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## CHAPTER-1: INTRODUCTION

Bangladesh is a land of agriculture. Livestock and poultry sector are the most important part of our economy. In our country lots of dairy and poultry farms have been established for last one decade. Poultry are considered as important source of protein all over the world. In Bangladesh, poultry contributes a major share of animal protein. Here, although natural condition is favorable but poultry is mainly produced on back yard subsistence and scavenging method (Das *et al.*, 2008). More than 80% poultry products of our country contributed by rural or back yard farms (Shamsuddoha *et al.*, 2003).

Poultry birds are one of the most susceptible objects of various kinds of diseases. Being reared well housing, feeding, breeding, management, a total flock may die due to by attack open epidemic poultry disease causing heavy economic loss of the farmers. Diseases are transmitted to the poultry farms by various ways. So, it is highly important to prevent and control the poultry diseases by ensuring fruitful measures in order to prevent transmission of pathogens. Thus bio-security has become an integral part of any successful poultry production system that reduces the risk and consequences of introducing an infectious disease. Bio-security means the procedure that reduces the probability of disease out breaks by controlling potential introduction of pathogens. The components of bio-security include management and placement programs, farm lay out, decontamination, pest control and immunization, directly affect productivity and profitability.

Gilinsky (2006) stated that bio-security as it pertains to poultry farms is the protection of poultry flocks from any type of infectious agent, whether viral, bacterial, fungal, or parasitic in nature. Due to the number of birds confined in one place, and the speed at which many infectious agents travel through flocks, outbreaks may have catastrophic results for poultry growers and processors. Bio-security has three major components: 1) Isolation, 2) Traffic Control and 3) Sanitation.

Isolation refers to the confinement of animals within a controlled environment. Buildings or fences keep birds in, as well as keep other animals (including humans) out.

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Traffic Control includes inter-farm as well as intra-farm vehicle patterns. Sanitation is the disinfection of materials, people, and equipment entering the farm as well as on the farm. Normally bio-security means protecting of birds from the transmissible infectious micro-organisms like viruses, mycoplasma, bacteria and parasites but some people extent its' definition to include non-living threats such as mycotoxins.

Farm location should be away from other poultry & breeders should be sited at least 5 miles from any commercial farms (Halifa, 2008). In case of feed and water supply, the feed clean up spills so as to not attract wild birds or rodents & avoid using pond water, this can spread Avian influenza if the pond is used by infected waterfowl (East *et al.*, 2007).

Professional vaccination crews should have their own bio-security code, which should be examined by farmer prior to visit. It is essential that vaccination crews do not visit more than one farm on the same day & that all their equipment is sanitized before the next job (Arzey *et al.*, 2007).

In Bangladesh, there was no study was conducted about the biosecurity status in the broiler and layer farm in costal bed area specially at Kabirhat and Companigonj Upazilla in the Noakhali district. The correlation between the disease transmission and biosecurity not yet studied. The assessment might provide valuable information of current status of biosecurity and the areas need to be improved for optimum production and profits. For this reason the study was conducted in the Noakhali district with the following objectives:

