

## SOME STUDIES ON THE EFFECT OF DIFFERENT STRAINS OF EIMERIA SPP. IN QUAILS EXPERIMENTALLY INFECTED WITH E. COLI.

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### ABSTRACT

*The interactive effect of E. coli and intestinal coccidiosis infections in quails broilers was studied. Single and dual orally inoculations were assessed in 6 groups of 25 quails chicks each. Mortality rate in group infected with Eimeria only was 24%; in group infected with Eimeria before E. coli was 28% while in group infected with E.coli and Eimeria at the same time was 32%, otherwise no mortalities observed in other tested groups. The total oocyst output and lesion score were high and severe in quail chicks infected with intestinal coccidiosis alone or with E. coli prior to coccidial infection. Low oocyst output and moderate intestinal lesion score were noticed in quail chicks inoculated with E. coli prior to or together with intestinal coccidiosis infection. Statistically using LSD, there was a significant decrease in body weight gain in all tested groups infected either with E. coli or intestinal Eimeria spp. or with both pathogens. These results suggested a synergistic action between E. coli and intestinal Eimeria spp. in producing gross lesions.*

### INTRODUCTION

*E. coli* infection in quails has been associated with a variety of disease conditions including acute septicaemia, haemorrhagic enteritis, salpingitis, air sacculitis, pericarditis and chronic synovitis in joints (*Melamed et al. , 1991*).

Quails of all ages are susceptible to diseases, caused by *Escherichia coli* and significant economic loss is increased due to morbidity, mortality, cost of treatment and condemnations of infected quails (*Hammouda, 1992*). In layers farms *E. coli* infections revealed low level of egg production (*Franches et al., 1995*).

An outbreak of septicaemia was caused by O:165 of serogroup of *E. coli* in Japanese quails (*Arenas et al., 1999*). Coligranuloma was reached in Japanese quails in Brazil. The disease caused an 85 % drop in egg production and 15 % mortalities (*Da Silva et al., 1989*).

Coccidiosis is one of the most important parasitic disease infecting quails as other poultry (*Shane, 1985*). It is caused by *Eimeria* species which infecting primarily the intestinal tract of the susceptible host, They seriously impairing food utilization and the growth of infected life stock and poultry (*Rose and Hesketh, 1991*). Susceptibility of birds to bacterial infection was increased due to intestinal lesions which produced by coccidian infection (*Arakawa et al., 1981 and Boba et al. 1982*). *Yatuserich (1982)* observed that *E. coli* and *Eimeria* species are synergistic pathogens.

*Nakamura et al. (1990)* reported interactive effect of *E. tenella* and *E. coli* infection in chicken and noticed that caecal lesions induced by *E. tenella* were more severe in chickens which were infected by both.

Therefore in this study we try to study the interaction between intestinal coccidiosis and *E. coli* infections in quails broiler.

## MATERIALS AND METHODS

### **E. coli strain :**

A strain of *Escherichia coli* that previously isolated from Japanese quails and identified morphologically, biochemically and serologically as *E. coli* O:165 according to *Lennette (1980) and McFaddin (1984)*, was used to infect quails chicks orally with  $10^8$  CFU per 21-day old chicks.

## **Coccidia strain :**

A field strain of quails intestinal coccidiosis was used. The infected dose was  $6 \times 10^4$  sporulated oocysts / quail chick per os.

## **Experimental design :**

A total of one hundred and seventy Japanese quails were used for this study. They were raised and fed a balanced unmedicated ration. A twenty quails chicks were slaughtered and subjected for laboratory examination to be sure that they were free from coccidian and E. coli infections. Quails chicks were divided into six groups weighted and placed in a separate cages (twenty five quails per cage). Group I was kept as non infected group. Group II, the quails chicks were inoculated with  $6 \times 10^4$  sporulated oocysts per quail chicks through oral route on day twenty one of quails age body weights were recorded at 20 day old and weekly for five weeks. Group III, the quails were infected orally with  $10^7$  CFU of E. coli O:165 on day twenty one of age. Group IV, the members were infected orally on day twenty one with  $6 \times 10^4$  sporulated oocyst per chicks and after fifty hours they received  $10^7$  CFU of E. coli O:165. Group V, they infected firstly with  $10^7$  CFU of E. coli O:165 on day twenty one and after 50 hours they inoculated with  $6 \times 10^4$  sporulated oocyst per os. Group VI, the quails chicks were infected on day twenty one with  $10^7$  CFU of E. coli O:165 and  $6 \times 10^4$  sporulated oocyst at the same time. All quails chicks were kept for five weeks. Five birds were slaughtered every five days and subjected to bacterial and parasitic examination. The parameters used for evaluation of severity of coccidian infection were mortality percentage, faecal scores (*Morehouse and Barny, 1970*) and total oocysts output / gm faeces using McMaster count chamber by *Long and Rowell (1975)*. Isolation and identification of E. coli was done according to *McFaddin (1984)*.

