Prevalence of common infectious diseases in Commercial broiler farm in Chattogram district, Bangladesh

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Abbreviations	Elaboration
CRD	Chronic Respiratory Disease
NE	Necrotic Enteritis
IBD	Infectious Bursal Disease
ND	Newcastle Disease
IB	Infectious Bronchitis
CMA	Chattogram Metropolitan Area
APEC	Avian pathogenic *E. coli*
IB	Infectious Bronchitis
CVASU	Chattogram Veterinary and Animal Sciences University

Abstract

This study was schemed to investigate the disease prevalence along with their associate risk factors in broiler chickens focusing Infectious bursal disease, Newcastle disease, Colibacillosis and Chronic respiratory disease, spatial distribution of these diseases in Chattogram district. Total 141 birds from 50 farms were collected, among which 71 broiler sick and dead chickens were selected at Department of Pathology and Parasitology of CVASU out of which 25.35% Colibacillosis, 23.94% Infectious bursal disease, 18.31% Chronic respiratory disease and 9.86% Newcastle disease were found. The main pathologic features were found hemorrhage in proventriculus, button ulcer in intestine in ND; enlarged or atrophied and hemorrhagic bursa in IBD; pericarditis, perihepatitis, septicemia in Colibacillosis and mucoid or hemorrhagic exudate in trachea, congested trachea, air sacculitis and conjunctivitis in case of CRD.

Among different risk factors, age, floor type and litter type were found statistically significant ($p \leq 0.05$) in IBD and flock size, litter type were significant ($p \leq 0.05$) in CRD. Raozan was predominantly hotspot of these diseases and disease prevalence was also higher at Sitakunda, Hathazari and Anowara in Chattogram district.

Key words: Broiler, IBD, ND, Colibacillosis, CRD, Prevalence, Risk factors.

Chapter-1: Introduction

Agriculture development is a significant contributor to overall economic growth in many developing countries. Bangladesh is predominantly an agricultural country, hence the sector's role in nurturing the country's rapid economic development is essential. It is essential to have a profitable, sustainable, and environmentally responsible agricultural system to ensure human food security over the long run. (Chapter 7 Agriculture, 2017.).

To produce more meat, chicken broilers have been bred to be a consistent size. A typical broiler strain combines White Plymouth Rock genes for white feathers and quick growth with Cornish genes for conformation and fleshing. Because their carcasses have a cleaner appearance, white-feathered birds are typically used in the production of commercial broilers (A.J. Maurer, 2003). Since the early 1950s, broiler chickens' live performance has greatly improved, mostly because of selection for quick early development, dietary advancements, and improved conditions for rearing, which reduces the time it takes to reach the finishing body weight of roughly 2 kg to 33 days (Goliomytis et al., 2003; Tumová et al, 2010). Therefore, these modern broiler chicken strains are characterized by a very high growth rate and low feed conversion ratio.

According to a joint WHO-FAO survey, Bangladesh has an annual meat consumption per person of 15.23 kg, with poultry accounting for 35.25 percent of all meat supplies (M. A. Rahman et al., 2017). Bangladesh produces a significant 37% of its total meat supply from just poultry (Begum et al., 2011).

The major constraints that can hold back the optimal performance of the poultry production in Bangladesh are various diseases, poor husbandry, and shortage of feed, all of which hamper (Haque et al., 1997). The community reports that disease (63.8% of the causes) was the main issue, followed by predation, a lack of food supply, ignorance, and shortage of resources (Bush, 2006). The outbreaks of various severe diseases that result in financial loss and discourage poultry rearing are one of the biggest obstacles to the poultry industry and disease incidence varies according to the

geo-climatic conditions, season, diet, and age of the bird. Faulty biosecurity also challenges the growing industry along with other factors (Wong et al., 2017). Age, strain of poultry, production type, flock size, floor type, biosecurity, insufficient vaccination coverage, poor farm hygiene, biosecurity, farmers' education, and experiences are all strongly related to common diseases in poultry (Islam et al., 2021).

Some infections, such as Newcastle disease, Infectious bursal disease, Colibacillosis, Mycoplasmosis, Coccidiosis, Necrotic enteritis, etc., make it difficult to manage poultry husbandry profitably (Sen et al., 2017).

This study emphasizes clinical diagnosis of common diseases of broiler. The common diseases of poultry (mainly broiler) encountered commonly in Bangladesh have been reviewed here by putting emphasis on Colibacillosis, Infectious Bursal Disease (IBD), Newcastle disease (ND) and Chronic Respiratory Disease (CRD).

