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Pathological investigation of diseases in Sonali cross bred at Joypurhat district, Bangladesh

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ABSTRACT

An experiment on pathological investigation of diseases with emphasis on infectious bursal disease in Sonali cross bred at joypurhat district of Bangladesh was carried out from January, 2013 to June, 2013. A total of 294 dead birds were collected from different Sonali farms and history, clinical signs, characteristic gross morbid lesions and histopathological study were done. The highest proportional incidence of the disease in Sonali was recorded (25.51%) for infectious bursal disease (IBD) followed by Coccidiosis (21.09%), Newcastle Disease (19.39%), Colibacillosis (15.31%), Salmonellosis (8.5%), Fowl pox (5.10%), miscellaneous disease conditions (2.04%), Deficiency Disorders (1.36%), Aspergillosis (1.02%) and Aflatoxicosis (0.68%). The findings indicate that infectious bursal disease (IBD) was the major disease problem in Sonali farming at Joypurhat.
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INTRODUCTION

Sonali breed is a F1 cross breed which had been produced from the cross of Road Island Red (RIR♂) cocks and Fayoumi hens♀. It has specially been advocated in terms of their higher production rate and better adaptability in rural situation (Ahmed, 1997). Pure line of RIR cocks and Fayoumi hens has been used for the production of hatchable eggs to be used by broody hens. Body plumage is yellowish red (locally called Sonali, hence the name of the breed). Legs and ear-combs are yellowish. Sonali females produce about 180 eggs per year (Ali, 1981). By definition, a key rearer is a beneficiary who rears at least five Sonali and some Deshi (indigenous and non-descriptive) chickens in their homesteads under a semi-scavenging system (Fattah, 1999). The Sonali have better production records (50–60% hen-day egg production with feed-conversion efficiency of 4.3% and lower age for increase egg production with 50% in production by 179 days) and higher disease resistance compared to Rhode Island Red and Fayoumi breeds (Haque et al., 1999; Miah et al., 2002).

Sonali chicken is suitable for rearing at village levels because of its low cost, small size, suitability for rearing under Bangladesh environment particularly in rural areas. So the farming with this cross-bred chicken by the smallholder village poultry farmers in Bangladesh may ensure sustainable poultry production in the country as well as to improve the economic and nutritional status of the people. In Bangladesh, 89% of rural household's rear backyard poultry and many households keep chickens and ducks on the same premise. In absence of appropriate fences or other barriers, backyard chickens roam freely from one house to another. Backyard chickens are

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reared in such free-range systems, they are more vulnerable to the HPAI (H5N1) virus infection and if they become infected, they can transmit the virus to domestic ducks, in which the virus can perpetuate and infect more backyard chickens (Ahmed, 1997).

The common diseases are found to be Salmonellosis, Mycopplamosis, Newcastle disease, Gumboro, Coccidiosis, Colibacillosis, Gangrenous dermatitis, Ascitis and Omphalitis at the time of chicks rearing period (Saleque, 2003). The common predators for the chicks are crows, fox, wildcat, mongoose, kite, rat, domestic cat, etc. (Saleque et al., 1996).

The name “Gumboro” disease was initially given to the condition because it was first recognize on the farm in the Gumboro district of Delawre, USA in 1962. Initially the IBD was confused with a variant form of infectious bronchitis virus (IBV) accompanied by nephrosis (Winter and Hitchner, 1962; Cosgrove, 1962). Gumboro is the highly infectious disease of poultry causing highest mortality per year by destroying immune system despite vaccination in Bangladesh. The prevalence of the disease was found in both private and government sectors. Both in vaccinated and non-vaccinated farms the IBD outbreaks in several areas in Bangladesh are found. It is true that the farmers are not properly aware about the AIDS like disease, Infectious Bursal Disease. So a systemic work should be developed on the incidence and prevalence on Infectious bursal disease. (Rahman et al., 2010).

In Bangladesh, Newcastle disease (ND) which is locally known as 'Ranikhet' disease caused by Newcastle diseases virus (NDV), produces epidemics every year, particularly in semi-scavenging and backyard chickens (Barman, 2002; Chowdhury et al., 1982). The disease was found as the most killer one of the semi-scavenging chickens reared in 17 northern districts of Bangladesh (Ahamed, 2002; Biswas et al., 2005). However, Sonali chickens reared in more-northern districts were more affected by Newcastle disease (ND) than Deshi birds (Biswas et al., 2005).

Fowl pox is globally distributed and is an economically important disease of poultry (Pledger, 2005) but the use of vaccines has reduced the incidence (Nagu et al., 1990).

