

**Study on the prevalence of common infectious diseases of Layer & Sonali
chicken in Chattogram district**



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**Study on the prevalence of common infectious diseases of Layer & Sonali
chicken in Chattogram district**



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Abstract

The goal of the study was to determine the common disease prevalence associated risk factors issues that the Layer & Sonali farmers in the Chattogram division, were facing. For the purpose of gathering primary data, a total of 141 respondents from 13 upazillas in Chattogram were randomly chosen. The farmers and their farming practices were assessed by examining the information gathered in a pre-structured questionnaire. Diseases were diagnosed tentatively based on the owner's complaint, clinical signs & postmortem lesions. The most prevalent diseases in Layer chicken were Avian influenza (55.4%), Colibacillosis (8.93%) & combinedly Infectious coryza, Mycoplasmosis, and Salmonellosis(7.14%). In Sonali chicken, the most prevalent diseases were Newcastle disease (69.23%) & Infectious Bursal disease (15.23). The factor contributing to disease prevalence was poor maintenance of farm biosecurity and overall management. Strict biosecurity, continuous surveillance programs, and group farm-based training can contribute to overcoming the problem.

Keywords: prevalence, tentative diagnosis, biosecurity, surveillance

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Chapter I: Introduction

The poultry industry plays a significant role in promoting agricultural development and lowering malnutrition among Bangladeshi citizens. It is an essential component of Bangladesh's farming system and has given about 6 million people access to direct and indirect employment opportunities as well as support services (Hamid et al, 2016). This sub-sector has demonstrated that it is a desirable economic activity, demonstrating its significance for the whole economy. The sector accounts for 14% of the total value of livestock output and is growing rapidly. It is found that Poultry meat alone contributes 37% of the total meat production in Bangladesh. Poultry contributes about 22-27% of the total animal protein supply in the country. The poultry population in Bangladesh is estimated at about 304.7 million where the chicken population is about 255.31 million & rest of them are duck populations. Over the years, the demand for poultry products in Bangladesh has grown significantly. In the last few decades, the poultry industry has been the fastest-fostering livestock sub-sector in Bangladesh with a 20% annual growth rate (Islam et al., 2014)

In Bangladesh, broilers and layers are the most common types of poultry bred, while certain other species including duck, pigeon, quail, geese, turkey, and guinea fowl are also kept as pets. With the importation of contemporary breeds, tools, and marketing strategies, the chicken industry began to modernize around 1960. The Bangladeshi poultry business steadily transitioned to a commercial enterprise after then. To meet the demand of the nation at the start of the new century, several local businesses launched their parent and grandparent (GP) operations. Novogen Brown/White, Hyline Brown/White, Shaver 579, ISA Brown/White, and Bovine White are the most widely used layer strains. Up until the advent of AI in 2007, the poultry industry saw substantial growth beginning in the 1990s, averaging about 15-20% per year. Due to this outbreak, 60% of poultry farms, as well as 70% of hatcheries and breeding farms, were shuttered in 2007–2008.

Sonali chicken, produced in 1986 as a result of the crossbreeding of a Rhode Island Red (RIR) male and a Fayoumi female, resembles nondescript local hens in terms of both phenotypic traits and flavor. Sonali crossbred chicken was introduced in the northern regions of Bangladesh between 1996 and 2000 by the Department of Livestock Services (DLS), creating work for millions of rural women (FAO, 2015). Because of its superior production records (average weights

of adult males and females of 2-2.5 kg and 1.5-2 kg, respectively, with a feed conversion ratio of 4.33), higher disease resistance, lowest mortality, and greatest profit rate per hen, Sonali raising is quickly gaining popularity (Rahman et al., 1997; Huque et al., 1999). They are also ideally suited to the rural semi-intensive rearing style.