Avian pathogenic *E. coli* (APEC) is a particularly critical pathotype for the broiler industry as it causes colibacillosis, a condition that results in large economic losses due to the mortality and/or decreased production of infected birds (Apostolakos et al., 2021). Escherichia coli of Enterobacteriaceae family is a commensal, facultative anaerobic microbe that develops as a symbiont in the lower gastrointestinal system of mammals and birds shortly after birth and helps produce essential vitamins for its hosts (Sarowska et al., 2019). The clinical signs of colibacillosis range from omphalitis, an infection of the yolk sac in broiler chicks, to septicemia, an infection of the reproductive tract in layers, to salpingitis. Airsacculitis, a respiratory illness, is common in both broilers and layers, and other visceral organ infections (perihepatitis, pericarditis) are frequently observed (Apostolakos et al., 2021).

IBD is a severe and extremely contagious viral virus that affects young chickens. The Bursa of Fabricius (BF) and other lymphoid organs, but to a lesser extent, experience lymphocyte loss because of IBD (Homer et al., 1992). The genus Avibirnavirus of the Birnaviridae family contains the causative agent. IBDV strains with high pathogenicity have been shown to have 100% morbidity and 20–30% mortality. There are two clinical forms of IBDV. Acute on set high typically occurs in 3–4

week-old birds (Admassu et al., 2015). In regions with high concentrations of poultry farming, the disease is a significant issue. The subclinical form, however, makes it frequently go undetected. Affected chickens are more vulnerable to concurrent or secondary infection and have a worse immune response vaccine (Homer et al., 1992).

Newcastle disease (ND) is considered to be the most important viral illness affecting poultry worldwide, including in developing nations. ND is a significant barrier to the growth of both industrial and local poultry farming in Asia and Africa (Sen et al., 2017). Newcastle Disease (ND) is a fatal endemic infection caused by Newcastle Disease Virus (NDV), also known as Avian Paramyxovirus type-1 (APMV-1) (M. S. Rahman et al., 2012).

The bacterial infection known as chronic respiratory disease (CRD) is brought on by a member of the pleuro pneumonia-like organism (PPLO) group, specifically *Mycoplasma gallisepticum* (MG), often with secondary problems (Chandhar et al., 2019). There have been reports of chronic respiratory diseases producing significant financial losses in huge commercial companies. The infection may not be visible or cause varied degrees of respiratory irritation, including coughing, sneezing, and minor to noticeable rales. In straightforward cases, mortality is low, and morbidity is significant (Bahatti et al., 2013).

These diseases cause severe economic loss in broiler farming and small-scale farmers are facing many difficulties and losing their birds. In this present study, (1) the gross lesions of IBD, ND, Colibacillosis and CRD were observed in various organs of diseased and sick chickens; (2) prevalence of these diseases of different broiler farms of Chattogram were calculated for clear view of current situation; (3) along with their association of different risk factors.

Chapter 2: Materials & Methods

Study area & period: The study was conducted for a period of three months, from January 2022 to March 2022 at the Department of Pathology and Parasitology, Faculty of Veterinary Medicine, Chattogram Veterinary and Animal Sciences University, Chattogram, Bangladesh.

Study design and cases: A total of 141 dead and sick chickens from various farms of Chattogram, Bangladesh were collected and tested at pathology laboratory, CVASU, Chattogram. Among them 71 broiler birds were examined, and tentative diagnosis was done by observing gross lesions obtained after postmortem examination of dead and sick (later killed) birds.

Postmortem Examination: In the Department of Pathology and Parasitology at CVASU, competent technical hands performed the postmortem on sick and dead birds and made a diagnosis of the disease. The liver, lungs, heart, spleen, proventiculus, gut, and caeca were all carefully checked, and results were noted.

Following that, samples (liver, heart) from sick and dead birds that were suspected to be positive by postmortem inspection were gathered in distinct zipper bags. To reduce the risk of contamination, it was completed in an aseptic environment.

Data collection and Record keeping: A pre-designed questionnaire that was relevant to the study objective was prepared to collect the data from farm owners to view the association of different risk factors. Face-to-face interviews and on-the-spot data computing were commended on location of farm, type of bird, clinical history, duration of illness, age, flock size, rearing system, feeding system, floor type, litter type, vaccination status, morbidity and mortality, previous disease and treatment history, presence of foot bath, feed and water source, rate of changing feed and water, cleaning history of farm by data collector. Before conducting the data collection process, oral permission was taken from farmers. Clinical signs, postmortem findings, tentative diagnosis were recorded in record sheet and later data were used that thought to be useful for the diagnosis and interpretation of disease prevalence of IBD, ND, Colibacillosis and CRD.

