EFFECT OF REPLACEMENT OF FEED ADDITIVE ANTIBIOTIC WITH DIFFERENT LEVELS OF LACTIC ACID ON BROILER PERFORMANCE

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ABSTRACT

The study was conducted to ascertain the effect of replacement of feed additive antibiotic i.e. flavomycin with different levels of lactic acid, on broiler performance. Two hundred day-old broiler chicks were randomly divided into five groups A, B, C, D and E, with 40 chicks in each group. Lactic acid 1, 2 and 3% was supplemented in the rations for groups B, C and D, respectively. Flavomycin was supplemented in feed for group E and group A was a control group. Growth rate, feed intake, feed efficiency, mortality and economics were recorded. The results showed that during the starter phase, none of the supplementation of ration helped in improving feed intake, the birds of groups A and E gained maximum weight ($P<0.05$) and showed better FCR ($P<0.05$). During finisher phase, flavomycin and 3% lactic acid supplementations helped in improving feed intake and weight gain ($P<05$) and all the supplementations showed better FCR than the control ration ($P<0.05$). Flavomycin proved to be the only economical supplementation as compared to the other rations.

Key words: Broilers, growth promoters, organic acids, lactic acid, antibiotic (Flavomycin).

INTRODUCTION

Livestock and poultry are fed low doses of antibiotics routinely due to which, bacteria may develop that are resistant to drugs. Such bacteria may persist in the animal products such as meat, eggs and milk that are improperly handled or cooked. As a result people consuming such products may become sick from the bacteria. Because the bacteria are resistant to the available antibiotics, efforts to control such illnesses may be ineffective (Anonymous, 1999).

Modern poultry industry must produce very large quantities of low cost, nutritious food products, which must be safe and free from any possible contamination by pathogenic bacteria. All this must be achieved without undue reliance upon medication. To combat diseases, use of products such as acidifier can play a useful role in assisting with resistance of poultry flocks and help maintain efficient production levels. The organic acid supplementation in the feed is likely to have beneficial effect upon poultry, which will allow a better performance by inhibiting micro-organisms in feed. This may help in solubilizing feed ingredients, providing a better microbial balance in gastro-intestinal tract and improving digestion and absorption of nutrients (Adams, 1999). The present study was designed to replace the flavomycin, a commonly used feed additive antibiotic, with different levels of lactic acid in formula feed for broilers.

MATERIALS AND METHODS

Two hundred, day-old broiler chicks were purchased, weighed and randomly divided into five groups A, B, C, D, and E, with 40 chicks in each group. Each group was further sub-divided into four equal replicates. The chicks were reared in starter batteries during the first four weeks and then shifted to grower batteries till the end of experiment. The birds were having free access to feed and water. The dietary feedstuff and chemical composition is shown in Table-1 and 2. The chicks received starter ration from 0-4 weeks and finisher ration from 5-6 weeks. Electric bulbs and ventilation fans were used to control recommended temperature and 24 hours light. The chicks were vaccinated against Newcastle disease and Gumboro, using the recommended schedule for broilers. The experiment had four dietary treatments i.e. 1% lactic acid for group B, 2% lactic acid for group C, 3% lactic acid for group D and flavomycin (0.1125 gm/kg feed) for group E. Birds of group A were given control ration. The experiment was carried out for 42 days. The parameters studied were: Weekly weight gains; weekly feed consumption; weekly feed conversion ratio (Morgan and Lewis, 1962); mortality and economics. Feed intake and body weight of birds were monitored weekly on replicate basis. The data collected were subjected to statistical analysis of variance technique and least significant difference (LSD) test, as described by Steel and Torrie (1982).