Although the Poultry industry has had rapid growth in Bangladesh over the years, there are some drawbacks that hinder the growth. Poultry disease is one of the main hindrances to production & a reduction in the economic advancement of poultry farmers (Badruzzaman et al., 2015; Islam et al., 2016). It is found that disease outbreaks cause roughly 30% of poultry populations to die (Badruzzaman et al., 2015). There are several factors influence disease prevalence such as temperature, location, farm hygiene, biosecurity, immunity status, chick quality, hatcheries, and management techniques (Abbas et al., 2015; Badruzzaman et al., 2015; Chakma, 2015; Hassan et al., 2016). Diseases such as Newcastle disease (ND), infectious bursal disease (IBD), colibacillosis, avian influenza (AI), coccidiosis, fowl cholera, salmonellosis, Mycoplasmosis, in layer & Sonali are reported to be common in Bangladesh. (Choudhary et al., 2012; Islam et al., 2014, 2016; Badruzzaman et al., 2015; Hassan et al., 2016; Matin et al., 2017; Rahman et al., 2017, 2019).

Mathematical models are devised to describe a phenomenon of interest. This is usually done through equation(s) that have been derived from experimental data that capture the phenomenon to some degree. In practice, models are not perfect descriptors and may only accurately describe a phenomenon under a restricted set of conditions. Such as STATA, which is a statistical analysis program developed by STATA Corporation, College Station, TX. In addition to supporting a very extensive array of statistical tools, STATA incorporates a critical complement of data management and graphics facilities as well. As demonstrated in another article in this volume (Boston et al., 2002)

Therefore, the objective of the study is to observe the prevalence of diseases among commercial poultry like Layer & Sonali originating from the Chattogram division based on different factors like farming type, hygiene maintenance, farm management, vaccination etc.

Chapter II: Materials & Methodology

2.1. Study area:

From January to March 2022, the investigation was conducted in the Pathology lab, CVASU of Chattogram Division. There are a lot of broiler and layer farms in this region, which is renowned for its chicken industry. Therefore, farmers from various broiler, Sonali, and layer farms as well as household individuals from the Chattogram division submitted their dead or sick birds to the pathology lab at CVASU, for diagnosis and treatment.

