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Investigation of biosecurity in commercial poultry farms of Dinajpur district

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ABSTRACT

This work was undertaken to investigate the biosecurity practiced on small scale commercial poultry farms of Dinajpur district from July-2018 to June-2019. A total of 70 poultry farms from different upazilla were considered for it. Four experimental designated data were collected directly with a pre tested questionnaire. As per the requirements of experimental objectives, the collected data on different variables were subjected to statistical analysis. The data revealed that different types of litter materials were used by individual farms. Among them use of rice husk was in highest value (54.28%; 38 farms). Only 2 farms (2.85%) used ash as their litter materials. Plastic was the most common materials used to prevent air passage in 41 farms (58.57%) whereas only 12 farms (17.14%) used the cloths or carpet. In case of dead bird disposal, 40 farms (57.14%) were habituated with throwing off whereas only 4.29% (3 farms) farms practiced burning of disposal. Disposal of litter materials in agricultural land was practiced by 13 farms (18.57%) whereas selling the used liter materials was practiced by 42 farms (60%). Veterinary service was taken in 40 farms which showed the highest value of frequency (57.14%) and lowest frequency (5.71%) was recorded in those farms where service was taken from Feed & Medicine dealers. In most of the farms (64.29% or 45 farms) workers did not take any formal or institutional training and maximum number of farms (78.57%) did not have knowledge on biosecurity. About 5-10% mortality rate was recorded in 54 farms (77.14%) and 10 % mortality rate was found in 7 farms. 5-10 days interval between batches was maintained in 25 farms (28.57%) whereas 6-30 days interval was maintained in 9 farms (8.57%). The study suggests that specific biosecurity program should be developed for individual poultry farm according to their particular need and situations with the cooperation of the decision makers and veterinarian to ensure the success of the farms.

INTRODUCTION

Poultry production in general is facing low capital base, inefficient management, disease and parasite, housing and marketing problems, etc. (Alabi *et al.*, 2000). Among these various types of problem several infectious diseases become a great thread for this industry. In order to have an effective disease prevention programme, good biosecurity should be a priority and should be practiced at all times. Application of standard biosecurity measures is vital in protecting poultry birds from any disease (Dorea *et al*., 2010). Biosecurity is the security from transmission of infectious diseases, parasites and pests (Zavala, 2011). Biosecurity has focus on maintaining or improving the health status of Poultry and preventing the introduction of new disease pathogens by assessing all possible risks to animal health (Fraser *et al*., 2010; Julien and Thomson, 2011). Biosecurity principles include simple procedures and practices which when applied to prevent entry of disease agents into a farm or to exit of the disease agent from infected premises. Some protocol includes controlling movement of stock, persons, equipment and products into the clean farm and out of infected premises; and finally it involves methods that enable farm to remain in a state of sustained cleanliness, referred to as sanitation (Philip, 2007).

Biosecurity level in commercial poultry production systems is minimal or in some cases non-existing and this may lead to the spread of multiple infections within and between farms (Permin, 1997). A serious risk of infection spread with using of untreated poultry manure as fertilizer

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(Cristalli and Capua, 2007). Water and feed sources recognized as a biosecurity hazard to poultry (Njue, 2009). The importance of biosecurity practices, there is little information available in the literature on the biosecurity status of poultry farms (Nespeca *et al*., 1997; East *et al*., 2007). Several papers have used multivariate analyses to classify these farms (Calavas *et al*., 1998; Solano *et al.*, 2000). Therefore, this study was undertaken to evaluate the basic bio-security status of commercial poultry farms in the country and to rank them according to the available bio-security measures. Therefore, a survey was conducted to evaluate the bio-security practiced in different commercial poultry farms in Dinajpur district in Bangladesh.

