

Chapter 1: Introduction

Poultry industry plays a crucial role in economic growth and simultaneously creates numerous employment opportunities in Bangladesh (Das SC *et al.*, 2008). According to Banglapedia (2015) the total chicken population is now 118.7 million in Bangladesh and poultry meat contributes approximately 37% of total animal protein supplied in the country (Rahman, 1998). Among poultry, broiler rearing attributed its popularity to the farmers for its short life span and comparatively low capital investment (Raha, 2007). Broiler farming has also been playing a key role in providing meat containing high quality proteins and micronutrients, which has a tremendous impacts on health and nutrition of poor people in rural areas (Neumann *et al.*, 2002;(Barroetoa, 2007). Cox's bazar is the south-east part of Bangladesh with different geo-climatic condition from other parts of the country A number of small scale commercial broiler farms are available here. But poultry diseases are major constraints for these farms and Newcastle disease is one of the major important viral diseases of poultry birds which have caused huge economic losses to farmers in recent past. ND is caused by a paramyxovirus which is the member of the family paramyxoviridae in the genus Avulavirus. Newcastle Disease Virus has been designated avian paramyxovirus-1(APMV-1). Newcastle disease viruses (NDV's) have three pathotypes: lentogenic, mesogenic, and velogenic. In the context of Bangladesh, ND of poultry is caused mostly by velogenic strains of NDV rather than mesogenic or lentogenic (Samad, 2005)). The rate of mortality in young and adult chickens due to very virulent (vvNDV) varies from 80-100% respectively (Eisa *et al.*, 1984). The transmission of NDV occurs through newly introduced birds, selling or giving away sick birds, exposure to fecal and other excretions from infected birds and contact with contaminated feed, water, equipment, and clothing (Tu *et al.*, 1998). NDV affects the respiratory, nervous, and digestive systems. Symptoms are very variable depending on the strain of virus, species of bird, concurrent disease and preexisting immunity. The incubation period for the disease ranges from 2 to 15 days. An infected bird may exhibit the signs of respiratory problems including sneezing, gasping for air, nasal discharge, coughing, greenish, watery diarrhea, depression, muscular tremors, drooping wings, twisting of head and neck, circling, complete paralysis and swelling of the tissues around the eyes and in the neck. NDV is so virulent that many birds die without showing any clinical signs.

The prevalence of disease in a particular area depends on various factor like, geo-climatic-condition, management, biosecurity, husbandry practices, immunization, social awareness etc. So to establish a commercial broiler farm the incidence of the disease should be considered for prevention and control of that disease.

After consideration the above mentioned criteria the present study was undertaken with the following objectives:

- ❖ To estimate the prevalence of ND in the small-scale commercial broiler farms in Ramu upazila, Cox's Bazar.
- ❖ To assess various factors like age, vaccination, location of the farm, entry of wild birds and native chickens into the farm premises, bio-security measures that may influence the occurrence of ND and transmission of infectious agents.

Chapter 2: Materials and Methods

2.1 Study design, study area and study period

This cross sectional study was conducted in Ramu Upazilla, Cox's Bazar over a period from 1st March to 16th April 2017. There were 11 union parishad in Ramu among the 11 union parishad, four unions like Eidghor, Gorjania, Chakmarkul, Fatekharkul had no broiler farms, and therefore, these farms were excluded from the study. The target population was the all broiler farms present in the rest seven union parishad and the farms less than three thousand broiler birds were selected as study population. Two stages cluster sampling was operated.

2.2 Data collection

A well-organized questionnaire was administered to gather information regarding previous encounter of any infectious diseases, and treatment ,vaccination status, time of last vaccine, mortality rate in the flock, educational status of farmer, bio-security measures, hygienic management of farms, entry of wild birds and native poultry in the farm premises, feeding system and carcass disposal system, hygienic status of vaccine gun and man who administers vaccine to birds. This informations were taken by a face to face cross questioning to the farm owners for the support of the diagnosis and the study.