Table-1: Feedstuff composition (%) of the basal diets

Ingredients	Starter Ration (%)	Finisher Ration (%)
Rice	46	32.40
Corn	-	19.23
Soybean Meal	19.64	14.76
Rice Polishing	10	10
Canola Meal	10	7
Sunflower Meal	4	4
Corn Gluten Meal 60%	1.5	4
Molasses	5	5
DCP	1.99	1.67
Vitamin Mineral Premix	1	1
Limestone	0.68	0.03
DL-Methionine	0.11	0.91

Table 2: Chemical composition of experimental broiler rations

Nutrients	Broiler Starter	Broiler Finisher
Crude Protein (%)	20	18.5
M.E. (Mcal/kg)	2800	2900
Crude Fiber (%)	4.29	3.92
Ether Extract (%)	2.64	3.13
Calcium (%)	0.92	0.90
Av. Phos. (%)	0.42	0.38
Lysine (%)	1.15	0.95
Methionine (%)	0.50	0.42
Linoleic acid (%)	0.796	1.10

RESULTS AND DISCUSSION

Mean values for feed consumption, weight gain, feed conversion ratio (FCR) and mortality percentage of broiler chicks at different stages are presented in Tables 3 and 4.

The mean values of feed consumed by different groups during the starter phase revealed that apparently maximum feed was consumed by the birds of group E fed on ration supplemented with flavomycin. On the other hand, group B which was reared on ration supplemented with 1% lactic acid consumed the lowest amount of feed. But statistical analysis revealed no significant difference between any of the studied groups. Neither different concentrations of lactic acid nor flavomycin proved beneficial in improving feed intake during starter phase. These findings are in agreement with the results of Yalcin *et al.* (1997), who reported that supplementation of lactic acid had no significant effect on feed consumption. However, the results of present study do not coincide with the findings of Cave (1984), who reported that from 0 to 28 days, voluntary feed intake of chicks was decreased with increasing dietary levels of organic acid.

During the starter phase the maximum weight gain was recorded in birds of control group A. This indicates that the supplementation of feed with 1, 2 and 3% lactic acid has not positive effect on the weight gain of the birds rather the group supplemented with 1% lactic acid had the minimum weight gain. Group A had a significant difference ($P<0.05$) with all three groups supplemented with lactic acid but no difference was recorded with the flavomycin group. This indicates that addition of flavomycin can help in increasing the weight gain (Bononi *et al.*, 1975) during the starter phase. The results of the starter phase indicate better FCR in group A (control) only, and the poorest FCR was recorded in group B (1% lactic acid). Statistically, group A (control) proved as the best group in FCR ($P<0.05$), whereas, all the supplemented rations showed poor efficiency.

During the finisher phase, group A (control) consumed the lowest amount of feed whereas group E, which was receiving flavomycin supplementation, consumed the maximum feed ($P<0.05$). Lactic acid at 3% was better than at 2% but there was no significant difference between 1% lactic acid, 3% lactic acid and flavomycin. These three groups had similar effects in feed intake. In the finisher phase the birds with 3% lactic acid and flavomycin showed highest weight gain ($P<0.05$), whereas the group A had the least gain in weight. When the groups with flavomycin and lactic acid were compared with each other, no difference was recorded suggesting the similar effects of flavomycin and lactic acid in different concentrations on the weight gain in finisher phase.. The present results agreed with those of Tortuero *et al.* (1989), Vasil *et al.* (1990) and Fuller (1995).

Growth promoting effect of flavomycin is achieved by its antibacterial action on microflora normally present in gastrointestinal lumen, which keeps the lumen 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). This study also proved that 3% lactic acid has better effect than 1% and 2% concentrations of lactic acid in the feed. In the finisher phase better efficiency was recorded in group B with 1% lactic acid ($P<0.05$). Tortuero *et al.* (1989) observed similar results.

In the starter-cum-finisher phase apparently maximum feed intake was recorded with flavomycin supplementation and minimum in control group, but no significant difference was recorded among these groups. These results are similar to the findings of Samanta and Biswas (1997), who stated that feed intake did not improve significantly between groups, from 0-6 weeks, by the addition of lactic acid in feed. This study revealed that supplementation of feed with additives did not prove beneficial in starter-cum-finisher phase and starter phase, whereas the group E which was with flavomycin supplementation proved to be the best in improving the feed intake. Lactic acid at the level of 3% of feed is helpful to improve the feed intake in finisher phase but there is no use to supplement feed with these agents in starter phase. The

