EFFECTS OF POULTRY ENHANCER (RE3) AND ANTIBIOTIC ON GROWTH PERFORMANCE AND NUTRIENT UTILIZATION OF BROILER CHICKENS

Ojebiyi O.O., Aboderin J.O. Shittu M.D. and Ogunyeye T.J.
Department of Animal Nutrition and Biotechnology,
Ladoke Akintola University of Technology,
P.M.B. 4000, Ogbomoso,Oyo state,Nigeria.
Corresponding author email: segunojebiyi@gmail.com

Abstract
This experiment was conducted to investigate the influence of direct fed microbial (RE3) and antibiotic Fysal P° on the growth and nutrient digestibility of Marshall Strain of broiler chickens. Two hundred and forty day old Marshal Strain of broiler chicks of average weight of 37-42 grammes was used for the experiment. The birds were randomly divided into 3 groups of 4 replicates of 20 birds each to make a total of 80birds per treatment in a completely randomized design experiment. Three diets were formulated as follows Diet 1 was the control without probiotic or antibiotic, Diet 2 - control diet plus probiotic RE3 (1.5 millilitre to 1 kilogram of feed, Diet 3 - control diet plus antibiotic (2 grammes to 1kilogramme). The experiment lasted for 8 weeks. The final weight total weight gain, feed cost per kg and daily weight gain were not significantly (P>0.05) affected by the treatment. The feed to gain ratio, feed cost per kg weight gain, total cost of drug per bird, total feed intake and daily feed intake were all significantly (P<0.05) affected by the treatment. The digestibility of nutrients except nitrogen free extract was not significantly (P>0.05) affected by dietary treatment. It was concluded that the use of direct fed (RE3) supplementation improved daily weight gain, decreased feed: gain ratio as well as the cost of production and generally improved performance of the birds. Its obvious advantage over antibiotics makes it a recommended alternative to antibiotics.

Key words: antibiotic, broiler chicken, direct fed microbial, growth performance and nutrient digestibility.

Introduction

Growth promoters are chemical and biological substances which are added to livestock feed to improve the growth of chickens through improved utilization of feed and in this way leading to better production and financial returns (Bellisle *et al.*, 1998). Their mechanism of action varies and positive effect can be expressed through better appetite,improved feed conversion, stimulation of the immune system and increased vitality and regulation of the intestinal micro-flora. In addition the use of antimicrobial growth promoters (AGP) in animal nutrition has been beneficial for the improvement of growth performance and prevention of diseases (Barton, 2000; Snel *et al.*, 2002). However, contemporary biosecurity threats arising from the increasing resistance of pathogens to antibiotics and the accumulation of antibiotic residues in animal products and the environment (Barton, 2000; Van den Bogaard and Stobberingh, 2000; Snel *et al.*, 2002) elicit a call for a worldwide AGP ban. As a result, in the post-AGP era, it is extremely important for the highly intensive broiler production sector of the poultry industry to achieve performance optimization and minimization of economic losses while ensuring the safety of broiler meat via the control and elimination of foodborne pathogens.

This experiment investigated growth performance and nutrient digestibility of broiler fed probiotics or antibiotics supplementation.

Materials And Methods

Experimental location: The study was carried out at Poultry Unit of the Teaching and Research Farm, Ladoke Akintola University of Technology, Ogbomoso,Nigeria.

Experimental diets: Three experimental diets were formulated at the starter and finisher phases. Diet 1 served as the control while poultry enhancer (RE 3) was incorporated into the control diet to form diet 2 and FYSAL- SP+ (antibiotic) was added to the control diet to form diet 3 (Table 1).

Bird management and experimental design: Two hundred and forty (240) days-old Marshall Strain of broiler chicks were used for the experiment. After weighing, the birds were divided into three treatments of four replicates each. There were 20 birds in each replicate which made up 80 birds per treatment in a completely randomized design. Birds were housed in deep litter pen of 1.2 m × 1 m with the floor covered with wood shavings spread on the floor as litter material. Feed and water were served *ad libitum.* Vaccination and medication of the birds were carried out according to the standard practice prevailing in the study location. Birds were

offered starter feed for the first period (0-4 weeks) and finisher feeds from then (4-8 weeks). Light was provided for 24 h during brooding (0-4 weeks), thereafter the birds were restricted to 12 h daily light. The experiment lasted for 8 weeks.

Data collection: Feed intake and body weight were monitored and used in calculating weight gain and feed to gain ratio.

Digestibility trial: At the end of seven weeks, two birds per replicate were selected and transferred to metabolic cages for digestibility study. The birds were acclimatized for two days after which the faecal samples were collected for 5 days. The wet as well as dry weight of the faeces were taken. The feaces for each replicate for five days were bulked together and subsamples were taken for proximate analysis.

