1. **INTRODUCTION CHAPTER-I**

The economy of Bangladesh is agro based. About 21.77% of Gross Domestic products (GDP) come from agriculture sector of which livestock alone shares 7.23% BBS, (2005-2006). Within the livestock sector poultry has the highest contribution in GDP. Poultry industry is an important part of agriculture in our country. Poultry farming is gradually taking the shape of a large industry, and it is now one of the intensive forms of agri-business in our country. In order to achieve the Millennium Development Goal (MDG), Bangladesh is committed to develop the poultry sector. The total poultry population, both backyard and commercial, accounts to approximately 246 million, providing 5400 million pieces of eggs annually and nearly 15% of total animal protein. This sector employs about 5 million people of the country and has experienced a long-term growth rate of about 4.5%, which is one of the highest in the economy and is believed to have accomplished a silent revolution in Bangladesh BLRI, (2008).

Some diseases create problems to run poultry farming profitably such as Colibacillosis, Salmonellosis, Newcastle disease, Mycoplasmosis, Infectious bursal disease, Coccidiosis, Necrotic enteritis.etc. Among these Colibacillosis is a threat for both commercial poultry and backyard poultry farming.

Escherichia coli (E. coli), popularly known as Colibacillosis disease, is recognized as one of the most important problems and most serious economic threat to the poultry population of Bangladesh. The disease is acute infectious which is characterized by sudden onset and rapid spread within the flock resulting high morbidity and mortality. The causal agent, Escherichia coli bacteria disease , is a Gram negative-bacteria. Colibacillosis disease (E. coli) is a highly infectious bacterial disease that attacks many species of domestic and wild birds Al*-*Garib *et al***., (**2003). Through restriction site mapping and sequence analysis of the gene, E. coli strains have been divided into four serotypes Gross *et al.,* (1995). Over many years, the most common serotypes are 01, 02, 035, 0157:H7 and 078 (47, 78). Many other serotypes have been found less frequently while some pathogenic isolates do not belongs to known serotypes or are untypeable. On their pathogenicity in chickens (Beard and Hanson, 1984). E. coli is reported as the most important viral disease of poultry in the world including developing countries Spradbrow *et al.*, (1997). In Africa and Asia E. coli is a major constraint against the development of both industrial and village poultry production. E. coli infections of poultry range from latent to gradually fatal depending upon the pathotype of bacteria involved Alexander, (2003). The transmission of E. coli 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). The disease causes high economic losses due to high mortality, morbidity, stress, decreased egg production and hatchability Alexander, (2000). E. coli may be sensitive to many drugs such as ampicillin, chlorumphenicol, colistin chlortetracycline, neomycine, nitrofurans, ormethiprim-sulfadimethoxine, oxytetracycline, and sulfa drugs. Recently fluoroquinolones (enrofloxacin, sarafloxacin) have become available in the market for treatment of colibacillosis in poultry , which have generally proved to be efficacious. Isolates of E. coli from poultry are frequently resistant to one or more drugs, especially if they have been widely used in the poultry industry over a long period (e.g tetracyclines).It is imperative to determine drug sensitivity of E. coli strains involved in a disease outbreak so that ineffective drug can be avoided. Even a highly effective drug may not result in improvement of the flock if too little is used or it is reaching the site of infection. Underdosing stimulates development of reistance. The infection still occurs in Bangladesh every year in the form of endemic and appears to cause up to 20-30% of the total mortality in poultry population creating one of the major problems in the development of poultry industry in Bangladesh Chowdhury *et al*., (1982a). Chicks from immunized parents possess high level of maternally derived antibodies (MDA) which protect them against other infections like virulent viruses Allan *et al*., (1978) and Rahman *et al.,* (2002). It was reported that MDA are protective Allan *et al*., (1978) and neutralize vaccine virus if the chicks are vaccinated in the presence of high level of MDA Awang *et al.,* (1992). In order to formulate appropriate medication and control measures the pathological status of E. coli among chickens need to be elucidated.