Case Definition of Emphasized Cases:

Infectious Bursal Disease: Any case with a sudden onset of depression, ruffled feather, dehydration, and sudden death; chickens can exhibit vent pecking because of the discomfort due to increased size of Bursa of Fabricius (Franciosini & Davidson, 2022). The bird that showed signs of enlarged or atrophied bursa, hemorrhage or edematous fluid in the bursa, hemorrhage on the thigh and breast muscles, among other things, was thought to have IBD (Sen et al., 2017).

Newcastle disease: Any case with the history of weakness, ruffled feather, greenish diarrhea (Alemneh, 2019); Hemorrhagic lesions prominent in the mucosa of proventriculus (tip of the gland), caeca, and small intestine (button ulcer/hemorrhagic plug) (Sen et al., 2017) were found on necropsy findings; considered as a case of ND.

Colibacillosis: Any individual showed respiratory distress, progressive emaciation, anorexia, and death; The gross lesion as recorded at the time of post-mortem, included white to yellowish fibrinous exudates covering the heart and liver, cloudy air sacs, omphalitis, septicemia in intestine (Halder et al., 2021)was considered as infected with Colibacillosis.

Chronic respiratory disease: Any individual showing respiratory distress, rales, sneezing, coughing; gross lesion indicating catarrhal exudate in trachea with congestion, hemorrhage and mucoid content, accumulation of caseous material in bronchus, congestion in lungs; cloudy and foamy air sacculitis with or without cheesy caseous exudates over air sacs was thought to be infected with CRD.

Statistical Analysis: Data were entered in Microsoft Office 365 Excel 2022 version; were coded, re-coded, and checked properly; then incorporated in STATA 13 (Stata Corp, 4905, Lakeway Drive, College Station, Texas 77845, USA). The Prevalence % of the mentioned four diseases in broiler birds were calculated based on the following formula:

Prevalence = (Total number of infected birds ÷ Total number of birds) × 100

We used data to apply Chi square test to assess the difference of proportion of each case type (IBD/ND/Colibacillosis/CRD) for the explanatory variables (age, flock size, litter type, duration of illness, vaccination status, presence of foot bath, water source) considered to be risk factors associated with the disease and those having p value ≤ 0.05 were considered as significant.

Chapter 3: Results & Discussion

A total of 71 infected broiler chickens among 141 birds including layer and Sonali were investigated and this study estimated a wide range of diseases of broiler chickens among which bacterial diseases were more prevalent than other infectious diseases (Table 1.). Table 1 indicated prevalence percentage of bacterial and viral group were 46.47% and 35.21% respectively, whereas fungal (8.45%) and protozoal (4.23%) disease were found to be less frequent than the two other mentioned group. Disease frequency of other causes like dust allergy and ascites was 5.63%.

About 46.47% bacterial disease prevalence in broiler which was close to the findings of Thøfner & Christensen, 2021, M. A. Rahman et al., 2017. (M. A. Rahman et al., 2017) found 25.7% disease prevalence by virus in poultry which was lower than this current study.

Table 1: Prevalence of common diseases in broiler in Chattogram district, Bangladesh from January 2022 to March 2022

Type of disease	Name of Disease	Infected Broiler, n(%)
Bacterial (46.47%)	Colibacillosis	18(25.35)
	Chronic Respiratory Disease	13(18.31)
	Necrotic Enteritis	2(2.82)
Viral (35.21%)	Infectious Bursal Disease	17(23.94)
	Newcastle Disease	7(9.86)
	Infectious Bronchitis	1(1.41)
Protozoal (4.23%)	Coccidiosis	3(4.11)
Fungal (8.45%)	Brooder Pneumonia	5(7.04)
	Mycotoxicosis	1(1.41)
Others (5.63%)	Dust Allergy	2(2.82)
	Ascites	2(2.82)

Legends: Here, N= 71 broiler, n= frequency number of cases that counted individually

