World Applied Sciences Journal 10 (7): 834-838, 2010
ISSN 1818-4952

The Effect of Virginiamycin and Thepax on Performance and Some Parameters in Serum of Blood Broiler

Farhad Ahmadi

Islamic Azad University - Sanandaj Branch, Kurdistan, Iran

Abstract: This research was carried out to investigate the effects of Vir, Pro and Vir+Pro (*Saccharomyces cerevisiae*) on performance and some of blood serum parameters of broilers. 240 one-day-old male broiler (Ross 308) was allocated in the complete randomized design with four treatments Control (without additive), Control+20 ppm Vir, Control+ 0.1%Pro, Control+ 0.1%Pro + 20 ppmVir in 4 replication and 15 birds in each pen. At the end of research from each pen one bird with closest weight to mean of weight each pen selected, slaughtered and collected of blood sample from wing vein. Then centrifuge its and the serum of the samples were separated. Phosphorous, calcium, magnesium and triglyceride of serum were measured by relevant kit using absorption atomic spectophotometric method. Percentage of abdominal fat pad and small intestinal weight also were measured based on percentage of body weight. The results indicated Vir, pro individually and Vir+ pro had significance effect on LBW, FI and FCR ($P<0.01$). Abdominal fat, small intestinal weight and serum of triglyceride concentration had significantly decreased in comparison with control treatment ($p<0.05$). Supplement of Vir and pro and combination had not significant effect on the rate of Ca, mg and P in serum of blood, although the noticeable increasing trend was observed in comparison with control. The results from this research showed that supplemented Diet with Vir and pro individually and combination improved performance in comparison with control treatment. In addition, treatments that inclusion Vir+Pro had high positive effect on efficiency of growth performance relative to others treatments.

Key words: Probiotic · Virginiamycin · Performance · Serum parameters · Feed conversion ratio

INTRODUCTION

Feed plays an important role in broiler production by sharing about 60-70 percentage of production cost. Therefore, efforts have been made to improve feed utilization and conversion to meat by using various feed additives like antibiotics and probiotics. Antimicrobials have been used as feed supplement for more than 50 years in poultry feed to enhance the growth performance and to prevent diseases in poultry. Most of the antibiotic growth promoters act by modifying the intestinal flora, which are associated with poor health and reduced performance of animals [1]. However, in recent years great concern has arisen about the use of antibiotics as supplement at sub therapeutic level in poultry feed due to emergence of multiple drug resistant bacteria [2]. The benefits of feeding sub therapeutic levels of antibiotics as growth promoters to poultry have been known since 1946. Antibiotics have been shown to improve the growth and feed efficiency of broilers and turkeys decrease flock variability and improve the intestinal digestion and absorption of carbohydrates and fats. Also, reported that feeding virginiamycin VM to male and female broilers at 16.5 ppm resulted in an increase in carcass yield from 63.3 to 64.0% at 50 d of age [3,4]. Male broilers fed supplemented diet with bacitracin methylene disalicylate at 27.5 ppm or VM at 11 ppm increased Carcass yield from 67.8 to 70 and 68.7%, respectively. The feeding of bambermycins at 2.2 ppm resulted in male broiler carcass yield of 67.9%, which was not different from the control treatment. For female broilers, reported that feeding bacitracin methylene disalicylate (BMD) at 27.5 ppm or bambermycins at 2.2 ppm resulted in an increase ($P<0.05$) in carcass yield from 69.6 to 70.5 and 70.6%, respectively [5]. The feeding of VM at 11 ppm resulted in female broiler carcass yield of 70%, which was mediatory among the control and the other treatments. Antibiotic growth promoters have recently come under scientific, public and political scrutiny for their proposed role in the development of bacterial resistance genes within

Corresponding Author: Dr. Farhad. Ahmadi, Islamic Azad University-Sanandaj Branch, Kurdistan, Iran.
Tel: +98-918 873 4591, E-mail: farhad_ahmadi@iausdj.ac.ir.

populations of animal ad human pathogens [6]. Therefore, other moderator of enteric micro flora should be investigated as alternatives to feed-grade antimicrobials. Probiotics are one alternative to antibiotic growth promoters that selectively prevent pathogen colonization of the gastrointestinal tract by serving as alternate attachment sites for the attachment of undesirable microorganisms including Salmonella and Escherichia coli [7]. Enhancement of colonization resistance and /or direct inhibitory effects against pathogens is important factors where probiotics have reduced the incidence and duration of diseases. Probiotics the removal of potential pathogens from the intestinal tract of growing animals may provide a more favorable environment for the digestion, absorption and metabolism of growth-enhancing nutrients [8]. The duration of antibiotic treatment may also affect the status of the intestinal micro flora. In addition to decreasing the colonization by undesirable microbes, antibiotics also impede the growth of beneficial strains of bacteria, such as Lactobacillus and can disrupt the competitive exclusion mechanisms provided by a protective bacterial population. The mode of action of probiotics in poultry includes [9]: 1) Maintaining normal intestinal micro flora by competitive exclusion and antagonism 2) Altering metabolism by increasing digestive enzyme activity, decreasing bacterial enzyme activity and ammonia production 3) Improving feed intake and digestion 4) Stimulating the immune system.

