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PJBS

ISSN 1028-8880

Pakistan Journal of Biological Sciences

ANSInet
Asian Network for Scientific Information
308 Lasani Town, Sargodha Road, Faisalabad - Pakistan

Pakistan Journal of Biological Sciences 9 (1): 104-106, 2006
ISSN 1028-8880

Effect of Salinomycin on Broiler Performance

[1]Hüsrev Demirulus, [2]Serdar Eratak and [3]Kazym Kara
[1]Department of Animal Science, Faculty of Agricultural, Yuzuncu Yil University, Van, Turkey
[2]Akhisar M.Y.O., Celal Bayar University, Manisa, Turkey
[3]Department of Animal Science, Faculty of Agricultural, Adnan Menders University, Aydin, Turkey

Abstract: In this study, effects of salinomycin on broiler performance were evaluated. Six levels of salinomycin added to feed were tested (0, 1, 3, 5, 7 or 9 ppm, respectively) for 49 days. Increasing the level resulted in a decrease in body weight, feed intake, weight gain and feed efficiency. The highest body and neck weight (1972.5 and 90.9 g) and the best feed efficiency (1.59) were obtained with 1 ppm salinomycin ($p<0.05$). The best viability rate (96%) was obtained with 3 ppm salinomycin ($p<0.05$). The highest plucked, carcass, tight, wing, breast and back weight of the group were 1629.1, 1316.9, 399.0, 150.0, 440.0 and 300.7 g, respectively. The highest abdominal fat weight (36.8 g) observed with 7 ppm salinomycin used group ($p<0.05$).

Key words: Salinomycin, broiler performance

INTRODUCTION

It has been observed that salinomycin used for animal health caused live weight increases in ruminants[1]. This observation led some producers to add salinomycin in their broiler's feed.

Salinomycin is widely used to control coccidiosis. Harms and Buresh[2] reviewed additional work indicating that monensin decreased body weight of broilers; they also reported that salinomycin depressed body weight of broilers. The amount of depression was dependent upon the level of salinomycin in the feed and the energy content of the feed.

There are various studies on adding salinomycin into fed[3-6]. The tolerance limits of salinoycin as a coccidiostat were reported as 120 and 80 ppm for Waren-Isabrown chicks and Lohmann selected Leghorn chicks respectively. The mentioned two breeds ingested 1.09 to 4.50 and 1.25 to 5.87 mg kg^{-1} body weight of salinomycin/day when 30-120 ppm dosage was applied[3].

In the Ferratto *et al.*[4] studied weight gain, feed intake, feed conversion and mortality in broiler chicks and measured over 28 days to compare the effect of adding monensin (100 mg kg^{-1}), salinomycin (60 mg kg^{-1}), lasalocid (90 mg kg^{-1}), arprinocid (60 mg kg^{-1}), halofuginone (3 mg kg^{-1}) and nicarnazin (125 mg kg^{-1}) with the performance on non-medicated control feed. Arprinocid gave the best results, differing from halofuginone only with regard to weight gain and from halofuginone as well as from nicarbazin with regard to feed conversion. Weight gain and feed conversion figures were not impaired by the use of monensin, lasalosid, salinomycin and arprinocid. When compared with the non-medicated control feed, feed conversion was impaired by the use of nicarazin and halofuginone. In another study[5] five levels of each coccidiostat were fed and increasing the levels of coccidiostat resulted in a decrease in body weight and feed intake. Monensin gave a greater depression at the level suggested by the manufacturer for prevention of coccidiosis (121 ppm) than did salinomycin (66 ppm). On the other hand, broilers were grown to 42 days of age on diets supplemented with salinomycin (60 mg kg^{-1}), monensin (99 mg kg^{-1}) or halofuginone (3 mg kg^{-1}) and continued on unmedicated diets to 49 days of age. There were no significant differences among anticocidals in final body weight, feed conversion, or mortality rates[6]. However, in another study in which salinomycin was given 60 ppm for 4 weeks poission symptom recession of water and feed intake and body weight were observed[7].

This research was conducted to determine the effects of adding various levels of salinomycin on broiler performance.