Rate of infection of total broiler chickens due to specific causal agents was shown in Table 1. Among bacterial diseases, infection rate was higher in case of Colibacillosis (25.35%) and was lower in Necrotic enteritis (2.82%). 18.31% of infected birds gave positive results for Chronic respiratory disease. In the case of viral diseases, Infectious bursal disease (23.94%) showed greater prevalence than Newcastle disease (9.86%) and Infectious bronchitis (1.41%). Coccidiosis infection was 4.11%

which was lower than the findings of Uddin et al., 2010, (7.11% in layer). Similar result was found by (Ahmed et al., 2009). Saleque et al., 2003 reported 1.9% Coccidiosis in broiler which was lower than this study. Brooder pneumonia caused 7.04% infection which was higher than the findings reported by (Bari et al, 2018) ;whilst 1.41% occurrence was due to Mycotoxicosis (Table 1.).

Spatial distribution of Infectious bursal disease, Newcastle disease, Colibacillosis and Chronic respiratory disease in broiler chickens: Figure 1 presents geographical origin of focused diseases in broiler in Chattogram district. IBD cases mostly originated from Raozan (41.18%) followed by areas under Chattogram Metropolitan (17.65%) and Fatikchari (11.76%); 5.88% cases were reported from Boalkhali, Anowara, Sitakunda and Chandanaish. Cases of Newcastle disease emerged high from Anowara and Hathazari (28.57%), then from Raozan, Sitakunda and Ctg Metro (14.29%) having same frequency (Figure 1). In the study of (Khatun et al., 2022), NDV prevalence was determined to be lowest (20%) in Tangail and highest (41.67%) in Gazipur.

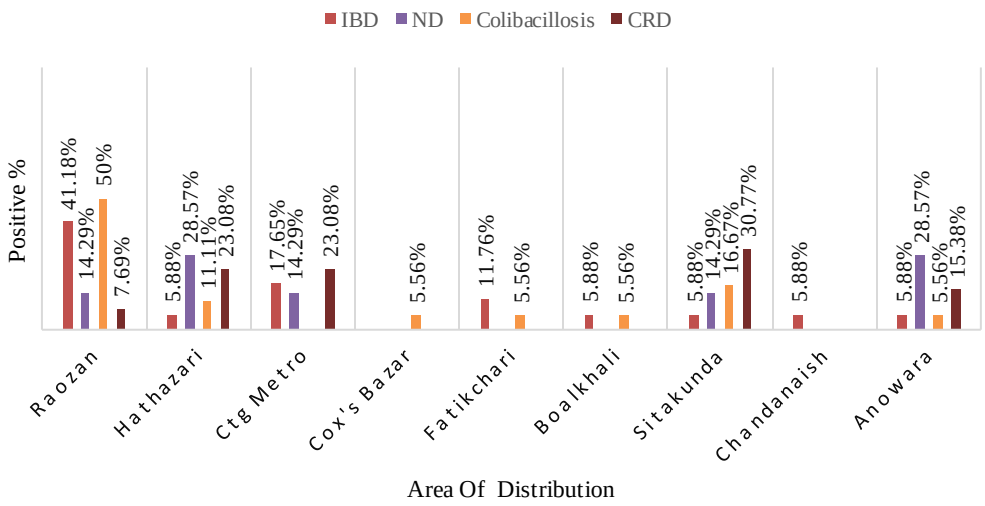


Figure 1: Spatial distribution of salient diseases (Infectious bursal disease, Newcastle disease, Colibacillosis, Chronic respiratory disease) in Chattogram district, Bangladesh from January 2022 to March 2022

Colibacillosis cases predominantly originated from Raozan (50%), Sitakunda (16.67%), Hathazari (11.11%) and equally prevalent at Boalkhali, Fatikchari, Anowara and in Cox's Bazar (5.88%). (Halder et al., 2021) reported highest prevalence of Colibacillosis at Raozan, followed by Hathazari and Sitakunda. Disease frequency of Chronic respiratory disease was more dominant at Sitakunda (30.77%), equivalent at Hathazari and Ctg Metro (23.88%) and Anowara (15.38%).

(Barua et al., 2006) observed 49.5% CRD prevalent in broiler and layer farms of Lohagara and Satkania.

Pathological study of Infectious bursal disease, Newcastle disease, Colibacillosis and Chronic respiratory disease in broiler chickens: Infectious bursal disease, Newcastle disease, Colibacillosis and Chronic respiratory disease were the main four diseases primarily focused by this manuscript.