MATERIALS AND METHODS

The study was carried out in 70 small scale commercial poultry farms under different upazillas (Birol, Ghoraghat, Chirirbondor, Sadar and Birganj) of Dinajpur district from July-2018 to June 2019. Among these farms there were 31 Broilar farms,16 Layer farms and 23 Sonali Farms. The farms were selected on the basis of geographical location, number & types of birds reared and variation in management practiced.

Data were collected directly from the farms with a pre tested questionnaire. The questionnaire was enriched with researcher observation and divided into different parts with both standardized closed and semi-closed questions regarding to the fields: 1. Farm characterization (location of the farm, type of farm, capacity, bird species and presence of other animals), 2. Infrastructure (distance in between farms, presence of farm fences, footbath dips, sanitation station and housing secure against wild birds) 3. Farm management and hygiene (Storage of poultry feed, litter, management, workers, record keeping in separate area, sharing machinery, availability of biosecurity plan) 4. Poultry health practices (pest control, carcasses disposal option, veterinary consultation, disinfection in between cycle and vaccination) which can be attributed to the few categories “farm characterization”, “biosecurity practices” and “disease prevention measures”. Farmers in this area were engaged in many agricultural activities to sustain their livelihood as well as livestock production, cultivation of cash crop, food crop, fish culture etc.

After completion of primary data collection, the collected data were tabulated and analyzed according to the objectives of the study. Data on different variables were subjected to analysis of variance (ANOVA) in a Completely Randomized Design (CRD) (Steel and Torrie, 1980).

RESULT AND DISCUSSION

A total 70 farms were visited of which 18 farms (25.71%) at Birol upazilla, 13 farms (18.57%) at Ghoraghat upazilla, 22 farms (31.42%) at Chirirbondor, 10 farms (14.29%) at Sadar upazilla and 7 farms (10%) at Birganj upazilla of Dinajpur district. The number of birds reared in individual farms located at different upazilla in Dinajpur district is shown in table 1.

500-1000 birds were reared in 31 (44.3%) farms under Dinajpur district of which 10 (14.29%) farms in each Biral and Chirirbondor upazilla, 5 (7.14%) farms in Ghoraghat and 3 (4.29%) farms in each Sadar and Birganj upazilla.

1000-2000 birds were reared in 14 farms (20%) of which 4 farms (5.71%) in each Ghoraghat and Chirirbondor upazilla, 2 farms (2.86%) in each Biral, Sadar and Birganj upazilla.

2000-3000 birds were reared in 19 farms (27.14%) of which 7 farms (10.0%) in Chirirbondor upazilla, 4 (5.71%) farms in each Biral and Sadar upazilla, 3 (4.39%) farms in Ghoraghat and 1 farm (1.43%) in Birganj upazilla.

More than 3000 birds found in only 6 farms (8.57%) of which 2 farms (2.86%) in Birol upazilla, 1 farm in each Ghoraghat, Chirirbondor, Sadar and Birganj upazilla.

The litter (bedding) materials and the materials used to prevent air passage were considered housing management in this study. It was observed that rice husk used as litter materials in highest number of farms (38; 54.28%) followed by saw dust used in 30 farms (42.85%). Only 2 farms (2.85%) used ash as a litter material (Table 2). Plastic as a materials used to prevent air passage in highest number of farms (41; 58.57%) followed by

sacks at 17 farms (24.29%) and lower number of farms (17; 24.29%) used cloth/carpet as a materials to prevent air passage (Table 2). The observation of this study is in accordance with the study of Ngugi (1980) and Kantengwa (1988).

The waste management including disposal of waste materials (dead birds and disposal of litter) were recorded in this study. Highest number of farmers (40; 57.14%) thrown their dead birds in an open field. Burial as a disposal method was used by 18 farms (25.71%). 9 (12.86%) farms sold their dead birds for further use and only 3 (4.29%) farms practiced burning method of disposal (Table 3). Highest number of farms (42; 60%) sold their litter materials to local people for further use whereas 15 farms (21.43%) used for their own fish culture. 13 (18.57%) farms directly used their the liter materials for crop production in agricultural land. This observation supports the results found by Muduli *et al.*, 2019 and Salminen and Rintala, 2002.

