

Original Research Article

The Incidence, Morbidity and Mortality of the Diseases of Broiler Birds in and around NDUAT, Kumarganj, Faizabad

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ABSTRACT

A study was conducted to record the incidence, morbidity and mortality of the diseases of broiler birds in and around NDUAT, Kumarganj, Faizabad and also to describe the clinical signs and gross lesions in various organs particularly lung, liver, kidney and intestine in different diseases. The naturally dead broiler birds from 4 different private farms around NDUAT, Kumarganj, Faizabad was collected for one year (May, 2016 to April, 2017). After postmortem examination, the grossly suspected samples (lung, liver, kidney, heart and intestine) were kept for further bacteriological examination. Samples were also collected from the ailing birds of the concerned farms. For bacteriological study, the aseptically collected materials were inoculated in nutrient broth and streaked on Mac Conkey's agar and EMB (Eosin Methylene Blue) agar. The positive *E. coli* isolates gave pink coloured colonies on Mac Conkey's agar medium and "metallic sheen" on EMB agar. The isolated strains were identified on the basis of cultural, morphological and bio-chemical characteristics. The suspected salmonella isolates produced red colonies on brilliant green agar media. 276 (colibacillosis) and 55 (yolk sac infection) were found to be suggestive of *E. coli* giving typical large (2-3mm) lactose fermenting pink coloured colonies on Mac Conkey's agar plate. Seventy four (74) cases of salmonellosis were diagnosed in one of the farm selected for the present study on the basis of history, clinical signs, gross pathological lesions in the dead birds. The present investigation identified a number of maladies responsible for morbidity and mortality of broilers. The incidence of the diseases viz. infectious bursal disease, hydropericardium-hepatitis syndrome, yolk sac infection, Salmonellosis, Mycoplasma-colibacillosis Complex, Colibacillosis, gout, Aspergillosis and choline deficiency was found in the present study area. The highest broiler proportionate mortality in the present investigation was recorded 75.65% due to Aspergillosis. This was followed by Salmonellosis (70.27%), Yolk sac infection (56.36%), Colibacillosis (54.71%), Mycoplasma-colibacillosis complex (54.54%), Infectious bursal disease (42.85%), Choline deficiency (42.85%), Hydropericardium hepatitis syndrome (41.43%) and Gout (41.26%).

Keywords

Broiler birds,
Diseases,
Incidence,
lesions

Introduction

Poultry farming is the most dynamic sector in the field of animal husbandry in India and become very popular day by day to fight against poverty, unemployment and

malnutrition. But the problem of poultry diseases in India has created an embarrassing situation. The exotic breed effected with various type of diseases make

the situation worse. The adoption of genetical hybridization geared up the country but simultaneously exotic diseases encroached the indigenous breed also. The diseases have a catastrophic potential for spread on a large scale. To sustain the loss and achieve successful broiler production, it needs investigation about the incidence and pathology of the poultry (broiler) diseases. In most of the diseases liver, lung and kidney are affected. During necropsy, it is observed that these organs are the major organ frequently affected in most of the poultry diseases either primary or secondary diseases. Scientific breeding, feeding, management and disease control are the key point of success in poultry improvement program. One of the major constraints in the development of the poultry industry is the outbreak of the diseases, which cause about 30% mortality of chicken in every year (Ali, 1994). A thorough knowledge about the epidemiology, pathogenesis and pathology of a particular disease in a prerequisite for proper diagnosis of the malady, as well as for the prevention and control of the disease is required. Among the various diagnostic procedure necropsy remain in the key position. Considering the above mentioned facts, a pathological investigation on the diseases of broiler was undertaken to study the incidence, morbidity and mortality of the diseases of broiler birds in and around NDUAT, Kumarganj, Faizabad.