Gross lesions in Infectious bursal disease: The postmortem findings included thigh/pectoral muscular hemorrhages, inflated, edematous, and hyperemic bursas with bloody or mucoid contents, or atrophic in cases of chronic disease, hemorrhage in the junction of proventriculus and gizzard that also reported by Hasan et al., 2010, Islam et al., 2021; Sen et al., 2017.

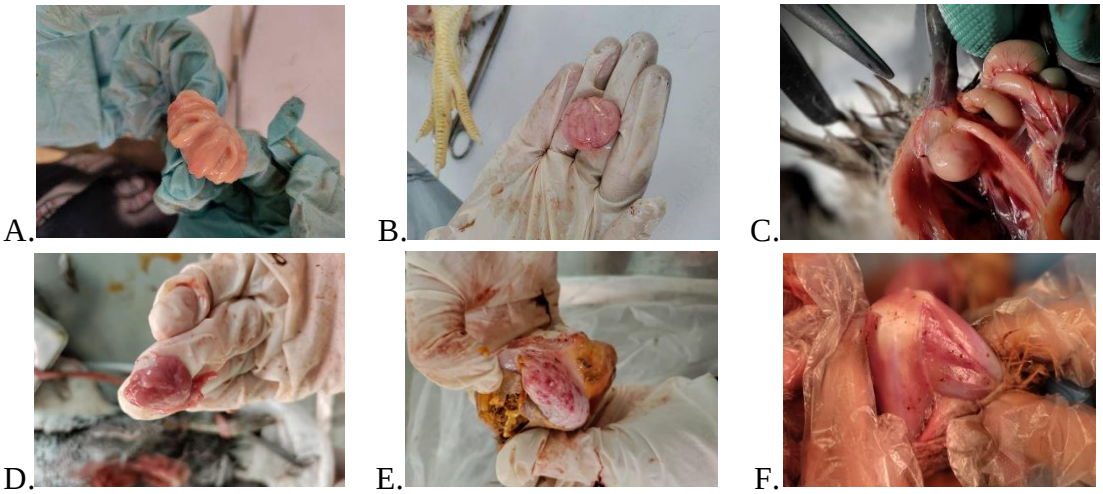
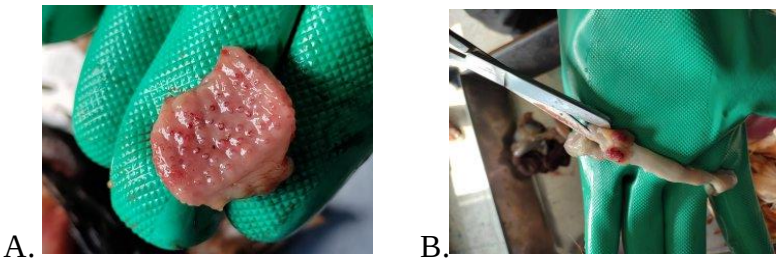


Figure 2: Postmortem lesions of Infectious bursal disease; A. Prominent Bursal folds, B. Swollen bursal folds, C. Enlarged bursa, D. Atrophied bursa, E. Hemorrhage in the junction of proventriculus and gizzard, F. Hemorrhage in thigh muscle

Gross lesions in Newcastle disease: During postmortem examination, the most frequent gross lesions were petechial hemorrhages in the colon, proventricular gland pinpoint hemorrhages, and hemorrhagic ulcers in the intestinal wall and caecal tonsils. These lesions supported the findings of Sen et al., 2017, Orsi et al., 2010.



C.  D. 

Figure 3: Postmortem lesions of Newcastle disease; A. Hemorrhage in proventriculus, B. Button ulcer in intestine (visible without cutting), C. Hemorrhagic plague in intestinal mucosa, D. Hemorrhage in large intestine

Gross lesions in Colibacillosis: Necropsy findings of colibacillosis exhibited air sacculitis, perihepatitis, pericarditis with yellowish fibrinous exudate, fibrinopurulent fluid accumulation in peritoneal cavity, severe congestion and septicemia in intestine. Halder et al., 2021, Talukdar et al., 2017) mentioned about these lesions in their study.

A.  B.  C. 

Figure 4: Postmortem findings in Colibacillosis; A. Pericarditis with yellowish exudate, B. Perihepatitis with whitish exudate, C. Hemorrhage in intestine and air sacculitis

Gross lesions in Chronic respiratory disease: Lesions discovered during postmortem examination were airsacculitis with caseous exudates, mild to severe congestion and exudate in trachea, conjunctivitis, these results agreed with studies of Bijanzad & Hosseini, 2013, Ahmed et al., 2009.