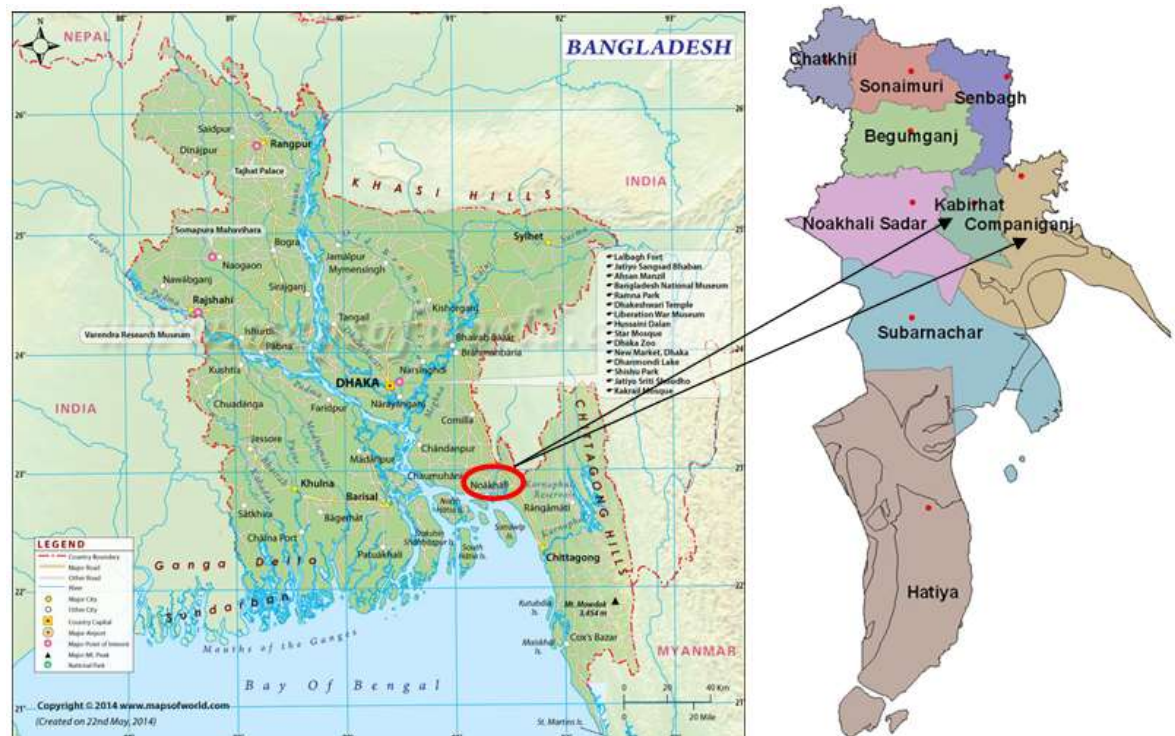
### **Objectives of the study**

Considering these facts, the present study was carried out to know the biosecurity status of some selected farms located in the Noakhali District of Bangladesh. The specific objectives of the study were:

- i. To know the present status of bio-security in broiler farms
- ii. To know the present status of bio-security in layer farms
- iii. To know the disease outbreak status of these selected farms

## CHAPTER-2: MATERIALS AND METHODS

**Study Area:** The study was carried out at the Kabirhat and Companigonj Upazilla, situated in the Noakhali District close to the Bay of Bengal and lying between latitudes 22°79'44" N to 22°82'93" N and between longitude 91° 92' 19E to 91° 98' 26E respectively.



**Fig. 1: A map of Noakhali District, Bangladesh, showing the study areas**

**Study period:** The study was conducted from 5<sup>th</sup> July to 31<sup>st</sup> July in 2017.

**Study Design and Study Population:** A cross sectional observation study was conducted to collect data on bio-security measures associated with poultry farms at Kabirhat and Companigonj Upazilla in Noakhali district. Hence, a total of 20 poultry

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farms found in and around Kabirhat and Companigonj upazilla were included in this study.

**Questionnaire preparation:** A questionnaire was prepared based on previous research reviews, practical experiences and technical support from expert personnel in the biosecurity field. The response questions in the questionnaire were closed ended.

**Data Collection:** Data were collected through direct observation and interviews made with farmers using a structured-questionnaire. Questions about existing bio-security measures such as location of the farm, distance from household, foot bath, poultry house disinfection, access of predators, rodents and wild bird, isolation, vaccination, entry system (humans and vehicles etc), water supply, pest control system, bird and manure disposal method etc. related to management practices were asked using different variables.

**Statistical Analysis:** All the collected data were imported in MS-excel 2007. The data were sorted and the extreme values were excluded from the research. Chi square test were done to compare the variables based on data from broiler and layer farms by using SPSS-16 version software.

## CHAPTER-3: RESULTS

**Table 1:** Location of the selected farms and distance of farm to the nearest farms

<b>For Broiler</b>			
<b>Variables</b>	<b>Frequency</b>	<b>Percentage</b>	<b>P value</b>
<b>Location of farm</b>			
Near main road	5	50	-
Far from main road	5	50	
<b>Distance to nearest farm</b>			
Less than 500 m	5	50	-
More than 500 m	5	50	
<b>For Layer</b>			
<b>Variables</b>	<b>Frequency</b>	<b>Percentage</b>	<b>P value</b>
<b>Location of farm</b>			
Near main road	6	60	0.37
Far from main road	4	40	
<b>Distance to nearest farm</b>			
Less than 500 m	6	60	0.37
More than 500 m	4	40	

Results showed that 50% farms were far from the main road and 50% have distances less than 500 m to the nearest farms in case of broiler and 40% farms were near main road and 60% have distances less than 500 m to the nearest farms in case of layer (Table 1).