The objective of this research was to determine the effect of probiotic and virginiamycin individually or combination on the performance and some of parameters in the blood of broiler chicks.

MATERIAL AND METHOD

The experiment included a total number of 240 one-day-old broiler (Ross 308) commercial lines, reared from 1to 42 days of age, distributed in pens with a wood-shavings litter in poultry farm of faculty agriculture, Islamic Azad University.

Experimental Diets: All feeds had the same nutritional value and were formulated with ingredients commonly used by the Iranian poultry industry according to NRC1994 (Table 1) and provided *ad libitum*[10].

Treatments and Experimental Design: The experiment had four treatments with four replicates and 15 birds in each pen. The following treatment was applied:

T1: Control (Basal diet, without growth promoter and probiotic
T2: Control + Virginiamycin (20mg/kg diet)
T3: Control + probiotic (1g/kg diet that contain10^4 spores/kgdiet *Sacaromycess cervisiae*)
T4: Control+Virginiamycin (20ppm) +probiotic (0.1% of diet)

Birds were randomly allocated from 1 to 42 days of age to the treatment groups. Live body weight, Feed consumption and Feed conversion ratio (Gain: Feed) and mortality of the birds were weekly determined. To determine weight of abdominal fat and small intestine of birds, one bird from each treatment with nearest body weight to the mean of weight treatment selected and

Table 1: Composition and Nutrient content of starter and grower basal diets (g/kg as fed-basis)

Ingredients (g/kg)	Starter (1to21)	Grower (22 to42)
Yellow corn	554.2	580.4
Soybean meal	354.5	321.5
Dicalcium phosphate	19.2	17.2
Limestone(38 % Ca)	12.2	11.0
Salt (NaCl)	2	2
DL-Methionine	2.2	1.1
Mineral and Vitamin premix[1]	5	5
L-Lysine Hcl	0.2	0.2
Total	1,000.0	1,000.0
Nutrient content		
ME (kcal/kg)	3000	3,050
CP (g/kg)	217.2	191.6
Ca (g/kg)	10.5	8.4
Total P (g/kg)	7.0	3.8
Available P (g/kg)	4.5	6.1

[1]Provides per kg of diet: Vit A 8,000 IU; Vit D3 2,400 IU; Vit and 16.65 mg; Vit K 1.5 mg; Vit B1 0.6 mg; Vit B2 2.36mg; Vit B6 0.6 mg; Vit B12 1,320 mcg; biotin 0.15 mg; choline 1.54 g; pantothenic acid 9.32 mg; niacin 30.12 mg; folic acid 1.42 mg; Se 0.65 mg; I 0.35 mg; Fe 57.72 mg; Cu 12.30 mg; Zn 141.48 mg; Mn 173.0 mg; K 7.88 g; S 0.72 g; Mg 0.90 g.

slaughtered. The organs removed and weighted as percentage of live body weight in 42 days age. Blood samples were collected from the brachial vein of birds. Serum was separated by centrifugation with 3000g and 15 min and Ca, P, Mg and TG were performed using commercially available kits.

Statistical Analysis: Data collected were subjected to Analysis of Variance (ANOVA) and correlative analysis. The treatment mean values were tested for significant differences by Duncan's Multiple Range Test of SAS package [11].

RESULTS AND DISCUSSION

The effects of probiotic and antibiotic supplementation on live body weight, feed intake, feed conversion ratio and mortality in 42 days age showed in Table 2. The addition of antibiotic to the diet significantly improved performance of birds in comparison with control treatment ($P<0.05$). The researchers demonstrated that chicks reared on the rations containing antibiotic, had a higher growth rate than control treatment without any supplement [12].

Body Weight: The results of the study indicated that the birds in T4 group showed higher body weight when compared to control group. The statistical analysis revealed significant ($P<0.01$) difference in body weight. The above finding is agreement with the others research reports [The results observed in this study related to growth improvement in accordance with the earlier reports that the live weight gains were significantly higher in experimental birds in comparison with control at all levels during the end of experiment[12].

Feed Intake: The results of the study showed that the birds in treatment T4 consumed lesser feed followed by T1, T2 and T3.The statistical analysis revealed significant ($P<0.01$) difference in cumulative feed consumption. This is in accordance with the earlier findings research that the major outcomes from using probiotics include improvement in growth, reduction in mortality and improvement in feed conversion efficiency [13].

