EFFECT OF SIMULTANEOUS APPLICATION OF GROWTH PROMOTER ANTIBIOTIC AND IONOPHOROUS ANTICOCCIDIAL ON THE PERFORMANCE OF BROILERS

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ABSTRACT

The effect of growth promoter antibiotic Flavomycin 80® (FLA) and an ionophorous anticoccidial Sacox® (SAC) on the performance of broilers was studied. The supplements were fed as single feed additive or in combination. Two hundred and forty one-day-old broiler chicks were reared for 42 days. The birds were randomly divided into 8 groups i.e. A1, A2, B1, B2, C1, C2, D1 and D2 comprising of 30 birds each. There were four dietary treatments i.e. 0 (A1, A2), 9 mg Flavomycin 80®/kg feed (B1, B2), 60 mg Sacox®/kg feed (C1, C2) and 9 mg Flavomycin 80® + 60 mg Sacox®/kg feed (D1, D2). Groups A2, B2, C2 and D2 were given a challenge dose of coccidial oocysts. Weight gain, feed consumption, oocysts in the faeces, clinical findings and mortality was recorded. Flavomycin 80® gave significantly ($P<0.05$) better performance than all other groups under controlled conditions i.e free of coccidia whereas under challenged conditions combination of the two drugs gave better results.

Keywords: Broilers, Growth promoters, antibiotic (Flavomycin®), anticoccidial (Sacox®).

INTRODUCTION

Coccidiosis is one of the major hazards in poultry industry due to which great deal of loss is encountered every year. It causes mortality, sub-optimal growth and poor feed conversion efficiency resulting into heavy economic loss. It damages the gut mucosa thereby facilitating infection by other opportunist microorganisms as well. Significant effect on production parameters was demonstrated when a bacterial infection was present with coccidiosis, even though no significant effect was seen with either condition alone. The interaction can sometimes be synergistic and exceed the sum of the effect for the individual diseases (Ruff, 1998). Several workers have suggested that combination of common chick intestinal bacteria and various types of *Eimeria* result into more severe enteric disease (Visco and Burns, 1972). Inclusion of anticoccidials in the diet at recommended level is carried out to prevent clinical coccidiosis (Shane, 1997). Addition of antibiotic / growth promoters helps to reduce limited growth performance by controlling bacterial population of the gut (Hogg, 1992) and also prevents necrotic enteritis complex (Shane, 1997).

The present study was carried out to know the effect of growth promoter Flavomycin 80® (Flavophospholipol) and an ionophore anti-coccidial Sacox® (Salinomycin sodium) on the growth performance of broilers. The substances were used as single feed additive and in combination under condition controlled and challenged with coccidial oocysts.

MATERIALS AND METHODS

Two hundred and forty one-day-old broiler chicks were purchased from a local hatchery. The chicks were reared in a well-cleaned shed under standard hygienic conditions. Randomly, the birds were divided into equal 8 groups. Each group was further divided to three equal replicates. One pen was allotted to each replicate. The chicks were placed on 5-10 cm. bedding of new rice husk. Each pen was equipped with a feeder and waterer. Electric bulbs and ventilation fans were used to control recommended temperature and 24 hours of light. The birds were vaccinated against Newcastle disease and Gumboro (IBD). The birds were having free access to feed and water. The chemical composition / calculated nutrient profile of the basal diet is shown in the Table 1. The chicks received a starter ration from 0-4 weeks and finisher ration from 5-6 weeks.

The experiment had four dietary treatments i.e. 0 (A1, A2), 9 mg FLA/kg feed (B1, B2), 60mg SAC/kg feed (C1, C2) and 9 mg FLA + 60 mg SAC/kg feed

(D1, D2). Groups A2, B2, C2 and D2 were inoculated with 40,000 sporolated oocysts of mixed *Eimeria* species on 22nd day. The experiment was carried out for 42 days. Feed intake and body weight of birds were monitored weekly on replicate basis. Clinical symptoms were observed after the inoculation of infection. Faecal examination of the birds was carried out on 5th, 6th and 7th days after infection to find oocysts per gram of faeces. Mortality was recorded when it occurred. The data collected was subjected to statistical analysis by one way analysis of variance (ANOVA) and least significant difference (LSD) test using SPSS, software (SPSS INC, 1996).

RESULTS

Mean values for feed consumption, weight gain, FCR, mortality percentage at 42 days of age and the total oocycst count of 5th, 6th and 7th day after inoculation have been presented in Table 2. Results revealed that the birds that were uninfected and given unmedicated diet or Flavomycin (FLA) alone consumed higher feed ($P<0.05$) than all other groups. The coccicdial infection as well as addition of Salinomycin (SAC caused suppression in feed intake ($P<0.05$). Data revealed improvement ($P<0.05$) in weight gain (6.83% higher) and FCR (7.5% better) by the addition of 9 ppm FLA in uninfected birds. However, amongst the infected groups combination of 60 ppm SAC and 9 ppm FLA showed better performance ($P<0.05$) giving 6.9% higher weight and 6.6% better FCR. High mortality (16-40%) and oocycst count in the infected groups showed that no treatment could fully prevent or overcome the infection. SAC and its combination with FLA also showed limited efficacy, however, their performance was better ($P<0.05$) as compared to unmedicated control.