**Table 2:** Traffic control measures in the poultry farms

<b>For Broiler</b>			
<b>Variables</b>	<b>Frequency</b>	<b>Percentage</b>	<b>P Value</b>
<b>Access to predators and rodents</b>			
Yes	5	50	-
No	5	50	
<b>Contact with village chicken and wild birds</b>			
Yes	5	50	-
No	5	50	
<b>Presence of fence</b>			
Yes	3	30	0.07
No	7	70	
<b>Open for authorized visitors</b>			
Yes	8	80	0.007
No	2	20	
<b>Provide visitors with protective clothing and boots</b>			
Yes	0	0	-
No	10	100	
<b>For Layer</b>			
<b>Variables</b>	<b>Frequency</b>	<b>Percentage</b>	<b>P Value</b>
<b>Access to predators and rodents</b>			
Yes	4	40	0.37
No	6	60	
<b>Contact with village chicken and wild birds</b>			
Yes	3	30	0.07
No	7	70	
<b>Presence of fence</b>			
Yes	8	80	0.007
No	2	20	
<b>Open for authorized visitors</b>			

Yes	2	20	0.007
No	8	80	
<b>Provide visitors with protective clothing and boots</b>			
Yes	0	0	-
No	10	100	

With regard to traffic control practice half of broiler farms (50%) and majority of layer farms (60%) have no access for predators and rodents. Likewise, 50% of the broiler farms and 70% of the layer farms prevent contact with village chickens and wild birds. Results from the study showed that 70% of broiler farms did not have a fence but in layer farms 80% had fence. However, 80% of the broiler farms are open for authorized visitors but in layer farms it is only 20% for authorized visitors. In both broiler and layer farms visitors are allowed without providing protective clothing and boots (Table 2).

**Table 3:** Level of biosecurity between the farm gate and the shed

<b>For Broiler</b>			
<b>Variables</b>	<b>Frequency</b>	<b>Percentage</b>	<b>P value</b>
<b>Pest control</b>			
As routine	7	70	0.07
After out break	3	30	
<b>Litter and manure disposal</b>			
Burning	0	0	-
Use as fertilizer	0	0	
Accumulate at back yard	5	50	-
Sale	5	50	
<b>For Layer</b>			
<b>Variables</b>	<b>Frequency</b>	<b>Percentage</b>	<b>P value</b>
<b>Pest control</b>			
As routine	10	100	-
After out break	0	0	

<b>Litter and manure disposal</b>			
Burning	0	0	<0.001
Use as fertilizer	0	0	
Accumulate at back yard	1	10	-
Sale	9	90	

The results showed that the pest control was done as a routine in 70% broiler farms and in all (100%) layer farms. 50% broiler farms and 10% layer farms accumulate litter and manure in back yard. Other 50% broiler and 90% layer farms sale litter and manure (Table 3).

**Table 4:** Sanitation practice at the shed

<b>For Broiler</b>			
<b>Variables</b>	<b>Frequency</b>	<b>Percentage</b>	<b>P value</b>
<b>Use of foot bath</b>			
Yes	0	0	-
No	10	100	
<b>House disinfection before starting new batch</b>			
Yes	10	100	-
No	0	0	
<b>Dead bird disposal method</b>			
Throwing	10	100	-
Others	0	0	
<b>For Layer</b>			
<b>Variables</b>	<b>Frequency</b>	<b>Percentage</b>	<b>P value</b>
<b>Use of foot bath</b>			
Yes	10	100	-
No	0	0	
<b>House disinfection before starting new batch</b>			



Yes	10	100	-
No	0	0	
<b>Dead bird disposal method</b>			
Burial	10	100	-
Others	0	0	

Regarding sanitation practice none (0%) of the broiler farms were applying foot bath but in layer farms all (100%) were applied footbath at the door of entrance. Both broiler and layer farms, hundred percent of the farms disinfect the poultry houses before starting new batch. All of the farms (100%) dispose dead birds by throwing and burial in broiler and layer farms respectively (Table 4).

