

Research Article

Effect of Experimentally Induced *E. Coli* on General Performance in Broilers

Pravin Rathod^{1*}, Ranjit Ingole¹, Vijay Ingale², Shailendra Kuralkar³, Satish Manwar⁴, Sunil Hajare⁵ and Maheshkumar Ingawale⁶

¹Department of Veterinary Pathology, Post Graduate Institute of Veterinary and Animal Sciences, Akola – 444104

²Department of Veterinary Microbiology, Nagpur Veterinary College, Nagpur – 441302

³Department of Animal Genetics and Breeding, Post Graduate Institute of Veterinary and Animal Sciences, Akola – 444104

⁴Department of Poultry Science, Post Graduate Institute of Veterinary and Animal Sciences, Akola – 444104

⁵Department of Veterinary Pharmacology and Toxicology, Post Graduate Institute of Veterinary and Animal Sciences, Akola – 444104

⁶Department of Animal reproduction, Gynecology and Obstetrics, Post Graduate Institute of Veterinary and Animal Sciences, Akola – 444104

Abstract

The present study was conducted to study effect of experimentally induced *E. coli* on general performance in broilers. Experimental study was conducted on eighty day old broilers and dividing them into two groups having forty chicks in each group. The group I served as control and receiving normal commercial broiler feed and another group II served with single dose of *E. coli* broth culture @ 0.5mL (1×10^8 cfu/mL) at 8th day of age by oral route and experimental study carried for a period of 45 days. These treatments were continued to all the experimental chicks up to sixth weeks of age. Birds revealed clinical signs of anorexia, depression, dullness at second week while, diarrhoea noted at third week and mortality of 14.25% while significant difference in the weekly body weight, body weight gain, feed consumption and FCR were recorded in *E. coli* treated group which results into economical losses to farmers and consumers.

Keywords: *E. coli*, General performance, FCR, broilers

*Correspondence

Author: Pravin Rathod

Email: pravintoo@gmail.com

Introduction

The Indian poultry industry has risen as an agro-based industry to all scale of farmers. The grill creation is the dynamic and most quickly extending portion of the poultry business in the nation. Poultry today not only act as source of income but it also helps to stabilize the source of income to various farmers by means of poultry farming as their main business or an alternative business. The annual broiler production in the country has increased over the years up to 1.23 billion individuals and this number is increasing every year. Eggs and chicken are acknowledged by all networks and are accessible at the most sensible costs. Inside a range of 25 years, the egg creation has gone up to 70 billion from couple of millions and the grill generation has gone to 3.8 million ton. Poultry is the most sorted out part in creature farming, worth rupees one lakh crores. The development is increased by 6 – 8 % in layers and 10 – 12 % in broiler birds every year against the development of agri-business all in all which is around 2.5% [1]. Colibacillosis caused by *E. coli* is one of the most prevalent bacterial diseases causing heavy economic losses to the poultry industry by means of low productivity [2], condemnation of carcasses [3] and increase in morbidity, mortality [4] and immunosuppression in birds. Considering these adverse impacts of the *E. coli* infection in birds and heavy economic losses to the poultry industry [5], it was felt necessary to conduct the study for understanding the pathology of *E. coli* infection in broiler birds.

Materials and Methods

E. coli culture

The *E. coli* serotype namely O78 was found to be the most prevalent in poultry farms situated in and around Akola. This serotype was further used for induction of *E. coli* infection in experimental birds. The predominant field *E. coli* obtained from field was grown on nutrient broth used for induction of infection in experimental birds @ 1×10^8 cfu/mL orally [6].

Determination of dose of E. coli culture

A spectrophotometer was used to titre bacterial suspension by OD projecting a beam of light at a single wavelength of 600 nm through the suspension within a transparent cuvette. The blank reading was taken by using a medium as a control. The OD of 600 nm value corresponds with cell number present in the bacterial suspension. The levels of cell strains may vary depending on different cell numbers at given OD 600 nm value, but OD 600 nm = 1 usually means bacterial culture has 1×10^8 cells/mL of culture [7].