Materials and Methods

For the present study, four different private poultry farms around NDUAT, Kumarganj, Faizabad were selected. The poultry farms were at Bawa (Farm No. 1), Haliyapur (Farm No. 2), Soraon (Farm No. 3) and Itauja, Pithla (Farm No. 4). The farms were visited every day and the morbidity, mortality, age of affection of various diseases was recorded. The dead birds were

collected and taken to the department of Veterinary Pathology, C.V.Sc & A.H, NDUAT, Kumarganj for necropsy and diagnosis of diseases. The diagnosis of the different diseases was based on the history, clinical signs and characteristic gross tissue alterations.

The clinical signs exhibited by the individual birds during illness were recorded in detail according to the descriptions of the respective poultry farm owners. In addition, sometimes some sick birds were kept under careful observation with feed and water ad libitum till death to record the detail clinical signs along with other abnormalities and all of them were necropsied soon after death. The naturally dead broiler birds from the above different private farms were collected for one year (May, 2016 to April, 2017). After postmortem examination, the grossly suspected samples (lung, liver, kidney, heart and intestine) were kept for further bacteriological examination and the observed lesions were recorded. Samples were also collected from the ailing birds of the concerned farms.

From the suspected dead bird pieces of liver, heart, lungs, kidneys and intestine were collected aseptically in sterile vial separately and were brought to the laboratory under ice coverage for the further study. Broiler chickens with suspected *E. coli* infection and omphalitis were collected within 6 hours of death. Sample processing was done in bacteriological laboratory of the Department of Veterinary Microbiology of this college. The method described by Cruickshank *et al.*, (1975) was used for the isolation of *E. coli* and *Salmonella* species. Characterization and identification of the organisms were done on the basis of morphology, motility, colony characteristics and biochemical properties as per the method of Edwards and Ewing (1972).

Results and Discussion

Bacteriological study

Isolation and identification of *E. coli*

Among tested samples from dead birds of different farms, 276 (colibacillosis) and 55 (yolk sac infection) were found to be suggestive of *E. coli* giving typical large (2-3mm) lactose fermenting pink coloured colonies on Mac Conkey's agar plate. They again produced characteristic 'metallic sheen' on EMB agar (Fig.1). On Gram staining during morphological study, they produced pink coloured, rod shaped ones (i.e. gram negative) with characteristic arrangement.

Bio-chemical characteristics of *E. coli*

The presumptive *E. coli* isolates had shown typical bio-chemical reactions which confirmed these isolates. All these isolates showed typical biochemical reaction which was positive to Indole test, M.R. test, T.S.I. agar test, nitrate reduction test and negative to VP test and H₂S production test. Among 331 *E. coli* isolates, 97.89% were negative to citrate utilization test and 96.97% to urease activity test. Out of 331 isolates of *E. coli*, 317 were motile. They all fermented D-glucose, lactose, manitol. Among 331 isolates of *E. coli*, 219 (66.16%) isolates, 236 (71.29%) isolates and 199 (60.12%) isolates had shown fermentation of sucrose, dulcitol and salicin respectively. Only eight isolate fermented adonitol. The result of biochemical reaction of *E. coli* are presented in Table 1.

Isolation and identification of *Salmonella* organism

Seventy four (74) cases of salmonellosis were diagnosed in one of the farm selected

for the present study on the basis of history, clinical signs, gross pathological lesions in the dead birds. For the bacteriological screening, materials were taken aseptically from heart, liver, lungs, spleen and intestine from the grossly suspected dead birds due to Salmonella.

The suspected salmonella isolates produced red colonies on brilliant green agar media (Fig. 2). On nutrient agar it produced gray white moist circular disc with smooth convex surface on entire edge.

On Mac-Conkey agar, colonies were pale yellow or red or colourless. Again on gram staining, the organisms were gram negative. On biochemical test the organisms were lactose non-fermenting, positive to methyl red test, citrate, glucose, nitrate reduction and H₂S production. The isolates were negative to the biochemical reaction to indole, urease and V.P. test.

Pathological study

The present pathological investigation identified a number of maladies responsible for morbidity and mortality of broilers. Diseases of broilers diagnosed in four farms along with morbidity, mortality patterns and age of the affected birds are shown in Table 2. Overall prevalence of diseases of broilers with their age susceptibility and case fatality rate is shown in Table 3.