2.4 Clinical diagnosis

2.4.1 Clinical signs

The cases of ND were considered at this study when the broiler birds of the affected case farms were registered with the followings criteria.....

- ❖ Marked dyspnea,gasping,coughing
- ❖ Sticky ocular and nasal discharge
- ❖ Violent diarrhea(yellowish white or greenish white in color)
- ❖ CNS involvement such as tremors, twisting of the head and neck,circling,paralysis

2.4.2 Post-mortem lesions

- ❖ Inflammation of the trachea and air sac
- ❖ Pin point hemorrhage in the tip of the gland of proventriculus
- ❖ Hemorrhage in the mucosal junction between proventriculus and esophagus
- ❖ Hemorrhagic or necrotic focus lesion in the mucosa of the intestine
- ❖ Hemorrhage present in caecal tonsils

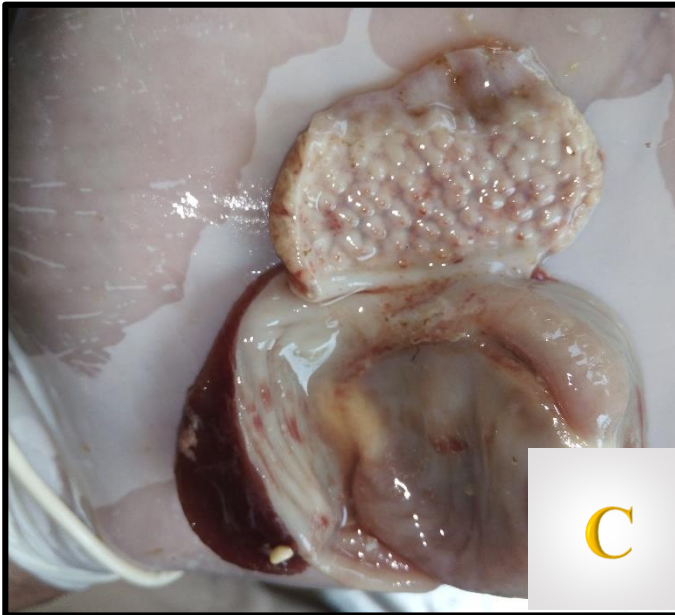
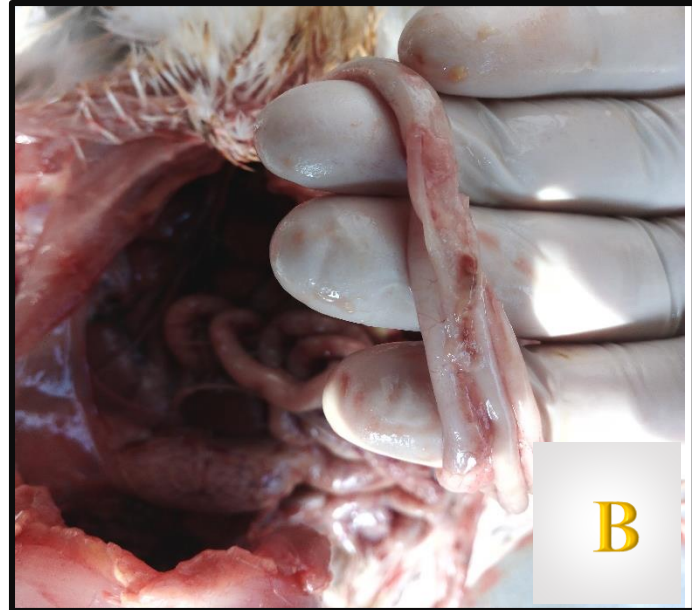


Figure 2.1: (A) Hemorrhage at proventriculus. (B) Hemorrhage at caecal tonsil. (C) Pin point hemorrhage in the tip of the gland of proventriculus. (D) Necrotic focus lesion in the mucosa of the intestine