The semi-scavenging poultry rearing model that has been developed in Bangladesh by the Department of Livestock Services (DLS) and the Bangladesh Rural Advancement Committee (BRAC) for rural smallholder farmers. The model composed of small units of breeders, mini hatcheries, chick rearing units and the smallholder farmers as end-producers with small flocks of 10 Sonali crossbreed hens (Saleque and Mustafa, 1996). It has been shown that RIR and Fayoumi are successful parent breeds in the government farms in Bangladesh. In case of semi-scavenging poultry model, the Sonali chicks are reared in confinement during the first 8 weeks of age in the chick rearing unit after which they scavenge part-time for some days in the smallholder farmer's yard and are gradually shifted to the existing scavenging system. Sonali chicken is the performed best among eight exotic breed combinations with highest egg production (156 eggs/hen/ year), lowest mortality and highest profit per hen (Rahman et al., 1997). On the other hand another study shown that, the productivity of Sonali was found to be higher and more profitable compared to RIR and Fayoumi under smallholder hill farming condition with feed supplementation (Rahman et al., 1997). Fayoumi (Fy) and crossbred Sonali have been taking their place besides the indigenous hens due to their adaptability and acceptability in the climatic conditions of Bangladesh (Anisuzzaman and Wahid, 1988).

Poultry production in Bangladesh is dominated by indigenous chickens. Indigenous chickens constitute nearly 80% of the total chicken population of the country. More than 89% of rural smallholders rear chickens (6.8 chickens per household) (Islam and Nisibori, 2009). Therefore the aim of this study is to summarize the current status of the indigenous chicken genetic resources of Bangladesh and thereafter to suggest how they could be improved under the existing village conditions of the country.

In rural area Sonali production is more suitable than other type of poultry rearing. It is efficient for both egg and meat production. It is also suitable

for back yard poultry rearing. So it is best replaces of indigenous back yard chickens as semi-scavenging system under village condition. The outbreaks of various diseases are directly or indirectly related to the management status or biosecurity of the farms. So, emphasis should be given to improve the management or biosecurity of the farm to check the mortality of chickens. Among the various diagnostic procedures, necropsy undoubtedly remains in the key role of the detection of diseases needed for taking instant therapeutic measures that can be the effective attempt for saving from a devastating condition. The objective of this study is to determine the incidences of diseases through pathological investigation in Sonali chickens encountered at Joypurhat district of Bangladesh.

MATERIALS AND METHODS

Experimental birds

In this study, a total of 294 birds of various age groups from four different upazilla (Panchbibi, Jouypurhat sadar, Akkelpur, Khetlal and Kalai) were suspected for the disease and considered as experimental birds. From those farms all dead as well as live sick chickens were collected with detailed particular of the outbreaks of diseases including farm location, history, age, breed, total number of birds and affected birds in farm, intervals between the batches, vaccine schedule, daily mortality and total mortality and clinical signs of affected birds. In each case sampling was done following standard sampling methods and send to the laboratory. Clinical diagnosis and in some cases necropsy examinations were carried out at the place of sampling where as histopathology of all samples (liver, heart, thigh muscle, bursa of fabricius, intestine etc.) were done in the laboratory.

Clinical examination of affected birds

The general health condition and age of the chicken were recorded. The clinical signs of the chickens were observed by visual examination. The clinical signs were recorded during the physical visit of the affected flocks and the farmer's complaints about the affected birds were also considered.

Necropsy findings of suspected birds

The postmortem examination of all the cases was performed as soon as the dead birds were collected. At necropsy, gross tissue changes were observed and recorded carefully. The representative tissue samples containing lesions were fixed in 10% formalin.

Histopathological study

During necropsy, various organs having gross lesions were collected, preserved at 10% formalin, processed, sectioned and stained for histopathological studies following a standard procedure (Luna, 1968).

RESULTS AND DISCUSSION

The highest proportional incidence of the diseases in Sonali in the recent study was recorded 25.51% which was the infectious bursal disease (IBD-Table 1). This was followed by Coccidiosis 21.09%, Newcastle Disease (ND) 19.39%, Colibacillosis 15.31%, Salmonellosis 8.5%, Fowl pox 5.10%, miscellaneous disease conditions 2.04%, Deficiency Disorders 1.36%, Aspergillosis 1.02 % and Alfatoxicosis 0.68 %.