The highest broiler proportionate mortality in the present investigation was recorded 75.65% due to Aspergillosis. This was followed by Salmonellosis (70.27%), Yolk sac infection (56.36%), Colibacillosis (54.71%), Mycoplasma-colibacillosis complex (54.54%), Infectious bursal disease (42.85%), Choline deficiency (42.85%), Hydropericardium hepatitis syndrome (41.43%) and Gout (41.26%).

Infectious bursal disease

A total of 42 broiler birds were found to be affected by infectious bursal disease in Farm 3 of which 18 birds died. Morbidity rate was 1.68% and mortality rate was 0.72%. All affected birds were at the age group between 22 to 28 days. The affected birds showed diarrhoea ruffled feather, sitting quiet with closed eyes, vent pecking and trembling before death. The bursa of Fabricius was swollen, enlarged, haemorrhagic, necrosed and sometimes contained yellowish caseous mass. Occasionally haemorrhages were observed at the junction between proventriculus and gizzard. Lungs were also congested and haemorrhagic. Kidneys were also swollen and haemorrhagic. There were punctate haemorrhages at the thigh muscle. The affected birds exhibited increased mucus in the intestine.

Hydropericardium-hepatitis syndrome

A total of 70 cases of hydropericardium-hepatitis syndrome were recorded of which 39 birds died at the farm 1 and farm 2 at the age between 29-35 days. Morbidity varied from 1.93 to 2.03% and mortality varied from 0.80 to 0.85%. The infected birds showed hardly any symptoms. Only, the dead birds were found among apparently healthy lots. At necropsy, the carcasses were found on good flesh with generalized congestion, edema and ascites. Sometime bloody exudate was found in the abdominal cavity. The pericardium was thickened and pericardial sac contained excess clear transparent fluid which gave the heart appearance of peeled Leechi. Besides, heart muscles were congested and severe petechial haemorrhage were found on the base of the heart. Liver was enlarged, pale in colour and congested with nodular focal necrosis in many cases. Kidney were enlarged and congested. Intestine was found

haemorrhagic. Spleen became congested, dark and atrophied. Lungs revealed generalized congestion and oedema.

Yolk sac infection

During first week of age 31 out of 55 (56.36%) affected chicks were died due to omphalitis or yolk sac infection in two farms. Broiler chicks upto one to two weeks ages were affected. The affected birds showed depression and aggregation around the source of heat. Necropsy examination revealed considerably thickened unabsorbed and edematous yolk in all the dead chicks. The content of the sac were cloudy and malodorous. There were congested blood vessels around the yolk. The livers in few chicks were markedly pale.

Salmonellosis

This investigation recorded a total of 74 cases of salmonellosis of which morbidity was 3.7% and mortality 2.6%. The affected and dead birds were between 8 to 12 days of age. The affected birds had a tendency to huddle near the source of light. The birds were dull and depressed. The affected birds showed loss of appetite, fever and diarrhoea. The liver was enlarged and congested and in few cases liver revealed punctiform haemorrhages and focal necrosis. Petechial haemorrhages were seen in spleen, base of the heart and kidney. Lungs were pneumonic in some cases. There was catarrhal inflammation in the intestine.

Mycoplasma-colibacillosis complex

Among the infected 44 chicks, 8-22 day old, 24 were died due to this malady with morbidity rate 2.2% and mortality rate 1.2%. The affected birds had sneezing, coughing, respiratory distress with loss of appetite and diarrhoea. Presence of catarrhal exudates in

nasal passage and trachea, petechial haemorrhage on spleen and base of the heart were observed. Thickening of the air sac, fibrinous perihepatitis and pericarditis with extensive deposition of fibrin on the surface of visceral organs were also noted.