Chapter 3: Results

Data was analyzed by STATA 13 MSI. Age of the bird, vaccination status, bio-security measures and provision of wild birds and native chickens and ducks were considered as the variables to see the association with the disease prevalence. Among the total tested sample 66.66% (n=60) were found positive. The prevalence of ND was higher at 20-35 days followed by 57.14% at 0 – 9 days, 47.62% at 10 – 19 days ($P < 0.05$), (Table 1). Moreover, the prevalence of ND was 53.48% in vaccinated farms compared to 100% in non-vaccinated broiler farms, as well as the farms with the provision of provision of wild birds and native chickens had higher prevalence (97.44%) than and prevalence in the farms without entry of wild birds and native chickens (9.52%) (Table 1). Similarly, 20% prevalence was found in moderate bio-secured farms whereas 100% prevalence was found in poor bio-secured farms (Table1). The highest ND positive cases was ascertained Joarianala union during the period of study (Figure: 3.1).

Table 3.1: prevalence of Newcastle disease

| Variable | Category | Number | Prevalence % (No of positive) | χ^2 - value | P- value |
|---|--------------|--------|----------------------------------|---------------------|----------|
| Age | 0 – 9 Days | 7 | 57.14%(4) | 6.7768 | 0.034 |
| | 10 – 19 Days | 21 | 47.62%(10) | | |
| | 20 – 35 Days | 32 | 81.25%(26) | | |
| Vaccination | Yes | 43 | 53.48% (23) | 11.8605 | 0.001 |
| | No | 17 | 100%(17) | | |
| Provision of wild birds, native chickens and ducks in farms | Yes | 39 | 97.44%(38) | 47.4725 | 0.001 |
| | No | 21 | 9.52%(2) | | |
| Status of bio-security | Poor | 35 | 100%(35) | 42.0000 | 0.001 |
| | Moderate | 25 | 20%(5) | | |
| Total | | 60 | 40 | | |