**Statistical analysis:** Data, obtained, were statistically analysed, using the analysis of variance (ANOVA) and comparing groups was performed using the least significant difference (LSD) at  $P < 0.05$  according to *Petrie and Watson (1999)* and computerized using *SPSS 11 (2001)*.

## RESULTS AND DISCUSSION

Concurrent infections of poultry species with coccidiosis and bacterial or viral disease was a major problem facing poultry industry. *E. coli* is a normal inhabitant of intestinal tract of quails and it contaminates the environment in quails farms that facilitate the reinfection of quails with *E. coli* (*Morishita et al. , 1999 and Samour, 2000*).

Intestinal tract is the predilection seat of *E. coli* serotypes and *Eimeria* species. In the present study, there was diarrhoea in groups II, III, IV, V and VI. This diarrhoea was bloody in group II and IV. There was naked decrease in total body weight in groups IV, V and VI which inoculated with *E. coli* after or before or at the same time of *Eimeria* infection. These results were in agreement with *Nakamura et al. (1990)* who reported that *E. coli* or *Eimeria* infection produce significantly decrease in body weight as compared with control group. These results might be due to damage produced in intestinal mucosa and submucosa which impaired digestion and absorption through the intestinal wall (*Gast and Beard, 1992 and Awadalla and Nasef, 1998*).

The highest mortality rate was recorded in group VI which infected with *E. coli* and *Eimeria* spp. at the same time. These results were in agreement with those reported by *Awadalla and Nasef (1998)*.

Regarding to total oocyst output was significantly low in quails inoculated with *E. coli* at the same time with *Eimeria* (group VI) and in group V which inoculated with *E. coli* prior to *coccidia* spp. (group II) only. The highest was recorded in group IV which inoculated with *Eimeria* spp. before *E. coli* organism. This can be attributed to the fact that competition between the two pathogens was established and one of them which inoculated first could colonize itself in the epithelial lining

of the intestine and prevent multiplication of the several pathogen (*Awadalla and Nasef, 1998* ). *Dominick and Jensen (1984)* reported that oral inoculation of turkey with *E. coli* resulted in extensive colonization of intestinal lesions expressed as gross score (GLS) induced by intestinal coccidial spp. infection alone and prior to *E. coli* inoculation were more severe than that GLS induced by *E. coli* inoculation prior to or at the same time with intestinal and caecal *Eimeria* spp. *Hegde et al. (1969)* established that the presence of secondary microbial invador is not essential for *Eimeria* intesti-nals either to establish itself or to induce pathological changes. The result was same as observed by *Tambur et al. (1997)* who mentioned that, coccidiosis was the main cause of the pathological change and *E. coli* was only a secondary infection. On the other hand, *Nakamura et al. (1990)* reported that, oral inocu-lation of *E. coli* had on effect an the severity of caecal and intestinal lesion caused by *E. intestinais*.

**Table (1):** Mortalities in quails broilers infected with *E. coli* O:165 and field strain of intestinal quails *Eimeria*.

Groups	No. of birds	No. of death	%
Group (I) control negative	25	0	0 %
Group (II) <i>Eimeria</i> only	25	6	24 %
Group (III) <i>E. coli</i> O:165 only	25	0	0 %
Group (IV) <i>Eimeria</i> before <i>E. coli</i>	25	7	28 %
Group (V) <i>E. coli</i> before <i>Eimeria</i>	25	0	0 %
Group (VI) <i>E. coli</i> and <i>Eimeria</i> at the same time	25	8	32 %

**Table (2):** Percentage of *E. coli* reisolation from experimentally infected quails at day 5<sup>th</sup>, 10<sup>th</sup>, 15<sup>th</sup> post infection.

Groups No.	5 days post infection	10 days post infection	15 days post infection
Group (I) control negative	0 %	0 %	0 %
Group (II) <i>Eimeria</i> only	0 %	0 %	0 %
Group (III) <i>E. coli</i> only	100 %	60 %	20 %
Group (IV) <i>Eimeria</i> before <i>E. coli</i>	0 %	40 %	40 %
Group (V) <i>E. coli</i> before <i>Eimeria</i>	100 %	60 %	20 %
Group (VI) <i>E. coli</i> and <i>Eimeria</i> at the same time	80 %	20 %	20 %

**Table(3):**Influence of *E. coli* and intestinal *Eimeria* species infection on quails.

Groups No.	Oocyst output/gm faeces	Intestinal <i>Eimeria</i> score	Protection against lesion	
			Lesion score	Protection
Group (I) control negative	Negative	Negative	Negative	Negative
Group (II) <i>Eimeria</i> only	19500	4.6 ± 0.9	90	10
Group (III) <i>E. coli</i> only	Negative	Negative	Negative	Negative
Group (IV) <i>Eimeria</i> before <i>E. coli</i>	15400	3.8 ± 0.7	80	20
Group (V) <i>E. coli</i> before <i>Eimeria</i>	63500	1.9 ± 0.5	50	50
Group (VI) <i>E. coli</i> and <i>Eimeria</i> at the same time	54900	1.7 ± 0.3	40	60



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