Feed formulation

The commercial broiler feed with standard pre-starter, starter and finisher mash were procured from M/s. Renukai Poultry Feeds, Jatharpath, Akola, (M.S.). The broilers were fed with standard pre-starter, starter and finisher mash *ad-libitum* from 0-1 weeks, 2-3 weeks and 4-6 weeks, respectively.

Experimental birds

Total eighty day old healthy Vencobb – 400 broiler chicks weighing about 30 to 42 gm were procured from M/s. Venkateshwara Hatcheries, House no. 114/A/2, Pune - Sinhagad Road, Vitthalwadi, Pune – 411030 (Maharashtra).

Experimental procedure

The experimental trial was conducted at Poultry Research Center, Post Graduate Institute of Veterinary and Animal Sciences, Akola for a period of six weeks. Total 80 a day old broiler chicks were divided into two equal groups. Group T0 was considered as control group and group T1 was challenged with single dose of isolated field predominant *E. coli* broth culture @ 0.5 ml (having concentration of 1×10^8 cfu/ml) at 8th day of age by oral route.

Statistical analysis

The data for weekly body weight and weekly body weight gain was analyzed by using unequal Completely Randomized Design [8].

Results and Discussion

The general performance of birds was recorded on the basis of clinical signs, symptoms, weekly body weight, weekly body weight gain, feed consumption and weekly feed conversion ratio throughout the experimental period.

Clinical signs/ observations

Group I birds did not showed any abnormal clinical signs and symptoms, while group II showed clinical signs of anorexia, depression, dullness from the second week onward, while during third week there were signs of diarrhea. The clinical signs of drooping of wings, ruffled feather, gasping, coughing, sneezing, hyperthermia and diarrhea were observed during 4th, 5th and 6th weeks of experimental period.

The clinical sign revealed watery diarrhoea, depression and recumbence after 48 hrs of *E. coli* infection @ 0.5mL in left abdominal air sac route in brown leg horn chickens[10] whereas, sneezing, coughing and depression in colibacillosis broiler birds[11]. The cyanosis of comb, dullness, depression, diarrhoea, less feed intake, sneezing, coughing and mucoid nasal discharge was noted in birds [12].

The present findings of similar clinical signs in *E. coli* infected group are in accordance with the authors [9], [13], [14], [15], [16] and [17] in broiler birds..

Mortality

No mortality was recorded in group I throughout the experimental period of six weeks. The numerical mortality of 14.25 % was recorded in II group.

The results of mortality in I group is in agreement with the authors [21] and [22] who recorded 14.3 % and 27.1% mortality in birds infected with *E. coli* serotype O78 given @ 1×10^7 cfu/0.5 ml in broiler birds. Contrary to the present findings Huff [20] recorded mortality of 68% in *E. coli* serotype O2 @ 1×10^4 in broiler birds. The present findings are same or less in collaboration with authors [9], [14], [15] and [16].

Weekly body weight (gm)

The average weekly body weight increases with the advancement of age. At day 0 and at the end of 1st week revealed non significant differences among control and *E.coli* treatment groups. The weekly body weight recorded at the end of 2nd, 3rd, 4th, 5th, and 6th week revealed significant differences among I and II group. The significant decreased in body weight was recorded in group II at the end of 2nd, 3rd, 4th, 5th, and 6th week when compared with I group. The average weekly body weight in II group suggesting detrimental effects of *E.coli* in broilers (**Table 1**).

Present findings of significant decreased body weights in *E. coli* treated birds is in agreement with authors in broiler birds [9], [10], [15], [16] and [17]. The *E. coli* attaches to host tissues may elicits inflammatory response leads to production of acute phase proteins, cytokines IL-1, IL-6 and tumor necrosis factor [18]. The *E. coli* infection causes spread of systemic infection throughout the intestinal tracts of the body which ultimately causes decrease in feed intake, anemic condition [17] and listlessness [16] and could be the possible reason for decreased body weight in *E. coli* infected group.