**Table 5:** Isolation practice in the poultry farms

<b>For Broiler</b>				
<b>Variables</b>	<b>Categories</b>	<b>Frequency</b>	<b>Percentage</b>	<b>P Value</b>
All in all out practice	Yes	10	100	-
	No	0	0	
Keeping of different age groups together	Yes	0	0	-
	No	10	100	
Isolation pen for diseased chicken	Yes	10	100	-
	No	0	0	
<b>For Layer</b>				
<b>Variables</b>	<b>Categories</b>	<b>Frequency</b>	<b>Percentage</b>	<b>P Value</b>
All in all out practice	Yes	10	100	-
	No	0	0	
Keeping of different age groups together	Yes	0	0	-
	No	10	100	
Isolation pen for diseased chicken	Yes	10	100	-
	No	0	0	

100% of both broiler and layer farms practiced all in all out system. Both all (100%) of the broiler and layer farms separated sick birds from healthy birds. 100% both broiler and layer farms did not keep different age groups together and they had isolation pen for diseased chicken (Table 5).

**Table 6:** Water sanitation and water system cleaning

<b>For Broiler</b>			
<b>Variables</b>	<b>Frequency</b>	<b>Percentage</b>	<b>P Value</b>
<b>Source of drinking water</b>			
Tube well	10	100	-
Others	0	0	
<b>Cleaning of water system (Waterer)</b>			
Weekly	2	20	0.007
More than one week	8	80	
<b>For Layer</b>			
<b>Variables</b>	<b>Frequency</b>	<b>Percentage</b>	<b>P Value</b>
<b>Source of drinking water</b>			
Tube well	10	100	-
Others	0	0	
<b>Cleaning of water system (Waterer)</b>			
Weekly	8	80	<0.001
More than one week	1	10	
2 week	1	10	

The result showed that all (100%) farms use tube well water. In broiler farms 80% were cleaning the waterer more than one week but in layer farms 80% were cleaning the waterer weekly (Table 6).

**Table 7:** Previous 2 years disease history

<b>For Broiler</b>			
<b>Variables</b>	<b>Frequency</b>	<b>Percentage</b>	<b>P value</b>
Previous 2 years disease history			
ND	4	40	-
ND, Gumboro	1	10	-
ND, Gumboro, AI	3	30	-
None	2	20	-
<b>For Layer</b>			
<b>Variables</b>	<b>Frequency</b>	<b>Percentage</b>	<b>P value</b>
Previous 2 years disease history			
ND	1	10	<0.001
Gumboro	1	10	
None	8	80	

From two years disease history, broiler farms were affected with ND (40%); ND & Gumboro (10%); and ND, Gumboro & AI (30%). Layer farms were affected with only ND(10%) and Gumboro (10%) (Table 7).

**Table 8:** Disease preventive measures in the poultry farms

<b>For Broiler</b>				
<b>Variables</b>		<b>Frequency</b>	<b>Percent</b>	<b>P Value</b>
Vaccination history	Yes	10	100	-
	No	0	0	
Type of vaccination	ND, Gumboro, IB	10	100	-
	Others	0	0	
Use of prophylactic antibiotics	Yes	6	60	0.37
	No	4	40	

<b>For Layer</b>				
<b>Variables</b>		<b>Frequency</b>	<b>Percent</b>	<b>P Value</b>
Vaccination history	Yes	10	100	-
	No	0	0	
Type of vaccination	All	10	100	-
	Others	0	0	
Use of prophylactic antibiotics	Yes	10	100	-
	No	0	0	

Farm owners and farm attendants were further asked for any prevention methods apart from the three bio-security measures if they used to practice. As a result, 100% of the farms were use vaccine for prevention of ND, Gumboro and IB in broiler farms and almost all vaccine were used in layer farms. On the other side 60% of the broiler farms and all (100%) of the layer farms use prophylactic antibiotics for prevention of bacterial diseases (Table 8).

