ISSN 1682-8356
ansinet.org/ijps

INTERNATIONAL JOURNAL OF

POULTRY SCIENCE

ANSInet
308 Lasani Town, Sargodha Road, Faisalabad - Pakistan
Mob: +92 300 3008585, Fax: +92 41 8815544
E-mail: editorijps@gmail.com

International Journal of Poultry Science 9 (3): 244-246, 2010
ISSN 1682-8356

Effects of a Garlic Active Based Growth Promoter on Growth Performance and Specific Pathogenic Intestinal Microbial Counts of Broiler Chicks

Shiva Kumar, K.C. Sharadamma and P.M. Radhakrishna
Provimi India Innovation Centre, Yelahanka New Town, Bangalore, 560 106, Karnataka, India

Abstract: The present study was conducted to determine whether dietary supplementation of a natural non-antibiotic garlic active based growth promoter i.e. G-PRO naturo would be used as a natural alternative to antibiotics growth promoters in broiler diets. Three hundred sixty, 1-day-old straight run broiler chicks (Cobb 400) were randomly divided into 3 treatment groups of 20 birds each with 6 replicates. The groups were 1) Negative control (basal diet), 2) G-PRO naturo 250 ppm (+ basal diet) 3) Positive Control (basal diet + Virginamycin) 500 ppm. The basal diets (starter/grower: 0-21 d, finisher 22-42 d) were based on maize and soybean meal. Each group was fed *ad libitum* with its own diets for a period of 42 days. Light was provided 24 h each day throughout. Water was always available. The body weight gains of birds were measured individually and feed consumption and feed conversion efficiency (g feed: g weight) were calculated weekly. At the end of the experiment all birds were sacrificed to determine intestinal microbial count. The results obtained in the experiment showed that the garlic based additive supplementation affected some performance parameters significantly ($p<0.05$). Addition of G-PRO naturo at 250 ppm to the diets improved body weight and feed conversion efficiency. The results obtained in the experiment also showed that the supplement was able to reduce the salmonella and *E. coli* counts in the intestine when in comparison to the negative control. It could be concluded that G-PRO naturo supplementation, at 250 ppm to broiler diets could have potential to improve growth performance of broilers.

Key words: Broiler diets, garlic, antimicrobial agents

INTRODUCTION

In the livestock farming, Infectious agents reduce the yield of farmed food animals. To control these, the administration of sub-therapeutic antibiotics and antimicrobial agents has been shown to be effective (Al-Dobaib and Mousa, 2009).

Supplementing animal feed with antimicrobial agents to enhance growth has been common practice for more than 50 years and is estimated to constitute more than half the total antimicrobial use worldwide (Wegener *et al*., 1999).

This practice of using Antibiotics in feed is known from more than 50 years. According to the National Office of Animal Health (2001), the objective of using AGP's is to "help growing animals digest their food more efficiently, get maximum benefit from it and allow them to develop into strong and healthy individuals".

At present Antibiotic Based Growth Promoters (AGPs) are being widely used as growth promoters in livestock animals. Antibiotics like virginamycin, salinomycin, neomycin, doxycycline, avilamycin etc., are few of the commonly used AGPs. However use of these antibiotics in feed has shown several side effects like resistance towards the drug, Residue in the meat and thereby the user getting resistance to the drug etc. hence several countries have banned the use of Antibiotic based growth promoters in the feed animal sector and appearance of resistant strains in human beings.

Alternative plant extracts and essential oils have been known to be used for many kinds of diseases by Egyptians, Chinese, Indians and Greeks. In many countries of the world, farmers use different kinds of food and food additives depending on local conditions and availability of food and food additives sources. Since the ban of antibiotics in EU, plant extracts as alternative to antibiotics have drawn a significant attention in animal nutrition.