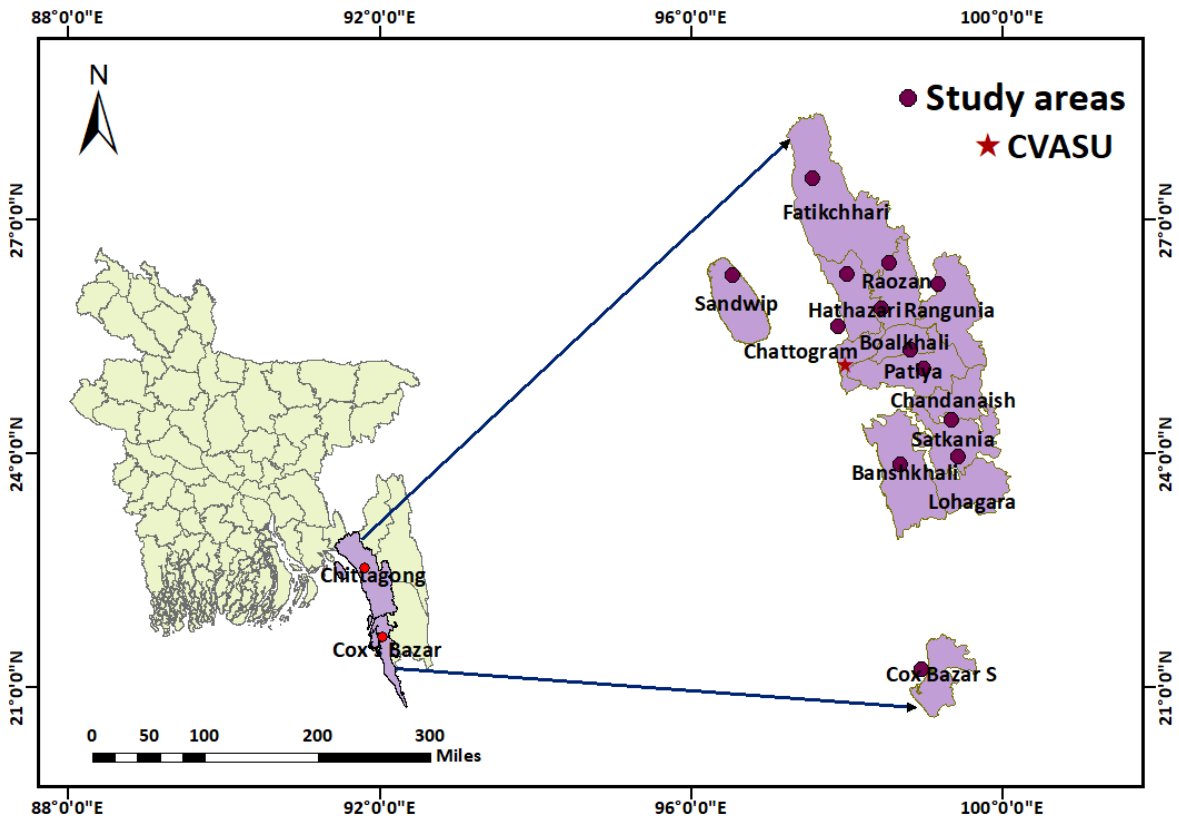


Figure 1: Study area

2.2. Sample size:

A total of 141 cases were recorded in this study, where 71 were from broiler, 56 were from Layer, and 14 were from Sonali chicken. In this study, data analysis has been done on Layer and Sonali chickens only.

2.3. Diagnosis of Disease:

A specific space in the Pathology lab, CVASU was used for the clinical assessment and postmortem of sick and deceased birds. The Atlas of Avian Necropsy's standard process and procedures were followed during the postmortem investigation (Majó and Dolz, 2011). Personal safety was observed during postmortem to avoid infection. The birds were thoroughly examined, and gross pathological lesions were noted and thoroughly recorded. A tentative diagnosis was made based on the owner's complaint, the clinical sign, and postmortem lesions. The necropsied birds were promptly dumped into the dumping hole after postmortem.

2.4. Collection of data:

A structured questionnaire was created for the study's purposes during the study period. Type of birds, number of birds, farm size, age, vaccination history, rearing method, clinical history, morbidity and mortality, postmortem lesions, and tentative diagnoses are among the data gathered. Farmers were questioned beforehand and at each postmortem, and their answers were properly recorded.

2.5. Statistic evaluation:

Data were added to Microsoft Excel 2019 (MS-10) and imported into STATA statistical software package developed by StataCorp for data manipulation, visualization, statistics, and automated reporting for additional analysis. To determine the prevalence in relation to several factors, such as diseases, species, type, age, farming method, and vaccination status, descriptive analysis was used. A 95% confidence interval was included with the percentages of the results. The substantial correlation between clinical poultry diseases and various variables was assessed using Pearson's Chi-square and Fisher's exact test. A significant relationship was defined as one where the probability (P) value was less than 0.05.

As per the process outlined by Swayne et al., the birds were examined and the post-mortem findings were documented (2013). Below are included the clinical symptoms and autopsy results of several diseases.

Chapter III: Result & Discussion

In Chattogram division, Layer & Chicken samples were collected for prevalence of disease and tentative diagnosis was made based on clinical sign and postmortem lesion. The result is calculated by getting the p-value on its prevalence data also the factors influencing the cause.

3.1. Disease prevalence of Sonali and Layer

Table 1: Disease prevalence of Sonali & Layer in Chattogram division

Name of the disease	Sonali n(%)	Layer n(%)	p-value
Avian Influenza	0(0)	31(55.4)	0.000
Mycoplasmosis	0(0)	4 (7.14)	1.00
Salmonellosis	0(0)	4 (7.14)	1.00
Colibacillosis	1(7.61)	5(8.93)	1.00
Fowl Cholera	0(0)	3(5.36)	1.00
Infectious coryza	0(0)	4(7.14)	1.00
Coccidiosis	1(1.79)	2(15.38)	0.089
Newcastle disease	9(69.23)	3(5.36)	0.000
Mineral deficiency	0.00	1(1.79)	1.000
Infectious Bursal disease	2(15.38)	0(0)	0.033
Brooder pneumonia	1(7.69)	0(0)	0.188
Tapeworm infestation	1(7.69)	0(0)	0.188