The present study showed that prevalence of IBD was 25.51%. This finding was corresponded with (Islam et al., 2006) who recorded IBD 24.26%. In present study, the clinical sign of IBD as whitish or watery diarrhea which was similar to those described by (Islam et al., 2014). In this observation, the gross pathological lesions were hemorrhages in the thigh and breast muscles (Figure 1); enlarged, edematous, hyperemic and haemorrhagic bursa of fabricious (Figure 2) and haemorrhage in the junction between gizzard and proventiculus. In some cases kidneys were found swollen. These type of gross lesions were supported by different investigators (Khan et al., 2006; Khan et al., 1998; Islam et al., 2014) Histopathological study revealed the finding as severe lymphoid depletion (Figure 9), heterophilic infiltration and oedema in the interfollicular space. These lesions were similar with (Ismail et al., 1987; Nakamura et al., 1992; Haque et al., 1999).

Table1
Incidence of diseases in Sonali chicken at Joypurhat district.

Disease	No. of dead birds fornecropsy (Mean ±SE mean)	Proportional incidences (%) (Mean ± SE mean)
Infectious bursal diseases	75.00 a ± 1.73	25.51 a ± 1.73
Coccidiosis	62.00 b ±2.89	21.09 b±1.73
Newcastle diseases	57.00 b ±4.04	19.39 b ±1.73
Colibacillosis	45.00 c±1.73	15.31 c ± 1.15
Salmonellosis	25.00 d± 2.89	8.50 d ±1.15
Fowl pox	15.00 e± 1.73	5.10 de ± 0.58
Aflatoxicosis	2.00 f± 0.58	0.68 f± 0.04
Aspergillosis	3.00 f± 0.58	1.02 f± 0.03
Deficiency disorder	4.00 f± 0.58	1.36 f± 0.15
Miscellaneous diseased condition	6.00 f± 1.15	2.04ef± 0.05
Level of significance value	6.532	3.431
Probability/Percentiles Value	0.00	0.00
Coefficient of variance	12.95	20.00

**Significant ($p<0.01$)
Note: CRD (Complete Randomized Design) was done through DMRT (Duncan Multiple Range Test) under MSTATC program.

The proportion incidence of coccidiosis in present study was recorded in 21.09% whereas (Bhattacherje et al., 1996; Bhattarcharya et al., (1987; Islam et al., 2014) recorded 9.40%, 10.91% and 7.5% coccidiosis respectively. Higher incidence of coccidiosis in Jaypurhat due to poor management in the farm. During this investigation the common clinical manifestations in the chicks suffering from natural coccidiosis were found as bloody diarrhoea, anaemia, reduction of feed, body weight loss and less water intake. These findings are also supported by (Williams, 1996). Grossly, thickening of intestinal wall, reddish to yellowish blood mixed intestinal contents in the lumen of intestine, profuse congestion and pin point hemorrhage on intestinal mucosa, hemorrhagic enteritis, mucoid to blood-tinged exudates, profuse mucosal bleeding and haemorrhage in the caeca (Figure 5). This observation is similar to those reported by (Arakawa et al., 1981; Levine, 1983).

In present study, the proportional incidence of Newcastle Disease (ND) was 19.39% which supported by (Islam et al., 2009; Islam et al., 2014) who recorded ND as 17.20% and 12.50% respectively. The gross morbid lesion was haemorrhage in caecal tonsil, Pin pointed hemorrhages at the tip of proventricular glands (Figure 3). Hemorrhage and necrotic ulceration on the intestine and caecal tonsils. Marked congestion of trachea which was similar to those described by (Calnek et al., 1997; Brown et al., 2008; Islam et al., 2014).

The incidence of colibacillosis was recorded as 15.31% at the present study which supported by (Islam et al., 2014) who recorded 12.50%. The clinical signs showed that sick birds were dullness, depression, reduced intake of food and water, coughing, sneezing, omphalitis and Post-mortem examination revealed air sac infection, pericarditis, formation of the Whitish fibrinous layer on the heart (Figure 6). Enlarged congested yolk sac, unabsorbed yolk (Figure 7), enteritis, Edema in body cavities. These clinical signs & gross lesions

were corresponded with (Islam et al., 2014; Rahman and Samad, 2003).

About 8.5% incidence of avian salmonellosis was recorded in our study. This incidence rate was supported by (Islam et al., 2014; Islam et al., 2006; Bhattaachrjee et al., 1996) who recorded 10%, 6.73% and 9.28% respectively. Fragile, enlarged, congested and bronze colored liver (Figure-4) was reported grossly, which was similar to those described by (Islam et al., 2014).