Considering all the facts the present study was undertaken with the following objectives:

1. To detect the prevalence of colibacillosis and other diseases of commercial poultry in Chittagong metropolitan area.

**2. REVIEW OF LITERATURE** **CHAPTER-II**

**2.1. General feature**

Escherichia coli is a infectious bird disease affecting many domestic and wild avian species. First found in German-Austria, Uropian country in 1885, then by Burnet in 1943 in Australia in connection with laboratory infection where the bacteria was isolated from in intestinal discharge of a patient to show the specific antibody titre in the patient's blood. Escheria coli is a gram negative, non acid fast ,uniform staining, non- spore-forming bacillus, usually 2-3×0.6µm. The organism may be variable in size and shape. Many strains are motile and have peritrichous flagella. In one study (76), 57% of isolates were motile. Its effects are most notable in domestic poultry due to their high susceptibility and the potential for severe impacts of an epizootic on the poultry industries. It is endemic to many countries.

Escherichia coli infection disease was discovered in German-Austria, Europian country in (1885) but also at this time slightly different strains were found in other parts of the world.

Exposure of humans to infected birds (for example in poultry processing plants) can cause mild [conjunctivitis](http://en.wikipedia.org/wiki/Conjunctivitis) and influenza-like symptoms, but the E. coli disease bacteria otherwise possess no hazard to human health. Escherichia coli may be sensitive to many drugs such as ampicillin, chlorumphenicol, chlortetracycline, neomycine and sulfa drug. But the use of prophylactic treatment and sanitary measures reduces the likelihood of outbreaks.

|  |
| --- |
|  |

**2.1.1. History of Colibacillosis disease**

Colibacillosis disease (E. coli) is an subacute infectious disease of poultry. The first outbreaks of (E. coli) occurred in 1885, in German-Austria, Europian country, (1885), .An outbreak also occurred in Germany in 1927 Edwards, (1928

Escherichia coli , popularly known as colibacillosis disease, has found to appear every year in the form of endemic, which causes 20-30% of the total mortality rate of poultry population in Bangladesh Chowdhury, (1982b). Kamal and Hossain, (1992) made surveillance on disease outbreaks and bird mortality in an organized poultry farm of Bangladesh Agricultural University, which revealed that the prevalence of Colibacillosis was the highest (24.65%). However, colibacillosis is frequently responsible for most of the losses in village poultry Alexander, (2000).

**2.1.2.** **Etiology**

Colibacillosis disease is caused by Escherichia coli gram negative non-acid-fast, uniform staining, non spore forming bacillus bacteria. Okamotm *et al*., (1993). Strains of Escherichia coli bacteria have been distinguished on the basis of the clinical signs produced in the infected chickens. On this basis Escherichia coli have been placed in four serotypes or groups have been 01, 02, 035, 078, and 0157 Gross *et al*, (1964):

**2.1.3. Epidemiology**

Escherichia coli infections have been established in species of birds representing 27 of the 50 orders of the class Kaleta and Beladauf, (1988).

Escherichia coli is transmitted from birds to birds horizontally as follows Alexander, (1988):

(a) Direct transmission: Inhalation of aerosols or dried faeces (fast); ingestion of contaminated faeces (slow).

(b) Indirect transmission: Humans, poultry products, fomites, food, etc.

Routes: Nasal, oral, ocular.

Pathogenesis

Ingestion / inhalation of infected material - replication take place in the intestinal tract especially midle to lower intestine. The various types of E. coli are intestinal inhabitants of animal and birds; therefore, they have a cosmopolitan distribution. Clinical disease is reported most often in chickens, turkeys, and ducks. Escherichia coli is a common inhabitant in the intestinal tracts of poultry at concentration up to 10/g. Higher numbers are found in younger birds, birds without an established normal flora, and in the lower intestinal tract. Incubation period: 2-15 days (avg. 5-6 days).

**2.1.4. Clinical signs**

Clinical signs depend on virulence and tropism of the bacteria, the age of the bird and the immune status of the birds, the route of exposure, the magnitude and duration of the infecting dose, the susceptibility of the host species, and external factors social stress and temperature Mcferran and McCracken, (1988).

In per-acute case: sudden death.

