

Studies of *Escherichia Coli* from Layers and Broilers

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Abstract: A total of 150 poultry carcasses, 75 broilers, and 75 layers were collected and examined for the presence of gross necrotic lesions on various organs. Of the 75 broilers, 3 age groups were investigated. Group A with age of 1-4 weeks, group B and C were of 4 - 8 and 8 - 12 weeks of age respectively. From each group 25 poultry carcasses were investigated. The higher incidence of *E. coli* infection was recorded in group A followed by groups B and C respectively. On the other hand, 75 carcasses of layers were studied through postmortem examination. Of the 25 carcasses with age of 1 - 8 weeks from group A, where as the birds of 8 - 16 and 16 - 24 weeks of age from group B and C respectively. During this study, a higher infection rate recorded in birds of 1 - 8 weeks compared to letter two groups. Five different organs, livers, intestines, lungs, hearts, and ovaries of broilers each of 25 in number from 3 age groups collected and examined. The highest positive percentage for *E. coli* was recorded in intestine (80%) followed by liver (68%), heart (64%), lungs (56%) and ovary (32%) in age group of 1 - 4 weeks as compared to other two groups. From layers same type and number of organs were examined. The highest infection rate was recorded in the intestine (84%) followed by liver (72%), heart (68%), lungs (60%) and ovary (36%) in age group of 1 - 8 weeks as compared to group B and C.

Key words: *Escherichia coli*, layers and broilers

Introduction

Poultry farming is not merely raising of hens and conceding to whatever they produce. It is in fact quite a complex art of converting coarse grains, roughages and other inedible raw materials into wholesome food i.e. eggs and meat.

During last two decades, poultry industry has made a significant progress in per capita availability of eggs and meat in the country. This progress of poultry has helped in easing of protein problem of Pakistan, through rearing commercial broilers and layers. Since poultry acquired a very important place in the overall economy of the country, but at the same time poultry industry is also facing the hazards of the common infectious diseases, which are caused by various micro-organisms.

Occurrence of ill-health causes panic and this panic leads to the errors in judgment, diagnosis, treatment, and control strategies. Besides, these problems already existing, a host of diverse complexities, which are harmful to our endemic circumstances and difficult to identify and eradicate, keep cropping up and adding to the miseries of the farmer. The ever-emerging new syndromes of obscure etiology are not only adversely affecting the health and performance

potential of the chicken but is also proving a challenge for the meager facilities available to diagnose and control such complications. This is a sort of deterrent for a farmer to be that cumulative losses in terms of retarded growth, reduction in production and increased depletion of the flock.

Of course not always and not at every place that is true but the unknown foreboding nevertheless is ever dominant. Further that the planned management contributes significant role in keeping the physical and physiological barriers of the body intact and preventing their breakdown. Many diseases could be effectively controlled through managemental practices alone.

The usual elements leading to failures in livability and production lie in the deficiency in achieving optimal standards of poultry husbandry and inadequacy in offering protective cover against infectious diseases.

The intensive poultry farming is always confronted with numerous diseases that are either infectious and non-infectious in nature. *Escherichia coli* is a common inhabitant of the intestinal tracts; at the same time *Escherichia coli* is also one of the notorious gram-negative coccobacillus bacterial organisms, which are

associated with large number of infectious diseases with a variation in manifestation. *Escherichia coli* infection includes enteritis, septicemia, omphalitis, perihepatitis, air-sac infection, and occasionally salpingitis etc. (Hofstad *et al.*, 1984). Other diseases caused by *Escherichia coli* are colibacillosis and coligranuloma and these are responsible for major economic losses to poultry industry (Savov, 1973). Egg transmission of *Escherichia coli* is common and could be responsible for high mortality of chicks. According to Barya and Bhatti (1968), 4000 chicks were lost due to the colibacillosis and climate contracted infections through immunization with Newcastle Disease Vaccine batch No. 37 at Govt: Poultry Farm, Quetta. The vaccine was investigated and found contaminated with a pathogenic strain of *Escherichia coli*, which could have resulted due to use of pre-infected embryonated eggs through transovarian route.