Here in Table 1, Individual disease prevalences are shown for both Layer & Sonali chicken with a total of 70 samples. The disease prevalence is different among Sonali & Layer chicken with significant values. In Layer chicken, Avian influenza is the most frequent 31 in number & most prevalent, 55.4% but in Sonali chicken, its frequency is null with no p-value. Followed by, Colibacillosis has 8.93% with the second most frequent in Layer chicken & 7.61% prevalence in Sonali chicken. Other diseases such are Mycoplasmosis, Salmonellosis & Infectious coryza with similar frequency & percentages of 4 & 7.14% in Layer chicken & 0 frequency and percentage in

Sonali chicken. On the other hand, Newcastle disease is the most frequent & prevalent with a value of 9 & 69.23%, in Layer chicken it's 5.36% with 3 in frequency. Other prevalent percentages are, Fowl cholera is 5.36% in Layer, Coccidiosis is 15.38% in Layer and 1.79 & in Sonali chicken, and Infectious bursal disease is 15.38% in Sonali, Brooder pneumonia & Tapeworm infestation has a similar prevalence in Sonali which is 7.69%. Lastly, mineral deficiency in the layer has 1.79% but null in Sonali. There has not been found any significant difference($p>0.05$) for most diseases, except Infectious bursal disease with a p-value of 0.033 for Sonali chicken. Also, Avian influenza & Newcastle disease has a p-value of 0.00 yet are non-significant.

3.2. Factors affecting farm management

In table 2, the differences are shown based on some factors like vaccination, farming, etc of farm management.

Table 2. The farm management system according to the bird type

Factors	Categories	Sonali n(%)	Layer n(%)	P-value
Vaccination	Yes	10(76.9)	50(89.3)	0.4
	No	3(23.1)	6(10.7)	
Farming type	Cage rearing	1(7.69)	40(75.00)	0.00
	Floor rearing	12(92.31)	14(25.00)	
Foot bath	Yes	2(15.38)	23(41.07)	0.113
	No	11(84.62)	33(58.93)	
Feed type	Ready-made	12(92.31)	56(100.00)	0.188
	Homemade	1(7.69)	0(0)	

In the vaccination category, Sonali chickens are ahead of Layer chickens in vaccinating with a nonsignificant difference. In the farming category, 75% of Layer chickens are reared in cages than the floor, whereas Sonali chickens are mostly reared on the floor which is 92.31% more than in cages. The percentage of footbath in layer farms is more than in Sonali farms, 41.07% & 15.38% consequently. In the Feed type category, the whole sample of layer farms was giving readymade feed also In Sonali chicken the percentage is quite higher 92.31%.

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Chapter IV: Discussion

The present study shows the prevalence of common diseases in both Layer & Sonali chickens of the Chattogram division. Here, Avian influenza and Colibacillosis are most prevalent in Layer chicken based on the sample affected. Newcastle disease & Infectious Bursal Disease are most prevalent in Sonali chicken.

4.1. Gross lesion of Avian Influenza

The sick/dead Layer chicken samples of avian influenza have shown some significant postmortem lesion, Such as Cyanotic comb, Hemorrhage in shank, Congested skin, egg peritonitis, cloudy air sac, misshaped egg, caseous mass over egg, flabby heart. A tentative diagnosis is made according to the owner's complaint, clinical signs, gross lesion,



Figure: 2 A. Hemorrhagic Ova; B. Hemorrhage on shank; C. Hemorrhage on skin

Avian influenza is the most prevalent in Layer chicken with 55.4% and 31 in frequency but null in Sonali chicken. Other studies show that Avian influenza in layer chicken is much lower, 2.56% reported by Hassan et al., 2016.

4.2. Gross lesion of Colibacillosis

The observed clinical findings of Layer chicken samples of Colibacillosis were coughing, sneezing, reduced appetite, poor growth, and omphalitis some significant postmortem lesions of different forms of colibacillosis. Postmortem lesions have appeared in the affected samples based on the degree of effectiveness. Lung congestion, Air saculitis, caseous mass on the thoracic air sac, cloudy abdominal air sac, foul smell, and caseous exudate in the abdominal cavity are commonly found.