 Mortality up to 20%. Listlessness, weakness, depression, oedema of the head and wattles, greenish diarrhoea. The appearance of soft-shell or misshaped eggs, followed by gradually decreasing of egg laying Alexander, (19

 Sudden respiratory distress, dullness, dehydration, off feed, weakness, drowsyness, and drop in egg production (Alexander, 1997). Respiratory tract infection-E. coli often infect respiratory tracts of birds,usually which other infection like bronchitis, Newcastle disease and mycoplasmosis.

Haemorrhagic lesions of the gastrointestinal tract, especially the small intestine, may vary considerably in size and severity Spradbrow, (1987). Tracheitis, often haemorrhagic. Air-sacculitis, appear cloudy and congested. Thickening of the air sacs with catarrhal or caseous exudates is often observed Beard and Hanson, (1984).

**2.1.5. Diagnosis**

Gross lesions

Samples for bacteria isolation and identification: Cloacal swabs or intestinal content or feces, lung, brain, liver, spleen, kidneys, and heart tissues. Culture can be done in agar and broth as a ordinary nutrient media at temperature of 18-44 C or lower. On agar plates incubared for 24h 37 C, colonies are low, convex, smooth and colorless. E. coli grows well in broth, producing turbid growth. Agar such as Eosin methylene blue, a presumptive diagnosis of E. coli infection can be made if most of the colonies are characteristically dark with a metallic sheen on EMB agar, bright pink with precipitate in medium of MacConkey agar,and yellow on tergitol-7 agar.

**3. MATERIALS AND METHOD CHAPTER-III**

**3.1.1. Study area**

The present study work was conducted at Chittagong metropolitan area in Bangladesh. The laboratory work was done in pathology lab, CVASU and Chittagong veterinary lab, Khulshi, Chittagong.

**3.1.2. Study population**

A total of 67 birds were examined from 52 commercial broiler farms and 15 layer farms (one from each farm). Birds were postmortemed for lesions that were randomly brought from different farms of Chittagong metropolitan area into pathology laboratory, CVASU for postmortem diagnosis and treatment .

**3.1.3. Season**

The study was conducted in summer season (April to November , 2014.)

**3.2.1. Post mortem examination**

Here poultry diseases were diagnosed on the basis of clinical history, clinical signs and postmortem findings. Postmortem examination of dead and clinically diseased birds was performed at pathology lab, CVASU.

**Tools required for postmortem examination**

* Postmortem tray
* Scissors
* Simple forceps
* Gloves
* Masks

**Measures taken before postmortem examination**

* At first general inspection was done on dead birds for detecting any defects or abnormalities that were present externally.
* After that a close inspection was done regarding the state of eye, presence or absence of litter materials in the beak.
* Then the birds were sprinkled with water for preventing any dust.
* Then the abdominal cavity was opened & inspection of visceral organs was done. Then the inspection of heart, lungs, air sac, proventiculus, uterus , and liver, intestine was done both internally & externally for detecting any sorts of lesions.
* The caecal tonsil & bursa also inspected.
* Lungs & air sacs were inspected for edema & caseous exudates respectively.
* Overall the internal organs were viewed at a glance.
* The oesophagus, trachea were also inspected for detecting lesions.

**Measures taken after postmortem examination**

* The birds were properly disposed by burial.
* The lesions on different organs that were found were noted down in the questionnaire.
* Then the tentative diagnosis was done in relation to lesions.

**3.3.1. Diagnosis of diseases**

The bird was examined systematically and recorded on the basis of standard postmortem changes during necropsy Charlton, (2000).

**Colibacillosis**

The clinical signs showed that sick birds were dullness, depression, reduced intake of food and water, huddling at the corner of the shed, loss of body weight, brown color droppings etc. Post-mortem examination revealed pericarditis, petechialhaemorrhages and formation of the fibrinous layer on the heart, air sac infection, enteritis, dilation of the last part of the intestine.

**Different form of colibacillosis-**

**Pericarditis :**

Most E. coli serotypes cause pericarditis following septicemia. Pericarditis is usually associated with myocarditis. The pericardial sac becomes cloudy and epicardium becomes edematous and covered with alight color exudate. The pericardial sac often fills with a light-yellow, fibrinous exudates.

**Salpingitis :**

When the left abdominal air sac is infected by E. coli, females may develop chronic salpingitis characterized by a large caseous mass in adilated, thin walled oviduct.