Table 3: Production performance (mean ± S.E.) of broiler of different groups during 0-4 weeks of age

Parameters \ Groups	A=Control	B=1 % lactic acid	C=2 % lactic acid	D=3 % lactic acid	E=Flavomycin (0.1125g/kg feed)
Feed Intake/bird (g)	1584.00[a] ± 14.26	1525.37[a] ± 43.34	1561.35[a] ± 34.57	1553.35[a] ± 28.14	1646.75[a] ± 27.22
Wt. gain/bird (g)	1003.47[a] ± 68.58	861.40[b] ± 70.84	888.92[b] ± 32.58	953.42[b] ± 47.18	917.65[abc] ± 40.29
FCR	1.59[a] ± 0.061	1.77[b] ± 0.032	1.75[b] ± 0.026	1.76[b] ± 0.047	1.73[b] ± 0.028
Mortality (%)	0.00	0.00	0.00	0.00	0.00

*Means in each row lacking a common superscript differ significantly ($p<0.05$)

Table 4: Production performance (mean ± S.E.) of broiler of different groups during 5-6 weeks of age

Parameters \ Groups	A=Control	B=1% Lactic acid	C= 2% Lactic acid	D= 3% Lactic acid	E=Flavomycin (0.1125g/kg feed)
Feed Intake/bird (g)	1778.50[a] ± 47.59	1932.75[b] ± 46.56	1853.50[ab] ± 58.98	1991.25[bc] ± 7.97	1996.50[bc] ± 20.66
Wt. Gain/bird (g)	870.00[b] ± 19.57	1095.00[a] ± 42.72	1052.50[a] ± 29.82	1110.00[a] ± 30.82	1110.00[a] ± 19.57
FCR	2.04[b] ± 0.030	1.76[a] ± 0.037	1.79[a] ± 0.034	1.79[a] ± 0.056	1.83[a] ± 0.027
Mortality (%)	0	0	0	0	0

*Means in each row lacking a common superscript differ significantly ($p<0.05$)

results in the starter-cum-finisher phase indicated apparently maximum weight gain with flavomycin while the control group had the lowest weight gain. At the end when the data were analyzed, it was found that no group was better than the other. The supplementation of feed with flavomycin or 3% lactic acid proved beneficial only in the finisher phase with no difference between each other. Flavomycin also helped in increasing the weight gain in the starter phase of life, while the addition of lactic acid did not prove beneficial rather showed the poorest weight gain with 1% concentration.

Throughout this study period the record of the mortality rate among the reared birds was strictly observed. None of the 200 birds died during this experiment. The finding is supported by the fact that the birds were reared under standard conditions of health, moreover the feed additives i.e. 1, 2, 3% lactic acid or flavomycin did not prove to be detrimental to the birds during any phase of research (Cox *et al*., 1994; Fuller, 1995). Chapman (1988) reported that probiotics which produced lactic acid, reduced symptoms of stress, acted as natural growth promoters and improved production and general health. According to Vasil *et al*. (1990), the immunological status of the birds is also enhanced with 1.5% lactic and acetic acids and clover juices. Samanta and Biswas (1997) and Surdjiska and Grigorova (1999) reported that mortality rate was reduced in supplemented groups as with 0.25% lactic acid and others.

On the basis of feed prices, group D with 3% lactic acid proved to be the most costly preparation during the starter and finisher phases collectively and after the control group (A) the group E, supplemented with flavomycin proved to be the most economical. On the other hand, among different concentrations of lactic acid the group B, with 1% lactic acid was the cheapest. When the price of feed was compared with the per kilogram weight gain in the birds, it was found that group E was the most economical and then comes the group B with 1% lactic acid, whereas the groups with 2% and 3% lactic acid proved costly.

It can be concluded that adding organic acids to broiler chicken feed improves production results although the positive affects of organic acids are less than that achieved by flavomycin. Also, being a natural product of bacterial/fungal fermentation, the use of lactic acid is not economical. Flavomycin proved to be the best choice of additive with which feed can be supplemented during the finisher phase of rearing. The flavomycin and lactic acid both are not recommended as feed additive during starter phase of growth of broilers.

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