Colibacillosis

In the present study, colibacillosis was recorded in all the four farms. Among 276 affected birds, 151(54.71%) were died. The age group of affected birds were 10-28 days. The morbidity rate varied from 2.72-4.5% whereas mortality rate varies varied from 1.48-2.55%. The affected birds showed loss of appetite, depression, dyspnoea and diarrhoea. Sometimes paste like faeces soiled the vent feathers. The gross changes of liver were found as enlarged, congested and covered with thick yellow/white serofibrinous covering. The serofibrinous membrane covered the liver either partially or completely that differs with degree and severity of infection. In intestine hemorrhages, congestion and edematous swelling were noted Heart was also covered with thick yellow/white serofibrinous covering. In severe *E. coli* infection the sero-fibrinous membrane covered all the visceral organs continuously.

Gout

This investigation recorded a total of 63 cases of gout of which morbidity was 2.52% and mortality was 1.04%. The affected birds were between 6 to 14 days of age. In the present study, it was observed that the onset of the disease was sudden. The birds showed dull appearance, unthriftiness, reduced feed intake resulting in uneven sizes, gradual emaciation, loss of body weight, polyuria and diarrhoea. Deaths were sudden. Rapid screening examination of all the birds disclosed dehydrated carcasses. Chalky

white deposits were seen over the subcutaneous tissues, liver, kidney, heart, lungs, spleen, surface of the breast muscle and serosal surface of the gastrointestinal tract and in air sacs. The pericardium was thickened and had a plaster like appearance. The kidney was enlarged with urate deposition in ureters, harder in consistency. Liver was enlarged, friable and congested. Lungs were edematous, congested. In some cases, along with surface of visceral organs, articular surface particularly hock joints, revealed white chalky urate deposition. The joints were enlarged, swollen. When the joints were opened, the peri-articular tissues were white due to urate deposition and white semifluid deposits of urates were found within the joints.

Aspergillosis

Aspergillosis was diagnosed in 115 chicks of 8 to 14 days of age. The morbidity varied from 1.4-3.48% and mortality varied from 1.1-2.6%. Among them 87 birds were died. The affected birds showed dyspnoea, depression and emaciation with loss of appetite and increased thirst. Most of the birds found severely emaciated and cachectic. Yellowish and /or whitish nodules of different sizes and shapes were found mainly in the lung, air sac, pleura and peritoneum. Presence of mucus in trachea and bronchial mucus plugs were seen. Multifocal granulomatous / nodular (small) pneumonic lesions were found in the lungs.

Choline deficiency

A total of 14 birds were affected due to choline deficiency at the age of 14-18 days old. Among them 6 birds were died. The affected birds showed no specific symptoms except poor growth. At necropsy, the liver revealed fragile and accumulation of yellowish fat in the abdomen.

Table.1 Result of bio-chemical reactions shown by *E. coli* isolates of different farms

Bio-chemical reaction	Positive		Negative	
	Number	Percentage	Number	Percentage
Indole test at 37 ⁰ C	331	100	-	-
Methyl Red	331	100		
Voges Proskauer	-	-	331	100
Citrate utilization	7	2.11	324	97.89
Urease activity	10	3.02	321	96.97
T.S.I. Test	331	100	-	-
H ₂ S Production	-	-	331	100
Nitrate Reduction	331	100	-	-
Motility	317	95.77	14	4.23
D-glucose	331	100	-	-
Lactose	331	100	-	-
Sucrose	219	66.16	112	33.84
Mannitol	331	100	-	-
Dulcitol	236	71.29	97	29.31
Adonitol	8	2.42	323	97.58
Salicin	199	60.12	132	39.87

Table.2 Diseases of broilers diagnosed in four farms along with morbidity, mortality patterns and age of the affection