**Peritonitis :**

Coliform infection of the peritoneal cavity occurs in laying hens and is characterized by acute mortality, fibrin ,free yolk.

**Synovitis :**

E. coli cause joint infection in chickens. Lesions may develop in joint space of articulating thoracolumber vertebrae causing spondalytis and progressive paresis and paralysis.

**Panophthalmitis :**

Panophthalmitis is an uncommon sequela of E. coli septicemia. Thre is hypopion, usually of one eye.which is blibd.

**Coligranuloma :**

Coligranuloma of chickens is characterized by formation of granuloma in liver, ceca, duodenum, and mesentery.It is a relatively uncommon coliform disease. Mortality as high as 75%.

**Acute septicemia :**

An acute infectious disease resembling fowl typhoid and fowl cholera from which E. coli can be isolated. The most characteristics lesions are green liver, marked splenomegaly, and congested muscle. As in coliform sepricemi associated with respiratory disease, there is a tendency toward pericarditis and peritonitis.

**Salmonellosis :**

The affected layer birds exhibited somnolence, ruffled feather, whitish to greenish diarrhoea; chalky white excreta adhered with the vent & anemic comb and wattle. Postmortem examination revealed enlarged and necrotic foci on liver, inflammation in oviduct, mishappened egg.

**Infectious bursal disease:**

The recorded clinical signs were soiled vent, feathers, whitish or watery diarrhea, anorexia, trembling, severe prostration and death. Post-mortem lesion includes pint point haemorrhage in the thigh and breast muscles, enlarged and necrosed bursa of fabricius, yellowish gelatinous membrane found over the swollen bursa, hemorrhage on the bursa. Mucous containing drooping found in the ascending part of small intestine.

**Necrotic enteritis:**

The affected birds showed dullness, dehydrated.watery diarrhea with blood stain. The postmortem lesion showed hemorrhage in intestine, thickened mucosa.

**Omphalitis :**

Birds were found dead without showing any clinical signs & some were lethargic and depressed with poor growth performance. The necropsy examination revealed that considerable thickened unabsorbed yolk in all dead chicks, abdominal contents cloudy and malodorous, and yolk appeared highly inflamed, thickened and edematous. The blood vessels around the yolk were highly congested.

**Coccidiosis :**

Clinical findings of coccidiosis were ruffled feather, drowsiness, bloody diarrhea, anemia & high mortality. Post mortem examination showed that hemorrhage on caecal tonsil, loss of tonicity of two caeca, clotted blood engorged in caecum, white foci present in the mucous membrane of intestine, catarrhal enteritis.

**Mycoplasmosis :**

The clinical finding showed that ocular-nasal discharge, gasping on mouth, lower feed consumption etc. Post- mortem examination showed that catarrhal exudates in nasal and para nasal passages, trachea, bronchi, cloudy air sacs and congestion of the lungs.

**Aspergillosis:**

the clinical findings of birds were dysponea, gasping. Labored breathing.the postmortem examinations were white caseous nodule in the lung or air sac of affected birds. Yellow white pin point hemorrhage in body cavities was present.

**New castle disease (ND) :**

The affected birds showed dehydrated, dullness, some neurological signs. The postmortem examinations were pin point hemorrhage in tip of gland of proventriculous, haemorrhagic tracheitis also present.

**CRD :**

The affected bird showed dyspnea, coughing. Post mortem examination was hemorrhage in trachea, congested lung, and cloudy air sac.

In case of mixed infection, both clinical and postmortem examinations were present, sometimes it was complicated.

**3.5. Statistical analysis:**

All the recorded and calculated data were analyzed by one-way ANOVA (Steel and Terrie, 1980). Values were expressed as mean [+ or -] SE. All the statistical analyses were performed using SPSS statistical software (Ver.11.5 for windows, SPSS).