Statistical analysis: Data were analysed by one-way analysis of variance (ANOVA) using the General Linear Model of SAS (2000). Means were separated using Duncan's Multiple Range Test of the same statistical package.

Results And Discussion

The proximate compositions of the experimental diets (Tables 1) are within the range recommended by NRC (1994). The growth response of broilers fed RE3 and antibiotics is presented in Table 4. The final weight total weight gain, feed cost per kg and daily weight gain were not significantly ($P>0.05$) affected by the treatment. The feed to gain ratio, feed cost per kg weight gain, total cost of drug per bird, total feed intake and daily feed intake were all significantly ($P<0.05$) affected by the treatment.

Birds on T2 and T3 had similar values for daily feed intake which are lower than the value for T1. Birds on the RE3 diet had a significantly ($P<0.05$) lower value (95.11) than the control (97.38). This is in agreement with the findings of Jernigan *et al.*, (1985) and Yeo and Kim (1997) that the use of probiotic in broiler chicks diets significantly improved the daily body weight gain, feed intake and feed efficiency but contrasted the findings of Miazzo *et al.* (2000), Ledoux *et al.* (1999) and Mutus *et al.* (2006) that Probiotic alone had no significant on feed consumption.

There appears to be a strong interaction between probiotics and the intestinal micro flora. The improvement in performance due to the action of probiotics on the micro flora can be interpreted in two ways: the first is related to the reduction in the utilization of nutrients by microorganisms and the second is the decrease of microbial metabolites that interfere with host growth (Anderson *et al.*, 1999). This is revealed in the feed to gain ratio which was significantly ($P<0.05$) higher in control group (3.13) than T2(2.98) and T3 (2.97) an observation similar to Khaksefidi and Rahimi (2005) who reported that the body weight and feed conversion ratio of probiotic fed broilers were superior compare to the control group. In the study of Sabiha *et al.* (2005) the probiotic and prebiotic supplemented (0.025 %) quails had a significantly higher body weight gain. However, Pelicano *et al.* (2004) observed that probiotic and enzyme supplementation had no beneficial effects on the growth performance of broiler chicken.

The feed cost per kg live weight gain in control is significantly ($P<0.05$) higher than RE3 supplemented (281.31) and antibiotic supplemented (279.48) diets which are similar. Results of the present study indicated that addition of RE3 in broiler diet resulted in low feed cost per kg weight gain.

The total cost of drugs (₦11.70) per bird is lower ($P<0.05$) in RE3 diet than that of contro l(₦15.90) and (₦15.8) for the antibiotic supplemented diet. This implies that less money will be spent on administration of drugs for animals raised with inclusion of probiotics in their diets.

The digestibility of nutrients (Table 4) by broilers in this study were not significantly ($P>0.05$) affected aside nitrogen free extract. This report is similar to that of Gippert *et al.*, (1992) and Luicke *et al.*, (1992) who reported that addition of growth promoters had no effect on nutrient digestibility.

Conclusion

The use of fed (RE3) supplement diets in this study improved daily weight gain, feed: gain ratio decreased the cost of production and improved general performance of birds.

References

Anderson D.B. , McCracken V.J., Aminov R.J., Simpson J.M., Mackie R.J., Vestegem M.W.A. Gaskins H.R. (1999). Gut microbiology and growth promoting antibiotics in swine. Pig News and Information; 20:115- 122

AOAC, (1990). Official method of Analysis 15th Edition. Association of Analytical Chemist, Washington D.C.

Barton, M. D. (2000). Antibiotic use in animal feed and its impact on human health. Nutr. Res. Rev. 13:279–299.

Bellisle F., Diplock A.T. and Hornstra A.T. (1998). Functional food science in Europe. Br. J. Nutr. 80:3-4.

Jernigan, M.A., Miles R.D. and Arafa A.S. (1985). Probiotics in poultry nutrition. A review. World Poult. Sci. J., 41: 99-107.

Khaksefidi A. and Rahimi S. (2005). Effect of

probiotic inclusion in the diet of broiler chickens on performance, feed efficiency and carcass quality. Asian-Aust J Ani Sci, 18: 1153-1156.

Ledoux, D.R., Rottinghaus G.E., Bermudez A.J. and Alonso-Debolt, M. (1999). Efficiency of hydrated sodium calcium aluminosilicate to ameliorate the toxic effects of aflatoxin in broiler chicks. Poult Sci., 78: 204-210.

Miazzo, R., Rosa, C.A.R., Queiroz, E.C.D. .Magnolis G. and S.M. Chiacchiera, S.M. (2000). Efficacy of synthetic zeolite to reduce the toxicity of aflatoxin in broiler chicks. Poult. Sci., 79: 1-6.

Mutus, R., Kocabagli N, Alp, M., Acar, N. Eren M. and Gezen, S. (2006). The effect of dietary probiotic supplementation on tibial bone characteristics and strength in broilers. Poult. Sci., 85: 1621-1625.