MATERIALS AND METHODS

In this investigation, 150 Ross PM3 chicks were divided into control (0 ppm) and 5 salinomycin groups (1, 3, 5, 7, 9 ppm, respectively). The density was 15 birds/m^2.

Corresponding Author: Husrev Demirulus, Department of Animal Science, Faculty of Agricultural, Yuzuncu Yil University, Van, Turkey Tel: 0090 432 2251603

Table 1: The composition of basal diet

Ingredients	Amount: Starter (0-3 week)	Finisher (4-7 week)
Yellow corn (%)	34.80	34.70
Wheat (%)	26.70	30.70
Soybean meal (46.88% Protein) (%)	27.10	22.70
Fish meal (%)	05.00	04.40
Salt (%)	00.35	00.35
Mineral (%)	00.175	00.175
Vitamin (%)	00.175	00.175
Limestone (%)	01.60	01.60
Vegetable oil (%)	02.00	04.00
Dicalcium phosphate (%)	01.20	01.20
Total	100.00	100.00
Protein (%)	20.09	19.99
ME kcal kg^{-1}	3002.54	3108.31

The lightening regimen was 24 L for the first two days and then 23 L: 1 D until slaughter. The duration of experiment was 7 weeks. The broilers were stunned by low electrical shock before slaughter.

A commercial type corn-soybean meal basal diet was used (Table 1). The starter and finisher diets were calculated to contain 20.09% protein and 3002.54 ME kcal kg^{-1} diet and 19.99% protein, 3108.31 ME kcal kg^{-1}, respectively. While control group was fed with basal diet, salinomycin groups were fed with basal diet containing 1, 3, 5, 7 or 9 ppm of salinomycin.

Chicks were not sexed and randomly distributed into 6 pens. Day old broiler chicks were wing banded for identification and weighted to determine live weight by a balance sensitive to 1 g every week until slaughter. Diets and water were provided *ad libitum* throughout the experimental period. Feed consumptions and live weights were measured to calculate feed efficiency.

The data were analysed by ANOVA[8]. Significant differences among treatment means were determined by Duncan's multiple range tests.

RESULTS

The addition of increasing amount of salinomycin to diet resulted in a decrease in body weight, viability, feed intake and feed efficiency (Table 2) ($p<0.05$).

A level of 7 and 9 ppm for salinomycin resulted in significant decreases in body weight ($p<0.05$). The best result of live weight was obtained from 1 ppm salinomycin ($p<0.05$).
The best viability (96%) was obtained from 3 ppm salinomycin group ($p<0.05$). Viability increased in 3 ppm group, but decreased in 5 ppm group.

Feed intake decreased as the level of salinomycin increased in the diet (Table 2). The best mean feed intake per capita of the last week (157.46 g) was obtained from control group and the lowest (92.29 g) was obtained from 7 ppm salinomycin group ($p<0.05$).

Table 2: Performance of broilers in control and salinomycin groups

Treatment groups Level (ppm)	Body weight (g)	Viability (%)	Mean feed intake on the last week (g day^{-1})	Feed efficiency (g feed g^{-1} B.W.)
Control	-			
0	1965.20^{a}	80^{ab}	157.46^{a}	1.90^{ab}
Salinomycin				
1	1972.50^{a}	88^{a}	116.19^{b}	1.59^{a}
3	1736.00^{ab}	96^{a}	134.38^{a}	2.17^{ab}
5	1915.27^{a}	72^{b}	130.95^{a}	2.14^{ab}
7	1523.46^{b}	92^{a}	092.29^{b}	2.24^{b}
9	1440.26^{b}	76^{b}	127.00^{ab}	2.50^{b}

B.W.: Body Weight, ^{a,b}: Means within columns with no common superscripts are significantly ($p<0.05$)

Feed efficiency of birds given diet containing 1 ppm salinomycin (1.59) was better than 9 ppm (2.50) group (Table 2) ($p<0.05$).

Parts of broilers carcass at the end of the trial were examined as well (Table 3).