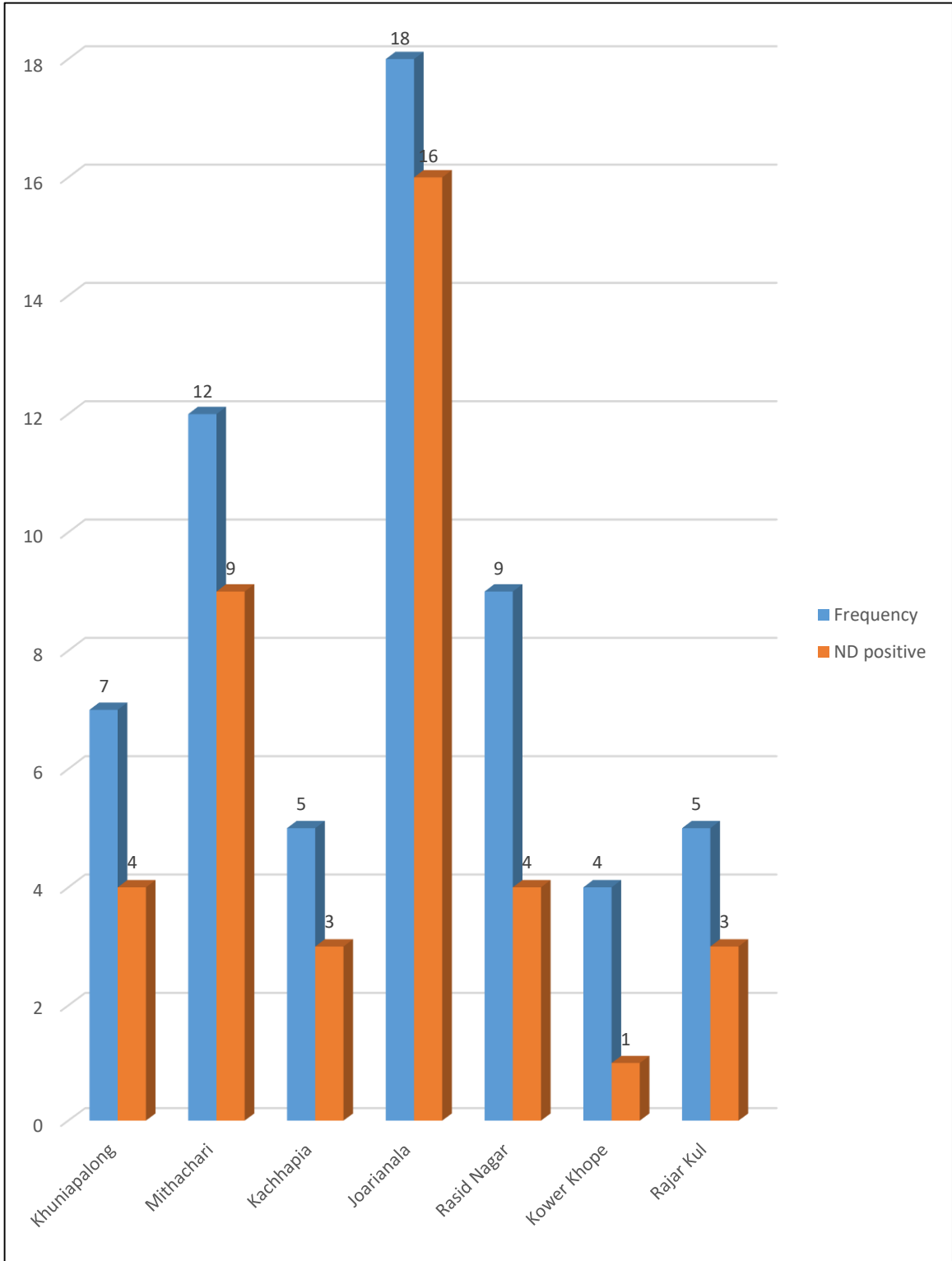


Figure 3.1: Frequency distribution of ND in Ramu Upazilla.

Chapter 4: Discussion

In this study various risk factors such as age of the bird, vaccination, status of bio-security and provision of wild birds and native chickens were examined to see their relationship with the prevalence of ND in broiler chickens. It was noticed that the age of the bird has significant relation with the occurrence of ND (P value ≤ 0.05) (Table 3.1) and the prevalence was higher (81.25%) at 20 – 35 days of age compared to other age group. Similar results were also observed by (Ezeokoli *et al.*, 1984). This higher prevalence in comparative older birds could be related with the fact that the longer life span of birds enhanced incidence of outbreak in broiler farms providing the opportunity for the birds, farm personnel and equipments to come in contact with the contaminated materials. Moreover, it provides a concept that ND may take place at any ages depending on level of antibody produced against ND virus owing to various risk factors. Vaccination generates active immunity in the body. The P value in case of vaccination was less than 0.05 (Table 3.1) which indicates presence or missing of vaccination on due date is related with the occurrence of ND more significantly. Birds are kept in poor biosecurity conditions in Bangladesh are much more susceptible to ND. In case of entry of wild birds and native chickens and ducks, P value was (<0.05) (Table 1). It notifies entry of wild birds and native chickens and ducks has significant relation with the occurrence of ND. Almost 97.44% prevalence was found in case of those farms with entry of wild birds and native chickens and ducks. Entry of wild birds and native chickens and ducks may facilitate the spread of ND from one farm to another (Miguel *et al.*, 2013). The highest percentage of prevalence of ND was 100% found in poorly bio-secured farms which is statistically significant because of P value is (<0.05). On the other hand, the highest number of poor bio-secured farms was recorded at Joarianala Union. That is why, sixteenth ND positive case was recorded in Joarianala Union (Figure 3.1). Prevalence of NDV at different small scale commercial broiler farms in Ramu upazila are showing in Table 1 where total 60 farms visited in this upazila. The prevalence of ND at Ramu was 66.66% which were dissimilar with the findings of (El-Yuguda *et al.*, 2007) who stated 46% prevalence in Borno state of Nigeria, (Njagi *et al.*, 2010) stated 17.8% prevalence in hot dry zone and 9.9% in cool wet zone. This variation of prevalence may be due to variation in geographical location, seasonal variation, species variation, managemental error and so on. In my study the ND was observed with clinical signs