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## CHAPTER 4: DISCUSSION

The present study has been conducted in Noakhali district targeting the two selected upazilla of Noakhali district viz. Kabirhat and Companigonj intended to examine biosecurity practice on broiler and layer farms. The results showed that 30% broiler and 80% layer farms had a secure boundary fence that is able to stop people and animals entering the farm, all farms (100%) practiced all in all out system and 100% layer farms used disinfectants in footbath which is coincide with Etih *et al.* (2010) who reported similar observation. According to Stephen (2012), there was no set distance that will uniformly eliminate the risk of disease transfer. During this study, it was found that the distance to the nearest farm was more than 500 m only in about 50% broiler farms and 40% of the layer farms.

In the traffic control investigation, out of 20 study farms 50% broiler and 60% layer farms were free from predators and rodents. Similarly, 50% broiler and 70% layer farms were prevent contact of chicken with other village chicken and wild birds. This finding indicates that most of the farms were secured from disease transmission by animal and equipments which are capable of bringing pathogens to poultry farms (Optiz, 1995). Moreover, 80% broiler and 20% layer farms were allow visitors to the poultry farm which is dangerous as Sharma (2010) remark people that come into poultry house can mechanically introduce many potentially devastating diseases.

In sanitation practice assessment, the study revealed that the layer farms in 100% of them there were a foot bath at the farm entrance which was higher than the findings of Ambarawati *et al.* (2011) only a small number of respondents set up a footbath at the farm entrance (37% from broiler farms and 18% from the layer farms). Regarding cleaning and disinfection practice of poultry house and equipments 100% of the farms were practice this process which is encouraging. According to Shane (1995) effective cleaning and disinfecting methods can substantially decrease disease transmission by reducing pathogen in the environment below infection level. Similarly, Shanna (2010) stated that clean poultry farm will reduce foul to neighbors and disease spread.

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During assessing the isolation practices of the poultry farms the study revealed that 100% of the farms were practicing all in all out practice. This result indicates that most of the farms were not at risk for some pathogens contradict with Hofcare and Rosales (1995) some disease agents that do not survive outside of chickens such as Mycoplasma, Avian influenza virus, Infectious coryza and infectious Laryngotracheitis virus.

Moreover, from the included study poultry farms none (0%) of them kept different age groups of chicken together which according to Sainsbury (2000) idea which stated that different age groups shall be placed separately to minimize the risk of disease spread.

Regarding, dead bird disposal all layer farms rather than broiler farms agree with Dekich (1995) by disposing dead birds promptly by burning and burying. However, broiler farmers threw dead birds near the farm in the open space that results foul smelling to neighbors and disease spread.

In reference to isolation of sick birds, 100% of farmers separated sick birds from health birds and all of respondents used burring for disposable of dead birds. Sudarnika *et al.* (2011) found that 24 farmers (96%) separated sick birds from healthy birds and burned or buried them for disposable.

Besides, this study also assessed about other disease preventive measures of the study poultry farms. As the finding of this study indicated that 100% of the farms practice vaccination for different disease prevention practice which is in agreement with the finding of Birhanu (2010).

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## PHOTO GALLERY







**Fig 2: Collection of data from poultry farms**



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## **CHAPTER 5: LIMITATIONS**

- The number of farms was too small.
- The duration of the study was too short to collect data.
- Financial insufficiency.

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## **CHAPTER 6: CONCLUSIONS**

The present study revealed that bio-security practice in poultry farms in the selected areas of Noakhali was encouraging. However, lacking were observed in - all in all out practice, quarantine of new comer birds and disease birds, restriction movement of attendant in the farms, dead bird disposal way, visitors management in to the farms and meeting the required open period after application of chemical. Hence, awareness should be created among the farm owners and farm attendants on bio-security measures practices through training and extension programs.

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**The Author**

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## **BIOGRAPHY**

I am Jewel Chandra Bhowmik passed Secondary School Certificate (SSC) examination from Oter Hat High School, Noakhali, Chittagong in 2009 and then Higher Secondary Certificate (HSC) examination from Government Science College, Dhaka in 2011. I enrolled my internship program for Doctors of Veterinary Medicine (DVM) Degree in Chittagong Veterinary and Animal Sciences University (CVASU), Bangladesh. The desire of my life is to construct a world where human and animal will live happily together in the nature. So I am proud of my journey through CVASU to prostrate my desire of being a veterinarian. I have interests in molecular biology, physiology and medicine. I want to work on anthelmintic resistance of livestock in Bangladesh. I like reading books and travelling. I hope the journey of my life will be more longer will all of my interests.