A.  B.  C. 

Figure 5: Postmortem lesions in Chronic respiratory disease; A. Conjunctivitis in sick bird, B. Mucoid exudate and mild congestion in trachea, C. Air sacculitis

Prevalence of four salient disease in broiler chickens: Our study (Table 1) showed Colibacillosis infection rate (25.35%) highest and ND prevalence lowest among four diseases (IBD 23.95% and CRD 18.31%). Uddin et al., 2010 reported prevalence value of Colibacillosis and CRD that did not support our study. Study result of

Halder et al., 2021 for Colibacillosis was almost double (52%) than this study as they showed prevalence including all type of chickens. Figure 6 presented disease prevalence of focused diseases in infected birds. Total 55 birds were positive for IBD, ND, CRD and Colibacillosis and positive% of these diseases in these 55 birds was showed in Figure 6.

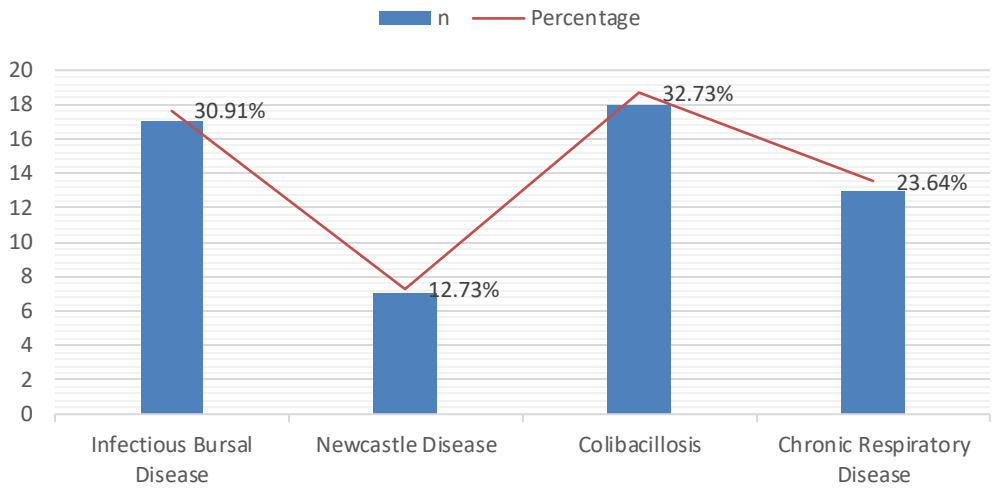


Figure 6: Prevalence% among total 55 cases of focused diseases (Infectious bursal disease, Newcastle disease, Colibacillosis and Chronic respiratory disease)

Sen et al., 2017, Uddin et al., 2010 found close results of IBD (23.58%, 24.96%) and ND (8.23%, 8.92%) prevalence respectively. Islam et al., 2021 reported slightly higher prevalence (25.3%) of IBD than our study. For the cases of ND, Kumar et al., 2016 showed 5.35% positive result; Orsi et al., 2010 said disease frequency of Newcastle disease varied from 1 to 7.6% in Brazil. Bari et al, 2018 also reported 8.95% prevalence of NDV in poultry. CRD is one of the most common avian infections in Bangladesh, which is economically significant and presents new challenges for the country's expanding chicken industry (Prodhan, 2002). It is not a deadly disease like Newcastle or Gumboro disease, but in difficult circumstances, birds may eventually die (Barua et al., 2006). (Barua et al., 2006) showed 49.5% broiler birds were positive for Mycoplasmosis that did not match to our study result. 11.66% CRD prevalence in commercial chickens was reported by (M. M. Rahman et al, 2015) and outcome was lower than ours.

Association between diseases (dependent variable) and probable risk factors (independent variable):

The current study showed that disease prevalence of Infectious bursal disease significantly increased with age. In Table 2, in first 2 weeks of age there were no positive result found, whereas 3- and 4-weeks old birds had 15.78% and 56% prevalence respectively. (Uddin et al., 2010) also found 12.95% positive cases in 3rd

and 4th weeks old bird. (Admassu et al., 2015) showed similar theory. In the study of Sen et al., 2017, the outcome did not support our study as the prevalence% was higher in their study. The similar outcome was noticed in Newcastle disease also, though it was not statistically significant. Here, no positive case was detected in 1st week of age; in 2nd, 3rd and 4th weeks old birds showed 7.69%, 10.52% and 8% prevalence respectively. Sudden surge was noticed in more than 28 days old birds, about 50% positive case was found which was closer to the findings of (Oluwayelu et al., 2014)