like sneezing, coughing, nasal discharge, laboured breathing, and torticollis which correspond with the findings of (Okoye *et al.*, 2000). Greenish diarrhoea was also similar with the findings of (McFerran *et al.*, 1988). Others signs like paralysis of legs, neck and wing which correspond with the findings of (Ressang *et al.*, 1961). Most common gross lesions that were found in different organs during postmortem examination showed in (Figure 2.1). In this observation, the gross pathological lesions were slight to severe hemorrhages in the proventriculus, hemorrhage in caecal tonsils. These findings support with the observation of (Mishra *et al.*, 2000) and (Okoye *et al.*, 2000) who reported that typical lesions are proventricular hemorrhage, most commonly seen in the surface near the junction with the ventriculus and in the caecal tonsils and hemorrhages in the intestine, which supports with the finding of others (Kumer *et al.*, 2016). (Kianizadeh *et al.*, 2002) who reported that hemorrhagic lesions associated with necrosis are found in the intestinal wall.

Limitations

The study has following constraints –

- ❖ The ND virus was not confirmed by molecular technique like by polymerized chain reaction (PCR).
- ❖ Level of antibody produced against NDV by hemagglutination (HA) test and hemagglutination inhibition (HI) test was not performed.
- ❖ Data on how many broiler farms are affected by previously occurred ND was not found in yearly reports of UVH, Ramu.

Chapter 5: Conclusion

From the above findings, it may be concluded that ND is a serious problem at poultry farm at Ramu. The unions like Joarianala, Mithachari are identified as the most enzootic area via the study at Ramu. Vaccination, biosecurity program and provision of wild birds, native chickens, ducks and crows in the farm premises act as an exciting factor on the occurrence of ND. It is possible to control ND under routine vaccination and preventive measure which is prime essential for substantial improvement in poultry production. For understanding of ecology and epidemiology of ND in these areas further improved data collection and analysis can be performed.

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Acknowledgements

All praises goes to the Almighty Allah who has given me the scope for the accomplishment of the report successfully. The author would like to thanks to the Director of External affairs, Professor Dr. AKM Shaifuddin, Dept. of Physiology, Biochemistry and Pharmacology, Chittagong Veterinary and Animal Sciences University for his suggestion. The author would like to thanks his reverend and beloved teacher and supervisor, Professor Dr. Tania Ferdushy Dept. of Pathology and Parasitology , Chittagong Veterinary and Animal Sciences University for her valuable advice, suggestions and kind co-operation during the study period. The author also avouches the gratitude of Dr. Rupen Chakma, ULO of Upazila Veterinary Hospital, Ramu for his congenial contribution to the completion of the report. Finally the author extended his appreciation to his parents, all farm owners and all well-wishers.

The Author

Biography

This is M.A.Kaium, son of Abdus Salam Azad and Umme Hane. I am the dweller of Cox's Bazar. I completed S.S.C in 2008 and H.S.C in 2010. I got admitted in Doctor of Veterinary Medicine course under Chittagong Veterinary and Animal Sciences University in 2011- 2012 session. During internship program, I got the opportunity to make a clinical report on the prevalence of Newcastle Disease under supervision of Professor Dr. Tania Ferdushy, Dept. of Pathology and Parasitology . I am enthusiastic to be a researcher on epidemiology and want to be a skilled poultry practitioner in future.