Feed Conversion Ratio: At end of the experimental period the cumulative feed efficiency of T1, T2, T3 and T4 were 2.02, 2.30, 2.15 and 2.24 respectively. The statistical analysis revealed that the feed conversion ratio all treatment was positive significantly ($P<0.01$) when compared to control group. The improvement in feed efficiency in this study with combination of Virginiamycin and yeast (*Saccharomyces cerevisiae)* is in agreement with the finding of other researcher [14]. The supplementation of antibiotic might have resulted in the reduction in gut micro flora that compete for nutrients with host and apparently increased the absorption of nutrients. The probiotic not only check the growth of pathogenic microorganisms but also could improve the feed utilization with neutralization of toxins and alteration of microbial metabolism. These results are consistent with previous experiment that observed improved feed conversion ratio with the supplementation of probiotic to the diet [15].

Mortality: The percent mortality of broilers among the treatment groups of T1, T2, T3 and T4 were 1.50, 1.10, 1.00 and 1.00, respectively. Inclusion of combination of Virginiamycin and probiotic of thepax at the recommended level had resulted in 1.00 percentages in comparison with treatment control of birds. The similar effects reported before by others [16].

Visceral Organ: The results of this experiment indicate that supplementation of diet with probiotic and antibiotic significantly decreased small intestine weight in comparison with control treatment. This reduction in weight of small intestine could be attributed to reduce of harmful colonization of micro biota in the gut. The addition of Vm increased Mn utilization regardless of the

Table 2: Effect of Virginiamycin and probiotic supplemented diet on performance and mortality[1]

Treatment	LBW(g)	FI(g)	FCR	Mor (%)
Control(Without supplement)	2015.28^{b}	5237.27^{a}	2.02^{b}	1.50^{a}
Virginiamycin (20ppm/kg diet)	2007.15^{b}	4980.02^{b}	2.30^{a}	1.10^{b}
probiotic of thepax(1g /kg diet)	2038.57^{b}	4714.11^{b}	2.22^{a}	1.00^{b}
Virn+pro(20ppm/kg diet+1g /kg diet)	2122.08^{a}	4695.48^{b}	2.24^{a}	1.00^{b}
Mean ± SE	2045.77±109.41	4906.72±154.34	2.17±.29	1.15±.23

[1]Means within a column with different letters differ significantly (P <?0.01) LBW= Live Body Weight; FCR = Feed conversion ratio; FI= Feed Intake

Table 3: Effect of Virginiamycin and probiotic on visceral organ weight at 42 days[1]

Treatment	Small intestine (%LBW)	Abdominal fat (%LBW)
Control	2.56[a]	2.92[a]
Virginiamycin (20ppm/kg diet)	2.10[b]	2.12[b]
probiotic of thepax(1g /kg diet)	2.19[b]	2.05[b]
Virn+pro(20ppm /kg diet+1g /kg diet)	2.21[b]	2.08[b]
Mean ± SE	2.26±2.74	2.28±2.88

[1]Means with different superscripts within the same column differ significantly (P<0.05)

Table 4: Effect of Virginiamycin and probiotic on the blood parameters at 42 days[1]

Treatment	Ca	P	Mg	TG(mg/dl)
Control	.53	.71	1.90	1.64[a]
Virginiamycin 20ppm/kg diet)	.62	.88	1.93	1.52[b]
probiotic of thepax(1g /kg diet)	.65	.92	2.01	1.53[b]
Virn+pro(20ppm / kg diet+1g/ kgdiet)	.68	.93	2.18	1.53[b]
Mean ± SE	.62±1.34	.86±1.23	1.54±2.54	1.85±4.01

[1]Means with different superscripts within the same column differ significantly (P<0.05) TG=Triglyceride

level of Mn supplementation and reduced intestinal weight in broilers. The reduction of intestinal weight was related to a thinning of the intestinal wall [17].

Determination of Ca, P and Mg: The results of related to analysis of macro elements showed in the Table 4. Blood of Ca, P, Mg Minerals were determined by auto analyzer and using commercial kits. The results was showed that Supplement of Vir and pro and Vir+pro hadnot significantly effect on the concentration of Ca, Mg and P in serum.. Although it was not significant, a numerical increase in Ca, P and Mg in the other treatments was detected as compared to the control diet group. A similar triglyceride depressing effect in chicks has been observed that the level of triglyceride in the liver and serum fed probiotic supplemented diet. The ability of virginiamycin to alter the composition of the intestinal micro biota and decrease the intestinal colonization by lactobacilli is well documented. Therefore, this position caused that absorption of minerals improved [18]. Several researchers have reported the nutrient sparing effects of Vm on crude protein, energy, Ca, Mn and P in pigs and chickens. The addition of Vm to marginally deficient P diets for broilers increased decreased mortality [19].Reported a 28% increase in P digestibility, an 11% increase in Ca digestibility and an increase in absolute retention of P, Ca, Zn and Mg in limit-fed pigs given Vm [20].