Garlic or garlic extracts are known to contain an array of substances with beneficial health-related biological properties (Agarwal, 1996). Class of sulfur containing organic compounds, which are commonly known as organo sulfur compounds are known to have several medicinal properties. Compounds like dialkyl polysulfides are known to be having antimicrobial activity (Shyh-Ming and Mei-Chin, 2001). Garlic, onion, asafoetida etc are the rich natural sources of these compounds. But these compounds are highly unstable when stored at 25-30^{o}C. Hence this is not bio available and degrades into smaller sulfur compounds before reaching the target organ.

The G-PRO naturo is an unique non-antibiotic growth promoter composed of stabilized fat soluble organosulfur compounds derived from *Allium sativum*, *Allium cepa*. The present study was conducted to assess the effects of G-PRO naturo on growth

Corresponding Author: Shiva Kumar, Provimi India Innovation Centre, Yelahanka New Town, Bangalore, 560 106, Karnataka, India

performance and specific intestinal microbial counts of broilers.

MATERIALS AND METHODS

Three hundred sixty, one-week old straight run broiler chicks (Cobb 400, procured from a reputed breeder) were divided into three groups with similar mean weight, comprising 20 birds each with six replicates for each group. Standard starter/grower diet (from hatching to 10 days, 22.5% CP and 3025 kcal/kg ME), finisher diet (from 22-42 days, 19.5% CP and 3200 Kcal/kg ME) were used as the basal diet (Table 1). The first group taken as negative control was given only the basal diet. The other 2 groups fed with starter/grower/finisher diet supplemented with virginamycin 500 ppm (STAFAC 20 from Pfizer used, each kg contains virginiamycin 20 g), 3) G-PRO naturo. The experiment was conducted following the guidelines of the Institutional Animal Ethics Committee.

During the experiment, the chicks were housed individually in pens; each pen is considered as experimental unit and reared at a conventional ambient temperature with a relative humidity of 60-70%. Feed and water were made available. Light was provided 24 h each day. The experiment lasted for 6 weeks, broiler growth performance was assessed by measuring feed intake every day, body weight and feed conversion rate every week. At the end of 42 days of age, 5 birds for each treatment were sacrificed to determine average bacterial count from small intestinal contents. The data were analyzed statistically using the Graph Pad Prism 4 and means were separated using Tukeys Multiple Range Test (Snedecor and Cocharan, 1967).

Table 1: Composition of Starter/Grower (0-21 d) and Finisher (22-42 d) diets

Ingredients (kg)	Starter/Grower	Finisher
Maize	557.68	602.34
Soyabean meal	372.52	310.75
Sunflower oil	31.63	52.68
Limestone powder	14.66	11.98
Dicalcium phosphate	14.56	15.15
DL-Methionine	2.4	1.62
Salt	2.22	2.48
Choline Chloride 60%	1	1
Br. Vit Premix[1]	1	1
Br. Min Premix[2]	1	1
Lysine	0.82	-
Sodium bicarbonate	0.52	-
Total (kg)	1000	1000
Calculated value		
C. Protein (%)	22	19.5
ME Kcal/Kg	3025	3200
C. Fibre (%)	3.35	3.07
Lysine (%)	1.25	1.03
Methionine (%)	0.58	0.47
Calcium (%)	1	0.9
A. Phosphorus (%)	0.4	0.45
M+C	0.94	0.8

[1]Supplies per kg diet: Vitamin A, 16,500 IU; vitamin D3, 3,200 ICU; vitamin E, 12 mg; vitamin K, 2 mg; vitamin B1, 1.2 mg; vitamin B2 10 mg; vitamin B6, 2.4 mg; vitamin B12, 12 mg; niacin, 18 mg; pantothenic acid, 12 mg.