Table 1: Number of birds in individual farms

Name of Upazilla	No. of Birds in individual farms							
	500-1000		>1000-2000		>2000-3000		>3000	
	No. of Farms	Percentages	No. of Farms	Percentages	No. of Farms	Percentages	No. of Farms	Percentages
Biral	10	14.29	2	2.86	4	5.71	2	2.86
Ghoraghat	5	7.14	4	5.71	3	4.29	1	1.43
Chirirbandar	10	14.29	4	5.71	7	10.0	1	1.43
Sadar	3	4.29	2	2.86	4	5.71	1	1.43
Birganj	3	4.29	2	2.86	1	1.43	1	1.43
Total	31	44.3	14	20.00	19	27.14	6	8.57

Table 2: Housing management

Litter Materials Used	Frequency of Farms	Percentage	P Value
Saw dust	30	42.85	
Rice husk	38	54.28	0.00**
Ash	02	2.85	
Materials used to prevent air passage			
Sacks	17	24.29	
Plastic	41		
Cloths/ Carpet	12	17.14	58.57

** indicates the statistical significant at 1% level

Table 3: Waste management

Disposal of Dead birds	Frequency of Farms	Percentage	P Value
Burial	18	25.71	
Burning	03	4.29	0.995 NS
Selling	9	12.86	
Throwing	40	57.14	
Disposal of Litter Materials			
Sell	42	60	
Fish Culture	15	21.43	0.05*
Agricultural Land	13	18.57	

NS indicates Non Significant, * indicates the statistical significant at 5% level

Table 4: Therapeutic management of farms

Therapeutic management of farms	Frequency No. of Farms	Percentage	P -Value
Veterinarian	40	57.14	0.084 (NS)
Self	17	24.29	
Feed & medicine Dealers	04	5.71	
Quack	9	12.86	

NS indicates Non Significant

The therapeutic management (treatment of sick birds) practiced in different poultry farms were presented in Table 4. The highest number of farms (40; 57.14%) were treated by veterinarian whereas in 17 (24.29%) farms farmers applied their own experience and knowledge. Feed and medicine dealer also provided treatment in 4 farms (05.71%). In 09 (12.86%) farms treatment are taken by quack (village doctors) at initial stage of illness in their poultry farms. These results agreed with Radwan *et al*. (2011) and Kantengwa (1988).

The knowledge about farm management including formal training, introduction of biosecurity term, presence of fencing, footbath and fumigation facilities were observed. Only 15 farms (21.42%) were familiar with the term biosecurity whereas 55 farms (78.57%) were not. Most of the farms 45(64.29%) personnel did not have formal or institutional training about farm management. Only 10 farms (14.29%) had 1 week training, 8 farms (11.43%) had 2 weeks training and 7 farms (10.0%) had 4 weeks of formal training. In most cases 53 (75.71%) footbath facilities was absent and presence of footbath facility was found in 17 farms (24.29%). Highest number of farms 51 (72.85%) had no fence around the poultry shed and 19 farms (27.14%) had fence around their poultry shed. Apparently all farms 69 (98.57%) did not practice fumigation inside the poultry shed except 1 farm (1.43%) practiced fumigation for destruction of pathogenic micro organism. The observations of this study were similar to Sarker *et al.*, 2009; Hossain and Ali, 2009.