Escherichia coli are a primary or a secondary invader, which is one of the important pathogens in poultry throughout the world. Poultry farmers are usually confronted with this organism, particularly, since the development of intensive poultry production. As a secondary invader, it has a classical role of intrusion through the breaches caused in the continuity of tracheal epithelium either by viruses or mycoplasmas which complicating the disease symptomatology to diagnosis and its control comparatively difficult. This situation has put the farmers and poultry pathologists in a position where they are unable to decide what should be done and has tended to use different antibiotics either as preventive or as curative against this and other infectious on a large scale. This situation has potentiated the induction of resistance in *Escherichia coli* to different drugs.

As regards to *Escherichia coli* infections in broilers and layers are concerned, a few studies have been conducted in Pakistan but no such type of work has been done in Sindh province before. The present study was therefore planned to isolate and characterize *Escherichia coli* from broilers and layers. Furthermore, to investigate the effects of different antibiotics on *Escherichia coli* and this will provide help in treating and controlling of *Escherichia coli* infections in poultry birds.

Results and Discussion

The percentage occurrence of *Escherichia coli* infection in broilers and layers: Broilers and layers from various poultry farms (each of 15 farms) were randomly collected and brought to

the laboratory where they were investigated through post mortem examination and *E. coli* findings of typical appearance were recorded. A total of 150 poultry carcasses (75 broilers and 75 layers) were collected and examined through postmortem, cultural and biochemical tests. During the present study livers, intestines, lungs, hearts and ovaries from each of 75 broilers and 75 layers were examined.

In broilers 70.6% intestines, 61.3% livers, 57.3% hearts, 50.7% lungs and 26.7% ovaries were found positive for *E. coli*. While in layers 77.3%, 62.6%, 58.7%, 53.3%, and 29.3% intestines, livers, hearts, lungs, and ovaries respectively were found positive (Table 1).

It is clear from the present study that this species commonly infects intestines because intestine is natural habitat of the species. But in certain stressful conditions *Escherichia coli* becomes pathogenic in intestine as well. Therefore, the frequency of *Escherichia coli* infection in intestines is more common as compared to other organs of the broilers and layers. The findings regarding different organs of dead broilers and layers investigated in this study are relatively close to that of Sinha *et al.* (1985). Who isolated 85 *Escherichia coli* from 195 samples, out of 85 isolates 35 were from intestines, 15 from hearts, 14 from livers and 13 from the lungs. Furthermore, that the trend of infection in different organs of birds reported by the author is similar to that of the present study but difference was that they calculated percentage of infection from total organs investigated.

The percentage occurrence of *Escherichia coli* infection in broilers of different age groups:

The results regarding broilers infected with *Escherichia coli* in relation to different organs and age groups A, B, and C are presented in (Table-2). A total of 75 carcasses of broilers were investigated. From each group 25 carcasses were collected and from each carcass five different organs were investigated. In group A of 1-4 weeks of age intestines 80%, livers 68%, hearts 64%, lungs 56% and ovaries 32% positive for *Escherichia coli*. In group B of 4-8 weeks of age intestines, livers, hearts, lungs, and ovaries were 72%, 60%, 60%, 52%, and 28% respectively found positive. While in group C of 8-12 weeks of age 60%, 56%, 48%, 44%, and 20% intestines, livers, hearts, lungs, and ovaries respectively were found positive for *E. coli*.

The pattern of *Escherichia coli* infection in broilers of different ages recorded in the present study are in accordance with the disease pattern of *E.*

Table 1: The overall number and percentage of *Escherichia coli* isolated from different organs of broilers and layers

No. of percentage of <i>E. coli</i> isolated from various organs		Broilers (75)	Layers (75)
Intestines	No	53	58
	%age	70.6	77.3
Livers	No	46	47
	%age	61.3	62.6
Hearts	No	43	44
	%age	57.3	58.7
Lungs	No	38	40
	%age	50.7	53.3
Ovaries	No	20	22
	%age	26.7	29.3

Table 2: The number and percentage of *Escherichia coli* isolated from different organs of broilers 1-12 weeks of age

No. and percentage of <i>Escherichia coli</i> isolated from various organs		Group Age (weeks) No. of carcasses	A 1-4 25	B 4-8 25	C 8-12 25
Intestines	No.		20	18	15
	%age		80	72	60
Livers	No.		17	15	14
	%age		68	60	56
Hearts	No.		16	15	12
	%age		64	60	48
Lungs	No.		14	13	11
	%age		56	52	44
Ovaries	No.		8	7	5
	%age		32	28	20