Rice husk and Saw dust were the most common litter material used in floor reared broiler chickens. Farm owners prefer rice husk (36%) to sawdust (12%) for broiler houses because rice husk is more readily available than sawdust. By affecting the levels of dust, air humidity, and ammonia, litter quality will have an impact on the birds' environmental hygiene (Hossen et al., 2015). Gumboro was significantly related to the litter material, on the other hand ND was not (Table 2). In this current study, 40% IBD cases were found positive in farms that used rice husk as their primary litter material and 12.19% positive cases were observed in the farms that used saw dust as their litter material which was noticed significant in Chi square test (p value=0.007) (Table 2). This significance might be due to the nature of IBD virus. IBD viruses have a high level of stability and can survive for several months without a host. The IBD virus is excreted in the droppings of infected chickens. The infection can spread to food, drink, bedding, and other litter and equipment. By ingesting the pathogen, other birds get sick. It has been demonstrated that the virus is carried by litter beetles or the smaller mealworm, *Alphitobus diaperinus*, in commercial settings (Tabler, 2018). Chronic respiratory disease prevalence as a result using sawdust as litter material was 31.7% (p=0.0006) (Table 3). A similar report was not found to support this data but epidemiology of CRD might put some light on this risk factor. Infection and clinical sickness may spread quickly through the flock by aerosols and the respiratory tract in stressed birds. Flock-to-flock transmission can happen either directly or indirectly when diseased birds, people, or other fomites migrate between susceptible flocks (Mohamed El-Gazzar, 2022). There are several airborne pollutants produced by the microbial decay of waste and litter, but ammonia and dust stand out (Homidan et al., 2003) The litter is the primary cause of dust emissions in aviary houses. Using sawdust as litter material may cause respiratory distress which aid in development of respiratory infections due to its fineness. The litter type does not seem to be significantly related to ND and Colibacillosis infection. In case of ND, 10% infection was found in the farms that used rice husk as litter, while the farms that use saw dust had 9.75% prevalence (Table 2), whereas Coliacillosis showed a greater percentage (Rice husk 20%, Sawdust 29.26%) than ND.

As for vaccination status, If we look at the association between disease occurrence and vaccination history, the disease prevalence was almost similar in vaccinated and

non-vaccinated birds. But the result found was not statistically significant. In IBD, 24.19% and 22.22% prevalence were found in vaccinated and non-vaccinated birds respectively.

Table 2: Prevalence estimates of Viral diseases (IBD, ND) by different associated risk factors in investigated broiler chickens

Factors	Categories	Sample (N)	IBD		ND	
			Prevalence% (No. Positive)	P value	**Prevalence%** (No. Positive)	P value
Age(days)	1-7	10	0% (0)	0.0001	0% (0)	0.0742
	8-14	13	0% (0)		7.69% (1)	
	15-21	19	15.78% (3)		10.52% (2)	
	22-28	25	56% (14)		8% (2)	
	>28	4	0% (0)		50% (2)	
Flock size	<1000	10	30% (3)	0.5318	0% (0)	0.6905
	1000-<2000	41	17.07% (7)		12.19% (5)	
	2000-<4000	19	31.57% (6)		10.52% (2)	
	≥4000	1	0% (0)		0% (0)	
Floor type	Paved	27	37.03% (10)	0.0428	7.40% (2)	0.5872
	Earthen	44	15.9% (7)		11.36% (5)	
Litter type	Rice husk	30	40% (12)	0.0067	10% (3)	0.9728
	Saw dust	41	12.19% (5)		9.75% (4)	
Vaccination	Yes	62	24.19% (15)	0.897	9.67% (6)	0.8928
	No	9	22.22% (2)		11.11% (1)	
Prev. dis. History	Yes	15	20% (3)	0.6869	6.67% (1)	0.6405
	No	56	25% (14)		10.71% (6)	
Duration of illness	1-3 days	40	20% (8)	0.3764	7.5% (3)	0.4488
	4-7 days	31	29.02% (9)		12.9% (4)	
Foot bath present	Yes	13	30.76% (4)	0.5234	7.69% (1)	0.7718
	No	58	22.41% (13)		10.34% (6)	
Water Source	Deep well	30	23.33% (7)	0.9179	13.33% (4)	0.4009
	tap	41	24.39% (10)		7.31% (3)	

Legends: IBD= Infectious bursal disease, ND= Newcastle disease, Prev. dis. History= Previous disease History

A chick's susceptibility to opportunistic environmental microbes including the ND virus, Marek's disease virus, and IB virus increases with immunosuppression, and its responsiveness to vaccination decreases (Rashid et al., 2013).

