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Clinical Article

POLYHERBAL FORMULATION AND ITS ROLE IN ALLEVIATING SIGNS OF DIARRHOEA IN BROILER BIRDS

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Abstract: A total of 120 broiler birds were taken for the purpose of study and allotted into four different groups having 30 birds in each. Group T0 was kept as negative control. Group T1 was kept as positive control and challenged with *E.coli* on 8th day and maintained on non medicated feed. Group T2 was treated with Salcochek at the rate of 500 g/tonne of feed (Prophylactic dose) with concomitant challenge with *E.coli* on 8th day. Group T3 was treated with Salcochek at the rate of 1000g/tonne of feed (Therapeutic dose) with concomitant challenge with *E.coli* on 8th day. Parameters viz. performance traits, clinical symptoms, mortality, TVC of *E.coli* in faecal samples, haemagglutination inhibition titre, gross and histopathological changes were evaluated. Results revealed that there was significant improvement in the mean weekly body weight and mean weight gain in the Salcochek (M/S Ayurvet) treated groups T2 and T3 as compared to the positive control group T0. Mortality % was significantly less in the Salcochek treated groups as compared to control group. Total viable *E.coli* count in faeces was also significantly reduced in the Salcochek treated groups as compared to control group. The Hemagglutination inhibition titre was significantly higher in the Salcochek treated groups as compared to control group. Thus, it can be inferred that Salcochek is highly effective in alleviating symptoms of diarrhea and promote growth in birds.

Keywords: Body weight, Hemagglutination Inhibiton Titre, TVC, Diarrhoea.

INTRODUCTION

Enteric diseases are one of the most important problems in the poultry industry because of high economic losses due to decreased weight gain, increased mortality rates, worse feed conversion ratio, greater medication costs, and increased risk of contamination of poultry products for human consumption (Timbermont *et al.,* 2011). Colibacillosis is one of the most important diseases threatening the poultry industry. (Ibrahim 1998, Ewers 2005, Ayoub 2007). Antimicrobial agents are used extremely in order to reduce the great losses caused by Escherichia coli infections in poultry industry (Talebiyan *et al.,* 2014). However, there are

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a number of publications that suggest a link to the use of antibiotics in animal production to an increase in human infections with antibiotic-resistant bacteria (Simonsen *et al*., 1998; Klare *et al*., 1999; and Bogaard *et al*., 2001). The alarming challenge facing physicians and pharmacist now, is the need to develop alternative approaches in addition to the search for new antimicrobial compounds (Sibanda and Okoh, 2007). Thus, both conventional and organic poultry production need alternative methods to improve growth and performance of poultry. Plants might hold a promise for combating the problem of antibiotic resistance Herbs, spices, and various other plant extracts are being evaluated as alternatives to antibiotics and some do have growth promoting effects, antimicrobial properties, and other health-related benefits (Diaz-Sanchez *et al*., 2015). Several herbal plants viz. *Aegle marmelos*, *Holarrhena antidysentrica* have been known to possess anti- diarrheal property and are serious candidates as alternatives to antibiotic therapy (Brigesh *et al.,* 2009, Rao 2012, Kavitha *et al.,* 2004, Sharma *et al.,* 2007). Thus, the present study has been undertaken to evaluate the effect of herbal anti- diarrheal in the treatment of E. coli induced diarrhoea in poultry.

MATERIALS AND METHODS

Experimental design

The present study was carried out in the Department of Microbiology, Krantisinh Nana Patil College of Veterinary Science, Shirwal during the period of 2016-17 to evaluate the prophylactic and therapeutic efficacy of herbal anti- diarrhoeal Salcochek (M/S Ayurvet Limited) against diarrhoea in broilers. A total of 120 healthy vaccinated commercial broiler chicks weighing between 45-55 g were procured from Ms/- Venkateswara hatchery. The broilers were allotted into four different groups having 30 birds in each. Group T0 (n=30) was kept as negative control and fed standard basal diet. Group T1 (n=30) was kept as positive control and challenged with 0.4 ml *E. coli* inoculum (approx. bacterial count 1x104 CFU/ml) on 8^{th} day of age and maintained on a non- medicated diet. Group T2 was supplemented with Salcochek at a prophylactic dose of 500g/tonne of feed from 0 day to 35^{th} day along with concomitant challenge with 0.4 ml *E. coli* inoculum (approx. bacterial count 1x104 CFU/ml) on 8^{th} day. Group T3 was supplemented with Salcochek at a therapeutic dose of 1000g/tonne of feed from 0 day to 35^{th} day along with concomitant challenge with 0.4 ml *E. coli* inoculum (approx. bacterial count $1x10^4$ CFU/ml) on 8^{th} day. Performance parameters viz. weekly body weight, body weight gain were recorded. Microbiological studies viz. total viable E.coli count, Haemagglutinin inhibition titre were also carried out. Gross and

histopathological examinations of various organs were conducted at the end of the experiment *i.e.* on 33rd day.

Statistical analysis

All the results were analyzed statistically by analysis of variance to determine the means and standard error as per the methods described by Snedecor and Cochran (Snedecor, 1994)

RESULTS AND DISCUSSION

Weekly body weight

Results revealed that the mean weekly body weight was significantly higher in the Salcochek (therapeutic dose) treated group T3 (1916 g) and Salcochek (prophylactic) treated group T2 (1914 g) as compared to positive control group T1 (1311 g) at the end of 5th week (table 1). The weekly body weight in the 5th week was non- significantly variable between the Salcochek treated groups T3 and T2 as compared to negative control (non- infected) group T0. This indicates remarkable effect of Salcochek in enhancing body weight in broilers infected with *E.coli*. The increase in weekly body weight may be attributed to the presence of *Aegle marmelos,* a constituent ingredient of Salcochek which is known to have anti-diarrheal effect (Gricilda, 2001), and also stomachic and digestive properties (Tripathi, 2011).