The addition of increasing amount of salinomycin to diet resulted in a decrease in plucked, carcass, leg, wing, breast and bag weights (Table 3) ($p<0.05$), but the highest (36.8 g) and the lowest (28.8 g) abdominal fat weight were obtained from level of 7 ppm of salinomycin and from level of 9 ppm of salinomycin, respectively ($p<0.05$). On the other hand, the highest (90.9 g) and the lowest (57.7 g) neck weights were obtained from level of 1 ppm of salinomycin and from level of 7 ppm of salinomycin, respectively ($p<0.05$).

DISCUSSION

In this research, generally, body weight, viability, adding of salinomycin in feed declined feed intake and feed efficiency. Various researches obtained similar results[1,4,9-12]. On the other hand, Wheelhouse *et al.*[13] added salinomycin (60 ppm) and lasalocid (125 ppm) into feed with low protein and obtained negative effect for body weight.

Viability increased in 3 ppm group, but decreased in 5 ppm group, whereas, no significant differences were determined among salinomycin group and control group for liveability in Lu and Tsai[14] studies.

The best mean feed intake per capita of the last week was obtained from control group and the lowest were obtained from 7 ppm salinomycin group ($p<0.05$). In a study, Harms *et al.*[5] used Cobb x Cobb chickens supplemented with the coccidiostas salinomycin 0, 44, 55, 66, 77 and 88 mg kg^{-1} and monensin 81, 101, 121, 141 and 161 mg kg^{-1}. In this research, increasing concentrations of coccidiostats decreased feed intake and body weights, indicating that appetite is a major factor in decreased performance.

Table 3: The weight of carcass parts (g)

Treatment groups Level (ppm)	Plucked	Carcass	Leg	Wing	Breast	Bag	Ab.Fat	Neck
Control								
0	1629.1^{a}	1316.9^{a}	399.1^{a}	150.0^{a}	440.0^{a}	300.7^{a}	29.4^{ab}	84.2^{ab}
Salinomycin								
1	1514.5^{a}	1254.5^{a}	374.0^{a}	146.8^{a}	406.4^{a}	285.0^{a}	30.5^{a}	90.9^{a}
3	1411.2^{a}	1137.5^{a}	337.9^{a}	138.7^{a}	385.4^{a}	259.2^{a}	23.4^{b}	75.9^{ab}
5	1565.8^{a}	1250.0^{a}	367.5^{a}	146.9^{a}	435.0^{a}	274.2^{a}	36.2^{a}	73.1^{ab}
7	1234.6^{b}	1027.5^{ab}	270.2^{b}	120.5^{b}	345.0^{ab}	260.4^{a}	36.8^{a}	57.7^{b}
9	1188.6^{b}	974.5^{b}	288.0^{ab}	123.2^{b}	333.6^{b}	215.5^{b}	28.8^{b}	62.3^{b}

Ab.Fat: Abdominal Fat, ^{a,b}: Means within columns with no common superscripts are significantly ($p<0.05$)

Feed efficiency of birds given diet containing 9 ppm salinomycin was lower than 1 ppm group ($p<0.05$). Harms and Buresh[5] added amounts of 66, 77 and 88 ppm salinomycin and obtained lower values than control group. Chappell and Babcock[12] used salinomycin monensin and lasalocid in their trial; Laczay *et al.*[10] used monensin, salinomycin and narasin. In both two trials the worst results of feed efficiency were obtained from salinomycin groups. But, Ferratto *et al.*[4] used salinomycin as well as lasalocid and nicarbosin and the best results for feed efficiency were obtained from salinomycin group. In another study, 60 mg kg^{-1} of salinomycin and 100 mg kg^{-1} monensin were added into the feed and better results were obtained from control group[15]. In a study of Lu and Tsai [14], feed efficiency of salinomycin group was not different from control group.

We concluded that except precaution for coccidiosis, adding salinomycin into feed is not recommended in broiler production.

Energy losses in from metan gass during the protein sentesis in rumen. These loses are prevented by salinomycin and consequently lambs gain weight. Because of the absence of rumen in poultry, similar affects were not observed.

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