	15
First feed for Day old chick (Vit-C, Glucose solution, Electrolyte)	15	21	37	6	3	2.481	16
Non-allowing of visitors	7	31	39	4	1	2.48	17
Proper maintenance of fumigation	26	12	19	17	8	2.38	18
Disposal of litter in pits	2	19	43	15	3	2.32	19
Storing feed in recommended condition (dry, clean, high place)	14	22	34	8	4	2.31	20
Disposal of dead birds by proper burying	7	13	27	32	3	1.87	21
Stopping use of additional antibiotic before 7 days of marketing	12	17	16	4	33	1.65	22
Use of drinker (1 drinker for 100 birds) and feeder (1 feeder for 60 birds)	63	6	3	4	6	1.41	23
Maintaining brooding temperature (1400 w for 500-700 chicks)	3	14	24	9	32	1.35	24
Using finisher feed after 22 days	12	6	6	8	50	1.05	25
Maintaining Standard lighting system ($5w/m^2$)	1	13	17	7	44	1.02	26
Consulting professional veterinarian for use of medicine (determining name and doses)	4	3	17	16	42	0.91	27
Consulting professional veterinarian for disease diagnosis	2	4	13	16	47	0.76	28
Use of ND (21st day) vaccine	4	5	8	7	58	0.66	29
Measuring temperature and relative humidity by using thermometer and hygrometer	2	5	9	3	63	0.54	30

Note: VG = Very good, G = Good, A = Average, BA = Below average, NAA = Not at all

Selected characteristics of smallholder broiler farmers

The salient findings of the selected characteristics of smallholder broiler farmers have been presented in Table 4.

Majority (58.55 percent) of smallholder broiler farmers were middle aged followed by 34.14 percent young, while only 7.31 percent were old aged category. The highest portion (54.9 percent) of the respondents had secondary level education, while 19.5

percent were illiterate and 18.3 percent had above secondary level educational qualification. Majority (52.43 percent) of the respondents fell into medium size household category followed by 24.4 percent of small and 23.17 percent of large households. Highest proportion of the respondents (56.09 percent) had medium experience, followed by 26.09 percent had high experience and 17.10 percent had lower experience in broiler production. The majority of the respondents (85.4 percent) had small farm, 13.41 percent had medium farm and 1.2 percent had large farm. Findings presented in the Table indicate that 78 percent operated broiler farming between 2-5 decimal areas. So the result indicates that the selected broiler farms fairly represented the smallholder farmers. Half of the respondents (50 percent) had medium knowledge, while the remaining 50 percent also had high knowledge. It means the smallholder broiler farmers had satisfactory level of knowledge on broiler production. Among the broiler farmers 20.7 percent of the farmers were less dependent on income from broiler farming followed by 52.43 percent medium dependent on broiler farming. Majority of the respondents (54.90 percent) had low extension media contact, while 41.50 percent had medium and 3.60 of percent had high media contact.

Relationships between the selected characteristics of the farmers and their use of recommended technologies in broiler production

In order to determine the relationships between the selected characteristics of the farmers and their use of recommended technologies in broiler production correlation analysis was conducted. The result of correlation analysis showed that among ten selected characteristics: educational qualification, broiler farm size, income from broiler production, knowledge on broiler production and extension media contract of the farmers had significant positive relationships with their extent of use of recommended technologies in broiler production. It could be concluded from observations that the more education of the farmers the more was their extent of use of recommended technologies in broiler production. Education enables people to have a comprehensive understanding of a production method and educated people easily perceive the importance of use of recommended technologies of a method. The larger the broiler farm size of the farmers, the more was their extent of use of recommended technologies in broiler production. As more area of broiler farming makes a farmer more sessions of investing high and receiving more profit from production, they are usually motivated to make high use of production technologies. Higher incomes from a farming enterprise encourage one to maximize profit from it, which in turn, motivates his technologies use towards perfection. Farmers' having enough knowledge of a practice makes him move motivational and sincere to use technologies at appropriate level. Therefore, a knowledgeable farmer can maximize his production benefit in broiler production by make proper utilization of resources for technology use. It was concluded from the

observation that farmers having higher exposure to extension media had higher use of recommended technologies in broiler production. A farmer can receive necessary technological information from different extension media that encourages his use of technology in the concerned farming practice.

Table 4 Salient features of the characteristics of the smallholder broiler farmers (n=82)

Characteristics	Scoring system	Observed range (Possible)	Category	Number	Percent	Mean	SD*
Age	years	20-60	Young (up to 30)	28	34.14	35.46	29.00
			Middle aged (31 to 50)	48	58.55		
			Old (>50)	6	7.31		
Educational qualification	Level of schooling	0-14	Illiterate (0)	16	19.5	7.82	4.35
			Primary Level(1-5)	6	7.3		
			Secondary level (6-10)	45	54.9		
			Above secondary level >10)	15	18.3		
Household size	Numbers	2-9	Small (up to 4)	20	24.4	5.56	1.64
			Medium (5-6)	43	52.43		
			Large (>6)	19	23.17		
Experience in broiler farming	Years	2-11	low (up to 3)	14	17.1	5.48	2.16
			Medium (4-6)	46	56.09		
			High(>7)	22	26.82		
Farm size	Hectare	0.008-3.030	Small (up to 0.99 ha)	70	85.4	0.53	0.56
			Medium (1.00-2.99 ha)	11	13.41		
			Large (>3.00 ha)	1	1.2		
Broiler farm size	Decimal	2-10	2-5 decimal	64	78	5.02	1.79
			6-8 decimal	15	18.29		
			>8 decimal	3	3.65		
Knowledge on broiler production	Score	4-29 (0-30)	Low(Up to 10)	0	0.00	20.96	4.16
			Medium (11-20)	41	50		
			High(>20)	41	50		
Annual income	Taka (in '000')	50.00-485.00	Low (up to 60)	1	1.20	193.13	80.28
			Medium (61-150)	29	35.36		
			High Medium (151-250)	39	47.56		
			High (>250)	13	15.85		
Income from broiler farming	Percent of total income (%)	16-100	Up to 25%	17	20.7	44.94	25.26
			26%-50%	43	52.43		
			51%-75%	8	9.75		
			>75%	14	17.07		
Extension media contact	Score	14-29 (0-39)	low (up to 13)	45	54.90	14.02	5.56
			Medium (14-26)	34	41.50		
			High (27-39)	3	3.60		