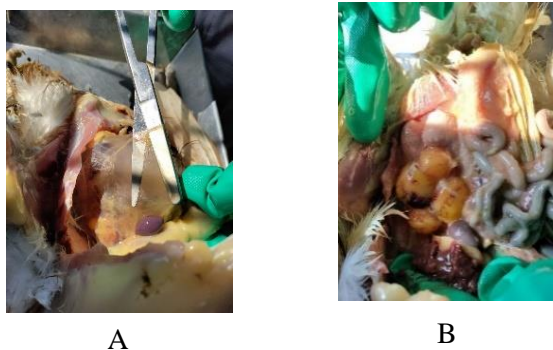


Figure. 3: A. Cloudy air sac, B. Misshapen Ova

Newcastle disease & Infectious Bursal Disease are most prevalent in Sonali chicken.

Infectious bursal disease (IBD): The observed clinical signs of IBD were severe depression, inappetence, ruffled feathers, vent pecking, limy diarrhea, and rise in body temperature. Post-mortem findings included hemorrhages in the thigh and pectoral muscles, and swollen and enlarged bursa. Kidneys are enlarged and urate deposition in the tubules.

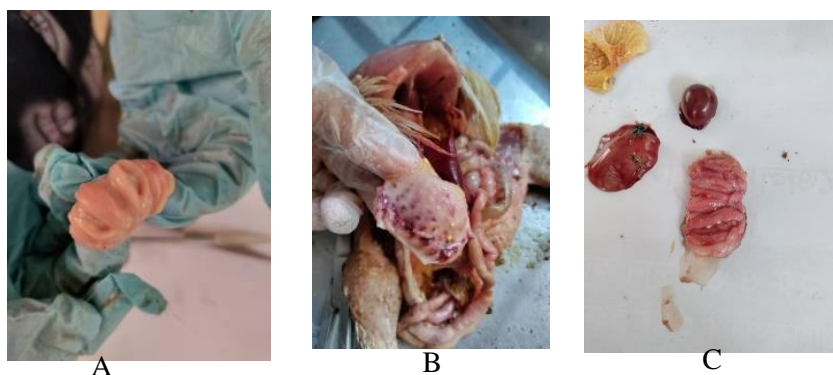


Figure 4: A. Swollen bursa; B. Hemorrhage on the junction of proventriculus and gizzard; C. Hemorrhagic bursa

In this study, IBD in Sonali is 15.38% in the Chattogram division which is quite similar to Dhaka & Mymensingh where it was reported in commercial chickens as 10.99%, 16.0%, and 19.16% cases of IBD but lower than Sylhet which was reported as 22%. It was maybe because of the topographic variation, overall commercial chicken type & less sample size, (Bhattacharjee et al, 96)

Newcastle disease (ND): The observed clinical findings of ND were sudden death, fluff-up feathers, body coat dragging on the ground, lethargy, inappetence, respiratory distress, gasping, and greenish diarrhea. Nervous signs included tremors, torticollis, convulsion, and paralysis of wings and legs. Post-mortem findings included pinpoint hemorrhages at the tip of proventricular glands, hemorrhage and necrotic ulceration on the wall of the intestine and cecal tonsils, and marked congestion of the trachea.

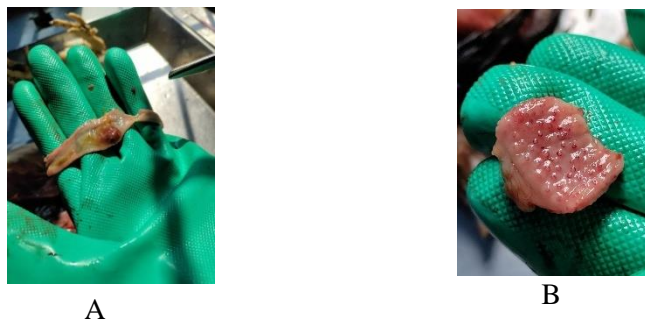


Figure 5: A. Caecal tonsil, B. Haemorrhage on the tip of the gland of the proventriculus