Table 1 Average weekly body weight gain (gm) per bird in different treatment groups during experimental period

Weekly Body Weight (g)						
Groups	1 st Week	2 nd Week	3 rd Week	4 th Week	5 th Week	6 th Week
T0	38.72±0.63	139.44±2.94	285.66±6.22 ^a	681.78±14.63 ^a	1087.17±23.07 ^a	1630.06±36.4 ^a
T1	39.28±0.48	136.56±1.56	229.61±2.65 ^c	607.11±12.02 ^c	981.56±39.65 ^c	1469.89±35.23 ^c
CD (0.05)	-	-	12.58	31.23	53.09	78.12
P value	NS	NS	**	**	**	**

Weekly body weight gain (g)

The overall observations of average weight gain revealed non significant differences among control and different treatment groups at the end of 1st, 3rd, 4th, and 5th week. However, 2nd and 6th week revealed significant differences among I and II groups. Significantly decreased in body weight gain was observed in group II at 2nd and 6th week when compared with I group (**Table 2**).

Contrary to the present findings [15], [17] and [19] reported significant decreased weekly body weight gains in *E. coli* treated groups. These findings can be collaborate with present findings at 2nd and 6th week. The inflammatory reaction elicited by *E. coli* organism causes detrimental effect of endotoxin causing decreased consumption, efficiency and ultimately resulted into low body weight gain in birds [18].

Table 2 Average weekly body weight gain (gm) per bird in different treatment groups during experimental period

Weekly Body Weight Gain (g)						
Groups	1 st Week	2 nd Week	3 rd Week	4 th Week	5 th Week	6 th Week
T0	100.72±2.42	146.22±6.22 ^a	396.11±14.19	405.39±13.41	542.89±15.89	525.11±15.72 ^a
T1	97.28±1.22	93.06±2.65 ^c	377.50±9.72	374.44±31.60	488.33±14.74	457.50±28.12 ^c
CD (0.05)	-	9.69	-	-	-	28.49
P value	NS	**	NS	NS	NS	**

Weekly feed consumption (gm)

The pooled mean feed consumption revealed non significant differences among control and different treatment groups and recorded as 1893.38±707.48 and 1890.40±737.48 in I and II groups respectively (**Table 3**).

Contrary to the present findings [9], [10], [19] and [21] authors' recorded decreased feed consumption in birds infected with *E. coli* of different strains at different dose rate. The present observation thus suggested no significant effect of *E. coli* infection on feed consumption. The variation of results with that of previous study might be due to variation in strain of *E. coli* or dose of *E. coli* given.

Weekly feed conversion ratio

The feed conversion ratio recorded during experimental period of six weeks revealed non significant differences from 1st week to 6th week. The pooled mean for feed conversion ratio also showed non significant difference among control and *E.coli* treatment group. Numerically increased FCR (1.79±0.21) was recorded in birds infected with *E. coli* treated group as compared control group. The present findings of *E.coli* treated group are in agreement with authors in broiler birds [9], [15], [17] and [21] (**Table 4**).

Table 3 Average weekly feed consumption (gm/birds) per birds in different treatment groups during experimental period

Weekly Feed Consumption (gm/bird)							
Group	1 st Week	2 nd Week	3 rd Week	4 th Week	5 th Week	6 th Week	Pooled mean
T0	156.17	348.51	1120.74	1986.55	3107.17	4641.14	1893.38±707.48
T1	158.41	303.09	1033.86	1877.22	3182.12	4787.71	1890.40±737.48
CD (0.05)	-	-	-	-	-	-	-

Table 4 Average weekly feed conversion ratio (FCR) per birds in different treatment groups during experimental period

Feed Conversion Ratio (FCR)							
Groups	1 st week	2 nd week	3 rd week	4 th week	5 th week	6 th week	Pooled mean
T0	1.12	1.22	1.64	1.83	1.91	2.15	1.65±0.16
T1	1.16	1.32	1.70	1.91	2.16	2.48	1.79±0.21
T2	1.10	1.13	1.61	1.79	1.86	1.97	1.58±0.15
CD(0.05)	-	-	-	-	-	-	-
Mean bearing same superscript for treatment in column do not differ significantly							

Conclusion

The *E. coli* @1X10⁸cfu/ml causes detrimental effects on the general performance by means of significant difference in body weight and body weight gain whereas non significant differ in feed consumption and FCR levels were observed in broiler birds during the experimental period of 42nd day.

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