*SD=Standard Deviation

Table 5 Relationships between selected characteristics and focus variable

Focus variable	Selected Characteristics of the smallholder farmers	Correlation coefficient (r) (df=80)
Extent of use of recommended technologies in broiler production	Age	-0.152^{NS}
	Educational qualification	0.295**
	Household size	-0.065^{NS}
	Experience in broiler farming	0.088^{NS}
	Farm size	0.010^{NS}
	Broiler farm size(yard)	0.483**
	Annual income	0.183^{NS}
	Income from broiler	0.248*
	Knowledge on broiler production	0.570**
	Extension media contact	0.586**

* Significant at 0.05 level of probability, ** Significant at 0.01 level of probability and NS= Not significant

The remaining characteristics (age, household size, experience in broiler farming, farm size and annual income) of the respondents did not show any significant relationship with their use of recommended technologies in broiler production. Therefore, it may be concluded that these characteristics have no influence on use of recommended technologies by smallholder farmers in broiler production.

Smallholder Farmers' Constraints in Broiler Production: The respondents overall constraint facing scores in all 13 selected constraints could range from 0 to 39, where 0 indicating no constraints and 39 indicating high constraints faced by the smallholder boiler farmers. However, the observed constraints scores ranged from 17 to 35 with a mean of 27.32 and standard deviation of 4.05. Based on their overall constraints scores, the respondents were classified into three categories as presented in Table 6.

Table 6 Categorization of smallholder farmers according to their overall constraint in broiler production

Categories of farmers	Range		Respondents (n=82)		Mean	Standard deviation
	Possible	Observed	Number	Percent		
Low constraint (up to 13)			0	0.0		
Medium constraint (14-26)	0-39	17-35	33	40.2	27.32	4.05
High constraint (27-39)			49	59.8		

Findings of Table 6 indicated that majority (59.8 percent) of the smallholder farmers had high constraints while 40.2 percent had medium constraint in broiler production. None of the farmers belonged under low constraint category. The mean value (27.32) clearly indicates that in general the farmers faced high level constraints in smallholder broiler production. For having the better understanding on smallholder farmers'

constraints in broiler production, it was necessary to have an idea about the comparative constraint in all 13 selected constraint items. The concerned results have been presented in Table 7.

Table 7 Rank order of 13 selected constraints as faced by the farmers in broiler production

Name of the constraints	Number of responses (n = 82)				Mean	Rank order
	High (3)	Medium (2)	Low (1)	Not at all (0)		
Fluctuation of market price	61	19	2	0	2.72	1
High interest on credit	50	27	5	0	2.55	2
Occurrence of diseases	45	33	4	0	2.50	3
Lack of modern technological knowledge	47	26	9	0	2.46	4
Lack of capital	41	36	5	0	2.44	5
Unavailability of day old chick in proper time	40	33	7	2	2.35	6
Low profitability despite high investment	35	39	8	0	2.33	7
High temperature in Broiler flock	45	20	9	8	2.24	8
Vaccination problem	36	24	13	9	2.06	9
High price of feed and other inputs	30	24	13	15	1.84	10
Natural calamities/hazards	23	29	8	22	1.66	11
Security problem (theft and animosity)	15	8	11	38	1.12	12
Adulteration of feed	7	25	15	35	1.05	13

Findings of Table 7 indicated that "fluctuation of market price" was the top ranked constraint faced by the smallholder broiler farmers. Majority of the people are more or less poor. Many farmers complained that high prices of day old chick, feed, instruments etc. were huge problems in the way of expanding the broiler production. Among others, high interest on credit, disease outbreak, and lack of modern technological knowledge were the major constraints that are needed to be addressed by the concerned authority for a sustainable development of broiler production in Bangladesh.

Conclusions

Majority of the smallholder broiler farmers were found to have medium extent in use of recommended technologies. It might be concluded that there is ample scope to increase the level of use of recommended technologies by the smallholder broiler farmers. Technology use was higher in regards of infrastructure and housing and feeding, while relatively lower in medicine and operational management. It is concluded that farmers' awareness on importance of the other aspects are also to be improved to increase broiler production. The DLS and other extension service providers should undertake appropriate strategies like training, field days, result demonstration, group meeting, campaigning etc., so that they can easily get and make frequent exposure to receive technological information in all aspects of broiler

production. These strategies should be designed in such a way that helps to motivate the smallholder broiler farmers to use of recommended technologies in production of broiler. Educational qualification, knowledge on broiler production, income from broiler farming, broiler farm size and extension media contact had significant positive relationship with the focus variable. Therefore, it may be concluded that by promoting educational facilities, taking proper steps to increase farmers technological knowledge, increasing income from broiler farming, providing farmers credit or other facilities to build large broiler farm and giving need based and up to date extension service to the smallholder broiler farmers should be promoted to increase the use of recommended technologies. Majority of the farmers faced high constraints in broiler production. The DLS and other extension service providers should increase advisory support for the smallholders to decrease their information and awareness related problems .On the other hand, authorities should make necessary arrangement with other agencies to provide financial and other support for the smallholder broiler farmers.

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