ACKNOWLEDGEMENT

The author are thankful to Management of poultry farm production in faculty of agriculture and the Dean of Islamic Azad University,Sanandaj Branch for providing facilities for carried out this research.

REFERENCES

1. Bedford, M., 2000. Removal of antibiotic growth promoters from poultry diet:Implications and strategies to minimise subsequent problems. World's Poul. Sci. J., 56: 342-354.
2. Wray, C. and R.H. Davies, 2000. Competitive exclusion-An alternative to antibiotics. Vet. J., 59: 107-108.
3. Woodward, S.A., R.H. Harms, R.D. Miles, D.M. Janky and N. Ruiz, 1988. Research note: Influence of virginiamycin on yield of broilers fed four levels of energy. Poult. Sci., 67: 1222-1224.
4. Salmon, R.E. and V.I. Stevens, 1990. Response of large white turkeys to virginiamycin from day-old to slaughter. Poult. Sci., 69: 1383-1387.
5. Izat, A.L., M. Colberg, M.A. Reiber, M.H. Adams, J.T. Skinner, M.C. Cabel, H.L. Stilborn and P.W. Waldroup, 1990. Effects of different antibiotics on performance, processing characteristics and parts yield of broiler chickens. Poult. Sci., 69: 1787-1791.
6. Gustafson, R.H. and R.E. Bowen, 1997. Antibiotic use in animal agriculture. J. Appl. Microbiol., 83: 531-541.
7. Newman, K., 1994. Mannan-oligosaccharides: Natural polymers with significant impact on the gastrointestinal microflora and the immune system, pp: 167-174.
8. Samanya, M. And K. Yamauchi, 2002. Histological alterations of intestinal villi in chickens fed dried Bacillus subtilis var. natto. Comp. Biochem. Physiol. Physiol., 133: 95-104.
9. Lutful Kabir, S.M., 2009. The Role of Probiotics in the Poultry Industry. Int. J. Mol. Sci., 10: 3531-3546.

10. National Research Council, 1994. Nutrient Requirements of Poultry. 9th rev. ed. Natl. Acad. Press, Washington, DC.
11. SAS., 2000. Institute Inc. SAS Technical Report P-243 SAS/STAT software. The GEMOD procedure. Release 6. 09. SAS Institute Inc. Cary. NC, USA.
12. Kahraman, R., H. Zpinar, I Abas, H. Eseceli and T. Bilal, 2000. Effects of probiotic and antibiotic on performance of broilers. Arch. Für Geflügelkunde, 64: 70-74.
13. Yeo, J. and K. Kim, 1997. Effect of feeding diets containing an antibiotic, a probiotic, or yucca extract on growth and intestinal urease activity in broiler chicks. Poult. Sci., 76: 381-385.
14. Miles, R.D. and R.H. Harms, 1984. Influence of virginiamycin on broiler performance, uniformity and litter quality. Nutr. Rep. Int., 29: 971-975.
15. Tortuero, F. and E. Fernandez, 1995. Effect of inclusion of microbial culture in barley-based diets fed to laying hens. Anim. Feed. Sci. Tec., 53: 255-265.
16. Kumprecht, I. And P. Zobac, 1998. The effect of probiotic preparations containing saccharomyces cerevisiae and Enterococcus faecium in diets with different levels of B-vitamins on chicken broiler performance. Zivocisna Vyroba, 43: 63-70.
17. Henry, P.R., C.B. Ammerman and R.D. Miles, 1986. Influence of virginiamycin and dietary manganese on performance, manganese utilization and intestinal tract weight of broilers. Poult. Sci., 65: 321-324.
18. Dumonceaux, T.J., J.E. Hill, S.M. Hemmingsen and A.G. Van Kessel, 2006. Characterization of intestinal microbiota and response to dietary virginiamycin supplementation in the broiler chicken. Appl. Environ. Microbiol., 72: 2815-2823.
19. Cervantes, H., K. Bafundo, P. Ewing, G. Pesti and R. Bakalli, 2002. Dietary supplementation with virginiamycin or phytase improves phosphorus utilization in broiler chickens. Poult. Sci., 81(Suppl.1): 150.(Abstr).
20. Agudelo, J.H., M.D. Lindemann, G.L. Cromwell and R.D. Nimmo, 2003. Virginiamycin influences mineral digestibility in pigs. J. Anim. Sci., 81(Suppl. 2): 82. (Abstr).