Farm	Total no. of birds	Disease diagnosed	No. affected	Age of infection (days)	No. of death	Morbidity (%)	Mortality (%)
1	1500	Colibacillosis	62	12-20	33	4.13	2.2
		Yolk sac infection	31	2-5	22	2.07	1.46
		Hydropericardium hepatitis syndrome	29	30-35	12	1.93	0.80
2	2000	Colibacillosis	56	14-21	30	2.8	1.5
		Hydropericardium hepatitis syndrome	41	29-33	17	2.05	0.85
		Yolk sac infection	24	2-4	09	1.2	0.45
		Choline deficiency	14	14-18	6	0.7	0.3
3	2500	Infectious bursal disease	42	22-28	18	1.68	0.72
		Colibacillosis	68	10-15	37	2.72	1.48
		Aspergillosis	87	8-14	65	3.48	2.60
		Gout	63	6-14	26	2.52	1.04
4	2000	Salmonellosis	74	8-12	52	3.7	2.6
		Colibacillosis	90	22-28	51	4.5	2.55
		Aspergillosis	28	10-14	22	1.4	1.1
		Mycoplasma-colibacillosis complex	44	8-17	24	2.2	1.2

Table.3 Overall prevalence of diseases of broilers with their age susceptibility and case fatality rate

Diseases	Age (weeks)			Total No. of cases encountered affected	Total No. of death	Case fatality (%)
	0-1	>1-3	>3-5			
Colibacillosis	0	186	90	276	151	54.71
Aspergillosis	0	115	0	115	87	75.65
Infectious bursal disease	0	0	42	42	18	42.85
Yolk sac infection	55	0	0	55	31	56.36
Hydropericardium hepatitis syndrome	0	0	70	70	29	41.43
Salmonellosis	0	74	0	74	52	70.27
Mycoplasma-colibacillosis complex	0	44	0	44	24	54.54
Gout	16	47	0	63	26	41.26
Choline deficiency	0	14	0	14	06	42.85

Fig.1 Characteristic “metallic sheen” given by *E. coli* strain on eosin methylene blue agar plate



Fig.2 Salmonella isolates producing red colonies on brilliant green agar media



This condition was considered as choline deficiency. After death of 6 birds, the disorder was controlled by supplementation of choline in the feed. The affected birds showed retarded growth and perosis. At necropsy, the liver revealed fragile and accumulation of yellowish fat in the abdomen. The large sized blood clot over the surface of liver was also found.

In the present study, naturally dead birds suspected for colibacillosis and yolk sac infection in post mortem examination were collected from the four different farms around NDUAT, Kumarganj, Faizabad. For the bacteriological screening, materials were taken aseptically from heart, liver, lungs, spleen and intestine from the grossly suspected dead birds due to above infection colibacillosis. The suspected sample was also collected aseptically from yolk sac contains of the yolk sac infected dead

boilers. The results found in the present study were in accordance with Edward and Ewing (1972). The present findings were also similar with the observations of Rahman *et al.*, (2003) and Chandra *et al.*, (2008).

The highest broiler proportionate mortality in the present investigation was recorded 75.65% due to Aspergillosis. This was followed by Salmonellosis (70.27%), Yolk sac infection (56.36%), Colibacillosis (54.71%), Mycoplasma-colibacillosis complex (54.54%), Infectious bursal disease (42.85%), Choline deficiency (42.85%), Hydropericardium hepatitis syndrome (41.43%) and Gout (41.26%).

A total of 42 broiler birds were found affected with Infectious Bursal Disease in the present study and 18 birds were died. Talha (1999) recorded 16.0% mortality of

chickens in Mymensingh. The gross lesions noted in IBD are similar to those described by Lukert and Hitchner (1984); Sam and Baruah (1998), Talha (1999) and Mahajan *et al.*, (2002).

Hydropericardium-hepatitis syndrome (HHS, Angara Disease, Leechi disease) was recorded in 70 cases of which 29 birds died. However, the occurrence of this disease has been reported in an organized farm in the area of NDUAT, Kumarganj earlier by Niyogi *et al.*, (2010). The gross lesions and clinical signs observed in the present study were almost similar to those described earlier by Niyogi *et al.*, (2010). Similar outbreak has also been reported from Chittagong Government Veterinary College (Biswas *et al.*, 2000 and Rahman *et al.*, 2000) and Himachal Pradesh Agricultural University, Palampur by Sharma *et al.*, (2014).