Table 3: The number and percentage of *Escherichia coli* isolated from different organs of layers 1-12 weeks of age

No. and percentage of <i>Escherichia coli</i> isolated from various organs		Group Age (weeks) No. of carcasses	A 1-8 25	B 8-16 25	C 16-24 25
Intestines	No.		21	19	18
	%age		84	76	72
Livers	No.		18	15	14
	%age		72	60	56
Hearts	No.		17	14	13
	%age		68	56	52
Lungs	No.		15	13	12
	%age		60	52	48
Ovaries	No.		9	7	6
	%age		36	28	24

coli in broilers reported by Belskii and Panikar (1969) who recorded 10% deaths in broiler chicken of 42-44 days old due to colisepticaemia. On the other hand, Javed *et al.* (1991) obtained somewhat lower prevalence in 3-week broilers (17.2%).

The percentage occurrence of *Escherichia coli*

in layers of different age groups: The percentage occurrence of *Escherichia coli* infection in layers of different age groups (A, B and C) is summarized in Table-3. A total of 75 carcasses of layers were investigated. From each group 25 carcasses were collected and from each carcass five different organs were investigated. In group A of 1-8 weeks of age

intestines 84%, livers 72%, hearts 68%, lungs 60% and ovaries 36% positive for *Escherichia coli*. In group B of 8-16 weeks of age intestines, livers, hearts, lungs, and ovaries were 76%, 60%, 56%, 52%, and 28% respectively found positive. While in group C of 16-24 weeks of age 72%, 56%, 52%, 48%, and 24% intestines, livers, hearts, lungs, and ovaries respectively were found positive for *Escherichia coli*. During this study a higher percentage of infection occurred in birds of 1-8 weeks compared to two later groups. The reason of high infection in group A may be due to age factor because birds were very young and could not develop immunity up to level and shown their susceptible to infection.

Haneef (1988) reported higher prevalence 19.04% of colibacillosis in layers of 11-20 weeks, followed by 7.93% and 6.66% in layers of 10 and 21-30 weeks of age respectively and no case was recorded above 40 weeks of age. Javed *et al.* (1991) studied some higher infection in hens up to 18 weeks of age (11.94%) followed by 18-30 (9.63%) and above 30 (5.2%) weeks of age.

References

- Barya M.A. and M.Y. Bhatti, 1968. Preliminary investigation on heavy mortality in white leghorn chicks following New Castle Disease vaccination with batch no.37:25.3. 1967 at Govt. Poultry Farm, Quetta. Proc. 20th All Pak. Sci. Conf. Dacca, 3. H-62.
- Belskii, B. and I.I. Panikar, 1969. *Escherichia coli* infection in table poultry. Med. Vet., 19: 143-145.
- Haneef, W., 1988. Isolation and pathogenicity of *Escherichia coli* strains poultry in and around Faisalabad. M.Sc. Thesis, Univ. of Agric. Faisalabad.
- Hofstad, M.S., B.W. Calnek, C.f. Helmboldt, W.M. Heid and H.W. Yoder, Jr., 1984. Diseases of poultry. (8th edition). Published by Iowa State University, U.S.A.
- Javed M.T., R. Anjum, M.Z. Khan and A. Khan, 1991. Studies of the isolation, pathogenicity, and sensitivity of *Escherichia coli* in layers and broilers. Pak. Vet. J., 11:187-190.
- Savov, D., 1973. *Escherichia coli* infectious in poultry. Bulg-Akad. Naukite Sofia, Bulgaria. Vet. Bull. 43: 3224.
- Shrivastava, P.K. 1990. Mortality in chicks due to bacterial, viral, parasitic and neoplastic diseases. A pathomorphological study. Ind. Vet. J., 67: 1095-1098.
- Sinha B.K., V.K. Mehrotra, K.C.P. Singh and C.B. Prasad, 1985. Prevalence of *Escherichia coli* in intestine and extra intestinal sites of poultry. Ind. J. of Comp. Micro. Imm. and Inf. Dis., 6: 53-55.