Table 3: Prevalence estimates of Bacterial diseases (Colibacillosis, CRD) by different associated risk factors in investigated broiler chickens

Factors	Categories	Sample (N)	Colibacillosis		CRD	
			Prevalence% (No. Positive)	P value	**Prevalence%** (No. Positive)	P value
Age(days)	1-7	10	30% (3)	0.7641	10% (1)	0.8652
	8-14	13	30.76% (4)		15.38% (2)	
	15-21	19	31.57% (6)		15.78% (3)	
	22-28	25	16% (4)		24% (6)	
	>28	4	25% (1)		25% (1)	
Flock size	<1000	10	10% (1)	0.4496	50% (5)	0.0451
	1000-<2000	41	31.7% (13)		12.19% (5)	
	2000-<4000	19	21.05% (4)		15.78% (3)	
	≥4000	1	0% (0)		0% (0)	
Floor type	Paved	27	22.22% (6)	0.6349	25.92% (7)	0.1937
	earthen	44	27.27% (12)		13.63% (6)	
Litter type	Rice husk	30	20% (6)	0.3752	0% (0)	0.0006
	Saw dust	41	29.26% (12)		31.7% (13)	
Vaccination	Yes	62	-	-	-	-
	No	9	-		-	
Prev. dis. History	Yes	15	66.67% (10)	0.9382	46.67% (7)	0.8411
	No	56	14.28% (8)		10.71% (6)	
Duration of illness	1-3 days	40	5% (2)	0.2283	10% (4)	0.346
	4-7 days	31	51.61% (16)		29.03% (9)	
Foot bath present	Yes	13	15.38% (2)	0.3607	30.76% (4)	0.1987
	No	58	27.58% (16)		15.51% (9)	
Water Source	Deep well	30	26.67% (8)	0.8276	20% (6)	0.7528
	tap	41	24.39% (10)		17.07% (7)	

Legends: CRD= Chronic respiratory disease, Prev. dis. History= Previous disease History

The result observed in, (Sen et al., 2017) were 29% vaccinated and 11% in non-vaccinated birds. In ND, the prevalence was 9.67% and 11.11% in vaccinated and non-vaccinated which supported the findings of (Sahoo et al., 2022; Sen et al., 2017). Even in populations who have received vaccinations, there have been several ND outbreaks in chickens recorded in North and Central America, Europe, Asia, the Middle East, and Africa (Sahoo et al., 2022). This could be due to vaccination failure, improper cool chain maintenance, not maintaining the schedule etc.

The prevalence of Collibacillosis were 30%, 30.76% 31.57% and 16% in 1st, 2nd, 3rd and 4th week accordingly. (Rahman et al., 2004) showed prevalence of all age groups of chickens (9.52 to 36.73%) that found to similar result as our study of avian colibacillosis, with adult chickens showing a particularly high prevalence rate (36.73%). On the other hand, 10%, 15.38%, 15.78% and 24% were the prevalence of CRD found in the birds of 1st to 4th week old chronologically. Ferguson-Noel et al., 2020 supported this outcome.

Chapter 4: Conclusion

In conclusion, it was observed that bacterial diseases cause more severe infection rate than other groups of pathogens in broiler and most prevalent diseases were Colibacillosis, Infectious bursal disease, Chronic respiratory disease and Newcastle disease. This present study showed overall scenario of disease prevalence in commercial broiler farms. Prevalence percentage among bacterial diseases was higher in Colibacillosis and among viral diseases was higher in IBD. Colibacillosis, ND and CRD can cause respiratory distress in chickens and showed variable level of infection in respiratory system. It was also noticed that even after routine vaccination, IBD and ND occurrence was high which arises question regarding quality of the vaccines also indicates poor management. Findings of this study may become fruitful and aid other researchers and poultry consultants to outline study design and conduct research on specific diseases and may take necessary measures to control these deadly diseases.

Limitations

The study was conducted for short period of time, so the seasonal variation in disease status could not be described. The sample size was small, and the tentative diagnosis was done only based on gross lesions found in necropsy.

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