The present study also revealed ND percentage in the study population, (69.23%) in Sonali & 5.36% in Layer chicken. These findings are not in agreement with Mohammad et al.¹⁹ in Kishorganj which reported 17.54% in Layer, and 11.78% in Sonali chickens. Also, findings reported by Islam et al. & Rahman et al.¹⁸ who reported 6.73% & 4.85% consequently support our findings percentage in Layer chicken. The most percentage of ND found in Sonali chicken than in Layer due to types of breeds and strain, failure to maintain bio-security for longer periods of time, vaccine use, vaccine failure due to stressful conditions, and sometimes subclinical state of disease (Sarker et al., 2012; Munmun et al., 2016).

The prevalence of salmonellosis in layer and mixed chicken were 5-38% and 6-14% respectively overall in Sylhet, Dhaka & Kishorganj which quite supports our findings in Layer chicken, 7.14%; colibacillosis was reported at the prevalence of 3-7%, and 5-15%, which are in agreement with our findings in Layer & Sonali chicken, 8.93% & 7.61% respectively. Similar to previous Bangladesh studies. Small and medium-scale farms typically have poor hygiene and farm bio-security practices (Badruzzaman et al., 2015; Matin et al., 2017). Rats, the carrier of *Salmonella* spp. and *E. Coli*, are also common on these farms (Høg et al., 2019).

Coccidiosis was recorded in 15.38% of Layer chickens in our study, which is higher than the findings of Ahmed et al. (2009) and Islam et al. (2014a); in Sonali chicken, the prevalence was much lower, 1.79% which was not supported by Talukdar et al., 2017, 49%. Lower sample size and poor litter management in farms contribute to the prevalence.

The prevalence of fowl cholera in Layer was 3-7% reported over the country which supports our findings, of 5.36%. The prevalence of Mycoplasmosis was 8-15% in the layer which is in agreement with our findings, of 7.14% (Hassan et al., 2016; Giasuddin et al., 2002; Mamun et al., 2019; Rahman et al., 2017;)

The study also shows that Infectious Coryza in layer chicken is 7.14% whereas, other studies reported that's a mixed infection it's 0.97% (howlader et al., 2022) & (0.64%) reported by Hassan et al., 2016. Also, Tapeworm infection or helminth parasites infection is seen at (7.69%) prevalent in Sonali chicken which is in disagreement with howlader et al., 2022, 0.74%. It has been found in Layer chicken in the present study that the result is null whereas other studies have record (0.74% to 2%). Also, other lower prevalent disease, such as mineral deficiency (1.79%) prevalent in Layer chicken which is much lower than all over the country reported by howlader et al., 2022, (8-12.40%).

In Table 2, the categories of factors are shown for both Sonali & Layer chicken farms based on the owner's response. By calling out the majority, most of the layer flocks are vaccinated in comparison to Sonali, and there is no significant variance. Most percentages of layer flocks are cage-layered but Sonali flocks are floor reared, their difference is significant. According to the result of the feeding system, most of the farmers choose to supply ready-made feed that decreases mineral deficiency prevalence which is shown in Table 1. The important factor related to farm hygiene which is using a foot bath is in lower prevalence in both Layer & Sonali farms could influence the disease prevalence in spite of having been vaccinated.

Chapter V: Limitation

- The study period was too short to cover all the upazillas in the Chattogram division
- The sample size was limited based on the topic; it can contribute information in further study related to the present topic

Chapter VI: Conclusion

The present study showed the prevalence of common infectious diseases in Sonali & Layer which is one of the main hindrances in growing poultry industry as most people are consuming poultry meat & eggs in Bangladesh as protein sources. The study will provide information of common diseases in Layer & Sonali chicken in Chattogram division for further study. Proper housing, feeding, and hygienic environment can be provided to reduce the disease prevalence of infectious diseases in Sonali chickens. The study will provide information of common diseases in Layer & Sonali chicken in Chattogram division for further study. Further microbiological and molecular diagnoses are suggested for detailed studies.

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Biography of Author

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