[2]Mn, 90 mg; Zn, 72 mg; Fe, 60 mg; Cu, 10 mg; I, 1.2 mg

RESULTS AND DISCUSSION

The results with respect to body weight, Daily weight gain, EPEF (European Poultry Efficiency Factor), feed conversion efficiency and Average bacterial counts from the chicken intestinal contents of broilers are shown in Table 2 and 3. The results obtained in the experiment

Table 2: Average body weight (g), Average daily gain, European poultry efficiency factor and feed conversion ratio (g/g) for broiler chicks given the respective treatment

	Treatments			
	Neg Control (T1)	G-PRO naturo (T2)	Virginamycin (PC) (T3)	p-value
Addition	-	250 ppm	500 ppm	
Birds	120	120	120	
Replicates	6	6	6	
Body weight (g)				
Day 14	331.4±3.103	327.9±2.804	331.4±2.867	0.793
Day 21	652.6±8.372	657.2±5.608	646.2±6.768	0.078
Day 28	1141±14.72	1144±11.83	1141±11.71	0.194
Day 35	1677±22.46	1724±20.22	1721±19.83	0.106
Day 42	2074±31.45[b]	2173±22.22[a]	2128±21.04[ab]	0.0002
Average daily gain (g)	49.39	51.76	50.72	
EPEF index*	254.5	297.91	274.97	0.099
FCR (g/g)				
Day 0-14	0.952±0.019	0.973±0.012	0.967±0.014	0.192
Day 0-21	1.268±0.027	1.27±0.027	1.289±0.026	0.657
Day 0-28	1.421±0.017	1.409±0.009	1.414±0.020	0.385
Day 0-35	1.589±0.021	1.545±0.028	1.526±0.015	0.260
Day 0-42	1.779±0.031	1.694±0.029	1.737±0.032	0.293

[a,b]Averages with different letters into the row are statistically different (Tukey, $p<0.05$).

*European Poultry Efficiency Factor = (Daily wt gain x survival rate) / (Feed Conversion x 10)

Table 3: Average bacterial counts from the chicken intestinal contents collected at 42 days of age from respective treatment groups (cfu/g of intestinal content)

Treatments	*Salmonella*	*E. coli*
T1-Neg control	73333	46666
T2-G-PRO naturo -250 ppm	566	3733
T3-Virginamycin-500 ppm	10000	800

showed that G-PRO naturo supplementation affected some performance parameters significantly ($p<0.05$). Addition of G-PRO naturo at 250 ppm to the diets improved body weight, daily weight gain, EPEF and feed conversion efficiency. The results obtained in the experiment also showed that supplemental G-PRO naturo had no untoward effects on health status of the birds and the growth performance were comparable to the growth performance of the positive control having AGP in the diet. The results in Table 2 indicate, that G-PRO naturo was able to reduce the salmonella and *E. coli* counts in the intestine when in comparison to the negative control.

The results show that the positive effects of supplemental G-PRO naturo could be attributed to its antimicrobial and stimulative effects on intestinal digestibility. The results obtained showed that there was an improvement of 99 grams in T2 (2173±22) supplemented with G-PRO naturo, against T1 (2074±31) Negative control and by 54 grams against T3 (2128±21). The weight difference was significant by ANOVA at $p<0.05$ at the end of the trial. Considering, European poultry efficiency factor, the highest score was for the T2-G-PRO naturo supplemented group (297) indicating a better performance among the treatments.

Conclusion: It could be concluded that supplementation of the garlic active based growth promoter to broiler diets could have potential to improve growth performance of broilers and can be effectively used as replacement against AGP's.

REFERENCES

Al-Dobaib, S.N. and H.M. Mousa, 2009. J. Food, Agric. Environ., Vol. 7.

Agarwal, K.C., 1996. Therapeutic actions of garlic constituents. Med. Res. Rev., 16: 111-124.

Snedecor, G.W. and W.G. Cocharan, 1967. Statistical Methods. 6th Edn., The Iowa State Univ. Press, Ames, Iowa, USA.

National Office of Animal Health (NOAH), 2001. Antibiotics for animals. An Overview. http://www.noah.co.uk/issues/briefingdoc/06-antib.htm. Last Updated October 2007.

Shyh-Ming Tsao and Mei-Chin Yin, 2001. J. Med. Microbiol., 50: 646-649.

Wegener, H.C., F.M. Aarestrup, P. Gerner-Smidt and F. Bager, 1999. Transfer of antibiotic resistant bacteria from animals to man. Acta Vet. Scand. Suppl., 92: 51-57.