Personal hygiene like use of face musk, change of clothing, washing hands before entrance and after work, use of separate footwear, perception of communicable diseases of working staffs was shown in table 6. In 61 (87.14%) farms the working staffs did not use face musk during farm operation except 9 farms (12.86%) where face musk were used. In 59 farms (84.29%) changing their regular cloth during farm operation was not observed; only 11 farms (15.71%) practiced it.. In 65 (92.85%) farms working staffs did not wash their hands before entrance to the poultry shed and in 5 (7.14%) farms they do it. Moreover after working the workers in 55(78.57%) farms did not use soap or other sanitizer during hand washing rather used only plain water. In 15 (21.42%) farms the workers used soap or sanitizer for washing their hands. In 62 (88.57%) farms the use of separate footwear inside the poultry farms was not practiced. Whereas 8 (11.42%) farms, they were used separate footwear during farm management. The knowledge on disease transmission from the bird to human was not known to 51(72.85%) farms but known to 19 (27.14%) farms. These results agreed with Aengwanich *et al.,* 2014 and Heft-Neal *et al.*, 2009.

The mortality rate of farms was also recorded (Table 7). Less than 5% mortality rate was found in 9 farms (12.86%) whereas 5-10% mortality rate was found in 54 farms (77.14%) More than 10 % mortality rate was found in 7 farms (10.0%). Similar results found in the work of John *et al*., 2018; Ajewolwe and Akinwunmi, 2014.

The Interval between batches was also recorded (Table 8). 0 to 5 days interval was found in 10 farms (11.43%), 5 to 10 days interval was found in 25 farms (28.57%), 10 to 15 days interval was found in 16 farms (17.14%), 16 to 30 days interval was found in 9 farms (8.57%) and no interval of days was found in 10 farms (12.85%). The results found in this study is in agreement with the findings of reports (Wijesinghe *et al*., 2017 and Siekkinen *et al*., 2012)

Table 5: Knowledge about farm management

Knowledge	Formal Training(Percentage)			Introduced with Biosecurity Term	Presence of Foot Bath	Fencing	Fumigation of Farm
	1 weeks	2 weeks	4 weeks				
Yes	10 (14.29)	8 (11.43)	7 (10)	15 (21.42)	17 (24.29)	19 (27.14)	1 (1.43)
No	45 (64.29)			55 (78.57)	53 (75.71)	51 (72.85)	69 (98.57)
P-value	0.031			0.00**	0.023*	0.023*	0.00**

*indicates the statistical significant at 5% level, ** indicates the statistical significant at 1% level

Table 6: Personal hygiene of working staffs

Parameters	Observation	Frequency Number	Percentage	P-Value
Face musk	Used	9	12.86	0.001*
	Not used	61	87.14	
Change of clothing	Yes	11	15.71	0.003*
	No	59	84.29	
Hand washing before entrance	Yes	05	7.14	0.00**
	No	65	92.85	
Hand washing after work	Use soap or sanitizer	15	21.42	0.003*
	No soap used	55	78.57	
Separate footwear	Used	8	11.42	0.00**
	Not used	62	88.57	
Disease could be transmit from birds to them	Yes	19	27.14	0.001*
	No	51	72.85	

*indicates the statistical significant at 5% level, ** indicates the statistical significant at 1% level

Table 7: Mortality rate of farm

Mortality rate of farms	Frequency	Percentages	P-value
< 5%	9	12.86	0.024*
5-10%	54	77.14	
> 10 %	7	10	

*indicates the statistical significant at 5% level

Table 8: Interval between batches

Interval between batches			
Days	No. of farms	Percentages	P Value
0 to 5	10	11.43	0.079(NS)
5 to 10	25	28.57	
10 to 15	16	17.14	
16 to 30	9	8.57	
No interval	10	12.86	

NS indicates Non Significant

CONCLUSION

Based on the findings it can be concluded that most of the poultry farmers of this area have not a good knowledge about basic biosecurity measures needed for their farms. No strict measures were taken to adopt biosecurity. The intensive sensitization of the poultry farmers by daylong workshop and seminars with field participation by appropriate authority can be beneficial for adopting strict biosecurity measures in their farms. However, maintaining strict biosecurity program in the farms should be monitored by government authority for scientific and sustainable poultry farming.

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