Table 1. Weekly body weight (g) of broilers in control and treated groups

Age of birds	Group T0	Group T1	Group T2	Group T3
1st Week	184±0.068	177±0.076	175±0.074	170±0.174
2nd Week	458±0.065	299±0.16	443±0.06	442±0.116
3rd Week	896±0.136	521±0.19	844±0.0412	846±0.102
4th Week	1412±0.114	867±0.18	1341±0.071	1337±0.089
5th Week	2002±0.159[a]	1311±0.16[b]	1914±0.0649[a]	1916±0.115[a]

Weekly body weight gain

The weekly body weight gain was significantly higher in the Salcochek (therapeutic dose) treated group T3 (87 g) and Salcochek (prophylactic dose) treated group T2 (85 g) as compared to positive control (infected) group T1 (68 g) at the end of 5th week (table 2). The body weight gain was non- significantly variable between the control (non- infected) group T0 and Salcochek treated groups T2 and T3 at the end of 5th week**.** This finding is in

consonance with observations of Abdelsamie (1983), Oke and Oke (2007), who also reported an increase in weight gain following the administration of *Aegle Marmelos* extract.

Table 2. Weekly body weight gain (g) of broilers in control and treated groups

Age of birds	Group T0	Group T1	Group T2	Group T3
1st Week	27±0.11	28±0.04	29±0.15	28±0.22
2nd Week	50±0.20	18±0.03	47±0.14	46±0.10
3rd Week	67±0.12	39±0.04	66±0.17	63±0.12
4th Week	78±0.12	58±0.02	77±0.16	76±0.11
5th Week	88±0.10[a]	68±0.09[b]	85±0.10[a]	87±0.09[a]

Mortality

The mortality percentage was significantly reduced in the Salcochek (therapeutic) treated group T3 (1.12 %) and Salcochek (prophylactic dose) treated group T2 (1.67%) as compared to the positive control (infected) group T1 (3.89%) (table 4). The decreased mortality may be attributed to the immunomodulatory effect of *Plantago ovata*, a constituent ingredient of Salcochek, which is rich in flavonoids and polyphenols (Haddadian, 2014). The astringent property conferred by Holarrhena antidyscentrica, a constituent ingredient of Salcochek, helps to ameliorate the deleterious effects of dehydration thereby reducing the mortality rate (Zope *et al.,* 2016).

Table 3. Mortality % of broilers in the control and treated groups.

Groups	T0	T1	T2	T3
Mortality %	0.56	3.89	1.67	1.12

Total viable E.coli count (mean log_{10} cfu/ml)

The mean cfu on completion of trial after 28th day after completion of trial in the Salcochek (therapeutic dose) treated group T3 (227 x 10^4) and Salcochek (prophylactic dose) treated group T2 (186 x 10^4) was significantly reduced as compared to the positive control (infected) group T1 (251 x 10^6). Log_{10}cfu/ml on completion of trial ater 28th dayin the Salcochek (therapeutic dose) treated group T3 (-648) and Salcochek (prophylactic dose) treated group T2 (-736) was significantly less as compared to positive control (infected) group T1 (1.394) (table 4). The decrease in the mean cfu and log10cfu/ml in the Salcochek treated groups may

be due to the anti bacterial property of *Aegle marmelos*, a constituent ingredient of Salcochek (Poonkothai, 2008).

Table 4. Results of total viable *E. coli* count (mean log10 cfu/ml) in the control and Salcochek treated groups

On 3rd day after challenge				
	T0	T1	T2	T3
Mean cfu	238 x 10^3	247 x 10^5	280 x 10^6	136 x 10^6
Log_{10}cfu/ml	-1.62	1.382	1.44	1.36
On completion of trial after 28th day.				
Mean cfu	256 x 103	251 x 106	186 x 104	227 x 104
Log_{10}cfu/ml	-1.589	1.394	-0.736	-0.648

Haemagglutination inhibition titre

The mean titre on 28th day was significantly higher in the Salcochek (therapeutic dose) treated group T3 (1:41.6) and Salcochek (prophylactic dose) treated group T2 (1:38.4) as compared to positive control (infected) group T1 (1:12). The mean log_2/ml on 28th day in the Salcochek (therapeutic dose) treated group T3 (5.3±0.132) and Salcochek (prophylactic dose) treated group T2 (5.2± 0.132) was significantly higher as compared to positive control (infected) group T1(3.5±0.17) (table 5). This may be ascribed to the immunomodulatory effect of *Acacia catechu*, present in Salcochek (Ismail, 2009).

Table 5: Results of Heamagglutination inhibition titre (mean log2 antibodies/ml) of control and treated groups

Before Vaccination				
Groups	Group T0	Group T1	Group T2	Group T3
Mean titre	1:14.4	1:12	1:13.6	1:12.8
Mean log_2/ml	3.8±0.133	3.5±0.167	3.7±0.153	3.6±0.165
After vaccination on 28th day				
Mean titre	1:48	1:12	1:38.4	1:41.6
Mean log2/ml	5.5+0.164^b	3.5 + 0.17^c	5.2 + 0.132^b	5.3 + 0.132^b

CONCLUSION

The body weight was significantly increased in the Salcochek treated groups as compared to positive control due to its ameliorative effect on diarrhoea. The total viable *E. coli* count was

also significantly less in faecal samples of Salcochek treated groups as compared to positive control. The results are highly suggestive of profound anti diarrheal effect of Salcochek on *E.coli* induced diarrhoea.

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