DISCUSSION

Feed consumption, weight gain, feed conversion

The results of present study confirmed the expected growth promoting effect of FLA in terms of weight gain and feed conversion in uninfected groups. Similar results have been reported earlier by Dost (1992), and Rehman (2000). Growth promoting effects of FLA is achieved by its antibacterial action on microflora normally present in gastro-intestinal lumen which keep the intestine in mild state of inflammation with diminished function and higher maintenance requirements. By controlling bacterial population in the gut and reducing the production of toxic products, it helps to reduce limitation to growth performance (Hogg 1992).

Elwinger *et al.* (1998) reported that ionophorous anti-coccidials monensin and naracin induced growth promoting effects similar to the tested growth promoters like avilamycin and avoparcin which might be attributed to their antibacterial effects. The same could not be established in our experiment because addition of SAC caused suppression in weight gain (6.5% lower) and feed consumption (7.15% lower) as compared to their unmedicated controls. Appetite was major factor causing decreased performance. The factors controlling consumption are complex and remain poorly understood (Hogg, 1992), however, one reason could be the formation of ionophore complexes in the consumer birds. Our findings are supported by Chapman (1993) and Farzana and Anjum (1999).

All infected groups showed a depression in weight gain and impaired feed conversion as compared to their uninfected controls. The difference was highly significant in case of unmedicated controls (24%) and birds given only FLA (19.63%) whereas in case of groups given SAC it was 11.38-11.65%. It means SAC has demonstrated a limited ability to prevent weight suppression by the infection. Combined addition of SAC and FLA gave the best weight gain and feed conversion under infected conditions.

All isolates of *eimeria* cause significant weight suppression and impaired FCR (Logan 1993). The reason for this impairment is that the organism destroys the absorptive mucosal surface, competes for micronutrients resulting into metabolic imbalances and hence adversely effects nutrient utilization.

Table 1: Chemical composition of experimental broiler rations

Nutrients	Broiler Starter	Broiler Finisher
Crude protein %	21.153	18.73
M.E. (K. Cal /Kg)	2750	2850
Crude fibre %	5.725	5.28
Ether extract %	4.11	4.471
Calcium %	0.95	0.90
Av. Phos %	0.40	0.38
Lysine %	1.107	0.994
Methionine %	0.503	0.460
Linoleic acid %	1.57	1.73

Mortality

Mortality occured in all the infected groups. The highest mortality was observed in uninfected unmedicated control followed by infected and FLA

treated, infected and SAC treated, and infected and SAC + FLA treated groups (Table 2). Postmortem lesions confirmed it to be caused by *Eimeria tenella*. No mortality was seen in uninfected groups. Birds given combination of the two drugs showed least mortality. The results are supported by Palic *et al.* (1998) who reported that birds given combination of SAC and FLA showed lower mortality as compared to SAC alone and unmedicated control under field conditions. Mortality in our study was higher because of heavy challenge, which prevented the medication to fully overcome the disease. Ionophore medications are often effective with mild coccidiosis, but ineffective at moderate or severe exposures (Sluis, 1998). Reason for better performance by combining the growth promoter and ionophorous anticoccidial could be the interaction of coccidia with some other bacterial infection sensitive to FLA. Flavophospholipol (active ingredient of Flavomycin 80®) has been reported to significantly reduce the degree and incidence of *Salmonella* and *Clostridium* shedding in broiler chicks by 6 weeks of age (Bolder *et al.* 1999).

Oocyst count

Oocyst counts were carried out on 5th, 6th and 7th day after the introduction of infection. The counts were zero in uninfected groups. Large numbers of oocyst were produced in all the infected groups however the count of birds given SAC and its combination with FLA was significantly lower than the other groups. The parasite was not completely suppressed by any of the treatments. Flocks given anticoccidial drug in diet remain susceptible to infection and clinical disease can readily occur at any time (Chapman, 1991). This is also supported by Sluis (1998) who reported that severity of test exposure is important as resistant to ionophore anticoccidial is dose dependent e.g. the medications are often effective with mild coccidiosis but ineffective at moderate or severe exposure. This explains the apparently better efficacy of ionophores under field conditions where coccidial exposures are mild.

Table 2: Broiler production performance (0-6 weeks)

Groups	Treatments	Avg feed intake/bird (gms)	Avg wt gain/bird (gms)	FCR	Percent Mortality %	Total oocyst count
A1	Uninfected+ Unmedicated Control (UUC)	3666^{a} ±47	1845^{a} ±28	1.99^{a} ±0.01	0.00	0
A2	Infected + Unmedicated Control (IUC)	3375^{bc} ±62	1485^{bh} ±40	2.27^{b} ±0.02	40.00	251800 ± 3825
B1	Flavomycin (FLA)	3623^{ga} ±27	1971^{c} ±33	1.84^{c} ±0.04	0.00	0
B2	Infected + Flavomycin (I.FLA)	3521^{a} ±41	1584^{dh} ±25	2.19^{b} ±0.03	36.66	198000 ± 3522
C1	Sacox (SAC)	3404^{c} ±18	1725^{e} ±13	1.98^{da} ±0.08	0.00	0
C2	Infected + Sacox (I.SAC)	3281^{dcb} ±96	1524^{fh} ±8	2.15^{eb} ±0.05	30.00	113000 ±2850
D1	Flavomycin + Sacox (FLA + SAC)	3372^{ec} ±55	1792^{gae} ±2	1.87^{fac} ±0.005	0.00	0
D2	Infected + Flavomycin + Sacox (IFS)	3367^{fc} ±90	1588^{h} ±35	2.12^{gb} ±0.02	16.16	65500 ±1730

*Means in each row lacking a common superscript differ significantly (P<0.05); *Values represent X ± Se

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