National Research Council, (1994). Nutrient Requirements of Poultry, 9th revised Ed. (Washington, DC. National Academy of Sciences).

Pelicano E.R.L. , Souza, P.A., Souza, H.B.A., Oba M and Lima, T. M.A.(2004) . Productive traits of broiler chicken fed diet containing different growth promoters. Rev Bra Since Avicola, 6: 177-182.

Sabiha M.K.A., Elizabeth V.K. and Jalaludeen, A. (2005). Effect of supplementation of probiotic on the growth performance of broiler chicken. Indian J Poult Sci 40: 73-75.

SAS, (2000). SAS Users Guide. SAS. Inst. Inc., Cary, NC.

Snel, J., Harmsen, H. J. M. Van der Wielen, P. W. J. J. and Williams B. A. (2002). Dietary strategies to influence the gastro-intestinal microflora of young animals, and its potential to improve intestinal health. Pages 37–69 in Nutrition and Health of the Gastrointestinal Tract. M. C. Blok, H. A. Vahl, L. De Lange, Van de Braak, V G., Hemke, and M. Hessing, ed. Wageningen Academic Publishers, the Netherlands.

Van den Bogaard, A. E., and Stobberingh E.E. (2000). Epidemiology of resistance to antibiotics. Links between animals and humans. Int. J. Antimicrob. Agents 14:327–335.

Yeo, J. and Kim, K.I. (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.

Table 1: Gross composition of broiler starter and finisher diets

	Starter diets			Finisher diets		
Ingredients	**Control**	**RE3**	**Fysal-SP**	**Control**	**RE3**	**Fysal-SP**
Maize	55.00	55.00	55.00	57.00	57.00	57.00
Soybean Meal	35.20	35.20	35.20	25.50	25.50	25.50
Wheat offal	1.50	1.50	1.50	10.00	10.00	10.00
Palm kernel cake	2.00	2.00	2.00	2.00	2.00	2.00
Fish meal	2.50	2.50	2.50	1.50	1.50	1.50
Salt	0.25	0.25	0.25	0.25	0.25	0.25
Bone meal	1.50	1.50	1.50	1.50	1.50	1.50
Lysine	0.12	0.12	0.12	0.12	0.12	0.12
Methionine	0.18	0.18	0.18	0.18	0.18	0.18
Premix	0.25	0.25	0.25	0.25	0.25	0.25
Total	100:00	100:00	100:00	100:00	100:00	100:00
RE3	-	+	-	-	+	-
FYSAL-SP	-	+	-	-	-	+
Cost per kg	105.90	106.64	105.90	88.89	89.63	89.43
Determined analysis						
Dry matter (%)	91.28	90.63	90.72	90.05	89.98	90.13
Crude protein (%)	23.43	23.31	23.62	19.74	19.08	19.43
Crude fibre (%)	3.62	3.68	3.76	5.77	5.87	6.10
Ether extract (%)	3.33	3.68	3.76	3.68	3.57	3.60
Ash (%)	5.63	5.49	5.36	9.09	8.94	9.07
Nitrogen free extract (%)	55.27	54.29	54.05	51.77	52.54	55.23
Metabolizable energy (Kcal/kg)	2982.15	2982.15	2982.15	2919.6	2919.6	2919.6

Table 2: Growth performance of broiler fed microbial (RE3) and antibiotic at 8 weeks

Parameters	**T1**	**T2**	**T3**	**SEM(±)**
Initial weight (g)	40.24	42.19	39.52	0.40
Final weight (g)	1779.70	1827.56	1814.03	20.21
Daily weight gain (g)	31.06	31.88	31.74	0.36
Feed cost/kg (N)	93.00	94.40	94.10	0.56
Feed: gain ratio	3.13^{a}	2.98^{b}	2.97^{b}	0.05
Feed cost/kg weight gain	291.09^{a}	281.31^{b}	279.48^{b}	60.29
Cost of drug per bird (N)	15.9^{a}	11.7^{c}	15.8^{b}	0.18
Daily feed intake (g)	97.38^{a}	95.11^{b}	94.3^{b}	1.27

^{abc}Means along the same row having different superscripts are significantly (P<0.05) different

Table 3: Nutrient digestibility of broiler chicken fed microbial (RE3) and antibiotics at 8 weeks

Parameters	T1	T2	T3	SEM
Dry matter (%)	89.28	89.40	89.80	0.457
Crude protein (%)	89.65	89.16	88.70	0.413
Crude fibre (%)	75.87	76.05	76.85	0.917
Crude fat (%)	93.92	94.76	94.96	0.237
Crude ash (%)	83.38	83.80	83.36	0.630
Nitrogen free extract	43.83^{a}	40.51^{b}	39.18^{c}	0.150

^{abc}Means along the same row having different superscripts are significant ly (P<0.05) different