**Postmortem findings of Colibacillosis disease**



**Metallic sheen on Eosin Methylene Blue Agar**

**Precipitate on MacConkey Agar**

 **4. RESULT AND DISCUSSION** **CHAPTER-IV**

The prevalence of colibacillosis disease at commercial broiler and layer farm in Chittagong metropolitan area in the month of April to November, 2014 was 11.94%. The prevalence of other diseases were Newcastle disease 06 (8.95%), Mycoplasmosis 05 (7.46%), Salmonellosis 03 (4.48%), Omphalitis 04 (5.97%), Coccidiosis 09 (13.43%), Gumboro 11 (16.42%), Newcastle disease 06(8.95%),Brooder pneumonia 04(5.95%),Necrotic enteritis 05 (7.46%),CRD 02(2.99%) and colibacillosis and Coccidiosis 05 (7.46%),Mycoplasmosis, colibacilosis 03(4.48%) and managemental problems 02 (2.99%). (Table:4.1).

**(Table: 4.1): Diagnosis of the diseases on the basis of postmortem examination**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Total farm** | **Case type** | **Name of diseases** | **No. of farm affected** | **(% ) Positive** |
| 67 farms | single | Collibacillosis | 08 | 11.94 |
| single | Salmonellosis | 03 | 4.48 |
| single | Omphalitis | 04 | 5.97 |
| single | Necrotic enteritis | 05 | 7.46 |
| single | Gumboro | 11 | 16.42 |
| single | ND | 06 | 8.95 |
| single | Brooder pneumonia | 04 | 5.95 |
| single | coccidiosis | 09 | 13.43 |
| single | Mycoplasmosis | 05 | 7.46 |
| single | CRD | 02 | 2.99 |
| Mixed | Colli +cocci | 05 | 7.46 |
| Mixed | Myco +colli | 03 | 4.48 |
| Mixed | Managemental problem | 02 | 2.99 |

The prevalence of Colibacillosis disease was 11.94% which was higher than the diseases like Gumboro, Coccidiosis and Salmonellosis disease in that time. This finding was higher than the findings of Islam *et al.,* (2003) and Bell *et al.,* (1990).This variation may be due to the difference of study period and study area.

The present result was higher than the results of Bell & Moulodi, (1988) and Courtecuisse *et* *al*., 1990). The findings of Minga *et al.*, (1989) and Chryostome *et al.,* (1992) was lower than the present study. This may be due to their study on good management and proper sanitary measures was maintained.

The result of this study was higher than the result of Courtecuisse *et al.*, (1990). It might be due to the prophylactic managemental variation and biosecurity practices.

**4.1 Mortality rate before and after treatment**

The mortality rates of Colibacillosis affected flocks were observed from history. At the initial stage of infection (before treatment) the mortality rate was about 5.5%. After providing treatment the mortality rate reduced to zero (Table: 4.1). This may be due to proper treatment against Colibacillosis that was increased the protective capability which prevents the infection.

**5. CONCLUSION CHAPTER-V**

Colibacillosis disease is a threat for poultry industry which causes high mortality and morbidity. The prevalence of Colibacillosis disease was moderately high in the month of April to November, 2014. There are many antibacterial drugs are available for treating the birds affected with Colibacillosis disease. An excellent management system of this disease can be practiced by using various bacteriostatic drugs and proper sanitary measures apply at initial stage of infection. This may increase the protective index level of the flock gradually against Colibacillosis when the flock was previously provide any precaution with any short of proper management and antibacterial drugs. Ultimately it may reduce the mortality rate of the flock affected with Colibacillosis.

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**APPENDIX CHAPTER-VII**

Questionnaire which was used for Data collection:

Diseases diagnosed in chickens by postmortem examination

Date: Sample No.:

1. Name of the owner & address:................................................

2. Total no. of birds:....................................................................

3. Total death to date:..................................................................

4. Age of the birds:......................................................................

5. Type of feed: a) mash b) pellet ………………………..............

6. Strain:....................................................................................

7. When the bird was died:.......................................................

8. Clinical signs described by the owners:………….…………..

9. Postmortem findings:

Head……………….......…… Spleen…………………....……..

Trachea……………………… Proventriculus………......………

Lung ……………………….. Gizzard………………………….

Liver ……………………… Air sac…………………………..

Intestine …………………… Caecal tonsil ……………………

Bursa ……………………… Yolk sac ……………………..….

others……………………..

10. Vaccination history:……………………………………………….

11. Tentative diagnosis based on post mortem examinations: ………

12. Treatment given: Rx………………………………………....……

……………………………………………………

 **Signature of the interviewer**