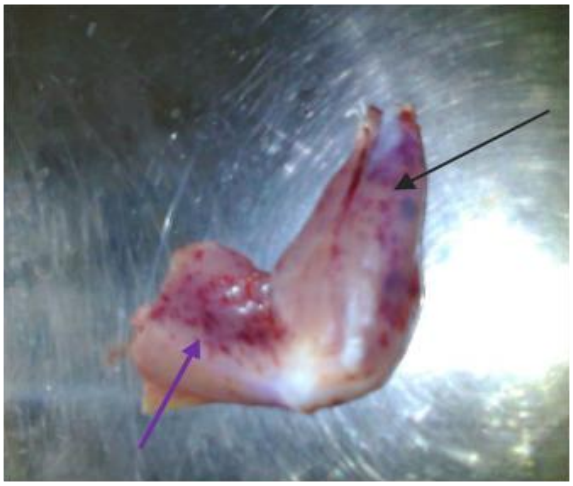

Figure 1
Haemorrhage in thigh muscle in infectious bursal disease.

Figure 2
Haemorrhagic swollen bursa in infectious bursal disease.

Figure 3
Haemorrhage in proventriculus in Newcastle disease.

Figure 4
Bronze color liver in avian salmonellosis.

Figure 5
Haemorrhage in caeca in coccidiosis.

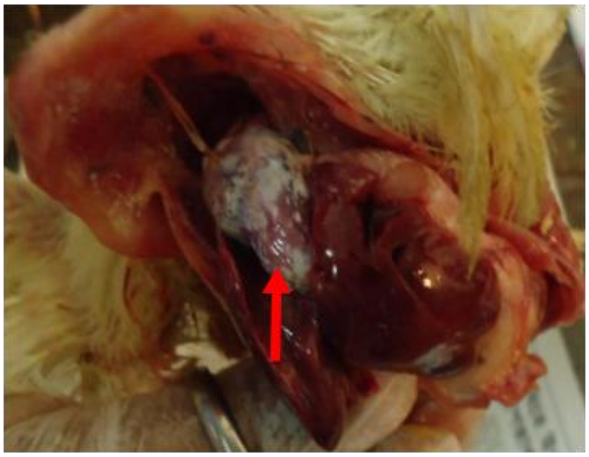

Figure 6
Whitish fibrinous covering of heart in colibacillosis.

Figure 7
Unabsorbed yolk in colibacillosis.

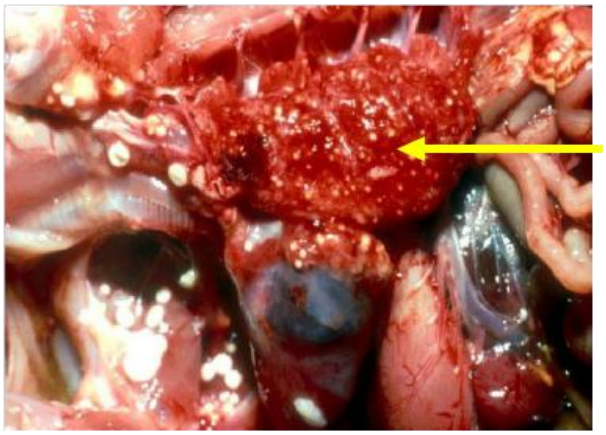

Figure 8
Granuloma formation in lungs in aspergillosis.

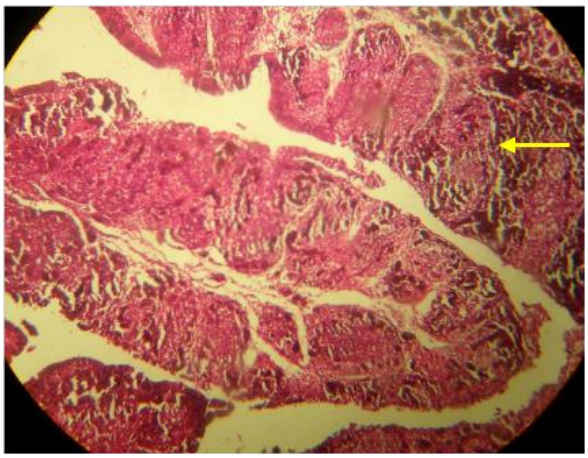

Figure 9
Depletion of lymphoid cells of Bursa of Fabricious in Infectious Bursal Disease (H & E; 40X).

In conclusion, Infectious Bursal Disease is the most common disease in Sonali chicken at Joypurhat of Bangladesh. However, Seroprevalence, microbiological and molecular examination should be performed for confirmation of diseases in sonali birds in a farm. Most of the recorded diseases are managemental diseases including Salmonellosis, Aflatoxicosis, and Coccidiosis etc. So, it is necessary to improve biosecurity for successful farming. For the above purpose to increase immunity level it is necessary for implementation on proper vaccine and maintenance.

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