Yolk sac infection was found in two farms selected for the present study. A total of 55 birds were affected of which 31 birds died. The birds were at the age between 2 and 5 days. Kamal (1989) recorded omphalitis in 39 (12.54%) cases in the Bangladesh Agricultural University Poultry Farm. The gross lesions are similar as reported by other researchers (Rahman *et al.*, 2003).

Salmonellosis was recorded in 74 cases, in the present study of which 52 birds died. Kamal 1989, Bhattachatjee *et al.*, 1996 and Islam *et al.*, 1998 recorded salmonellosis in 4.82, 9.28 and 9.2% cases, respectively from the poultry farms. The gross lesions observed in the present study are almost similar to those recorded by Nazir *et al.*, (2012) in the broiler birds in the Srinagar district and adjoining areas.

In the present study, mycoplasma-colibacillosis complex were recorded in 44

cases out of which 24 died. Islam *et al.*, (1998) recorded this disease with relative occurrence of 20.9%. However, Talha (1999) recorded the occurrences of mycoplasmosis and colibacillosis in 8.66 and 5.51%, respectively. Bhattachatjee *et al.*, (1996) recorded colibacillosis in 10.61% birds. This malady produces fibrinous inflammation on the serous surfaces of the various organs which is similar to those described by Talha (1999).

It was found that 151 birds (45.04%) died due to colibacillosis out of total 424 dead birds in different farms. This finding indicated that the colibacillosis is a major problem in the poultry farms around NDUAT, Kumarganj but morbidity and mortality varies from farm to farm depending upon the management system. The gross lesions observed in the present study corroborated with the findings of Chandra *et al.*, (2008), Tonu *et al.*, (2011), Daud *et al.*, (2014) and Parwez *et al.*, (2015).

In the study, it was observed that the onset of gout was sudden. This was also observed by Rahamathulla and Mohiyuddeen (1973). Clinically, the spontaneously affected gouty birds showed no specific clinical signs as also reported by Chowdary (1988). The birds showed dull appearance, unthriftiness, reduced feed intake resulting in uneven sizes, gradual emaciation, loss of body weight, polyurea diarrhoea. Deaths were sudden. Chowdary (1988) and Jana *et al.*, (2008) also described the similar clinical signs. The gross lesions recorded in the present study, confirmed the earlier reports of Gupta *et al.*, (2002), Jana *et al.*, (2008), Eldaghayes *et al.*, (2010) and Feizi *et al.*, (2012). Visceral and articular gout occurred concurrently in some cases which simulated the reports of Jana *et al.*, (2008). Urate deposition was generally due to failure of

urinary excretion. This might be due to obstruction of ureters, renal damage or dehydration.

Aspergillosis was recorded in 115 cases out of which 87 birds died. However, Kamal (1989), Bhattacharjee *et al.*, (1996), Islam *et al.*, (1998) and Talha (1999) observed 10.61%, 5.11%, 4.3% and 4.20% cases of aspergillosis, respectively. This finding indicated that the aspergillosis is still present in the poultry farms as a havoc but varies from farm to farm depending upon the management system. The pathological lesions observed in the present investigation were similar to those described by Samad and Chakraborty (1993), Talha, (1999) and Rahman *et al.*, (2003). Choline deficiency is also recorded in the present study. Bhattacharjee *et al.*, (1996) reported 8.22% cases related to malnutrition and Islam *et al.*, (1998) recorded 6.10%.

This present finding indicated that the aspergillosis, colibacillosis, Mycoplasma-colibacillosis complex and Salmonellosis are the major problems in the poultry farms around NDUAT, Kumarganj but morbidity and mortality varies from farm to farm depending upon the management practices. So this infection can be prevented by regular preventive treatment using antimicrobial agents along with improved sanitation, hygiene and better husbandry practice and the farming community can earn more by better production.

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