APRW -10

Growth Performance and Haematology of Broiler Birds Fed Diets Containing Korean Ginseng

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Abstract
The study was conducted to determine the effect of dietary Korean ginseng inclusion on growth performance and haematology of broiler birds. A total of 80 day old chicks were used for the study. The birds were randomly divided into four treatments and assigned to four treatment diets in a Completely Randomized Design (CRD) as follows T_0, T_1, T_2, and T_3 containing 0, 2, 4 and 6 g per 5 kg feed inclusion in their diet respectively. Routine management practices were carried out as at when due and the experiment lasted for eight weeks. The result showed that there were significant ($p<0.05$) difference in their body weight gain, feed intake, feed conversion ratio and mortality rate of broilers fed 4 g and 6 g per 5 kg feed of Korean ginseng. The haematological indices showed that there were significant ($p<0.05$) difference only in Packed cell volume. From the results, it was concluded that Korean ginseng inclusion at 4 and 6 g per 5 kg diet enhanced growth performance of broiler birds.

Key words: Korean ginseng, broiler birds, growth performance, haematology.

Introduction

Poultry production is one of the fastest means to achieving appreciable improvement in the nutritional standard of the populace because of its short generation interval, quick turnover rate and relatively low capital investment (Smith, 2001; Ani and Okeke, 2011). As a primary source of animal protein, the poultry sector offers a valuable repository to bridge the gap between demand and the availability of balanced nutrition. During the last few decades, antibiotics have been widely used in the livestock industry for growth promotion and enhanced feed efficiency. However, there is growing concern about the possibility that the use of antibiotics in livestock and poultry feed increases number of antibiotic-resistant pathogens and creates antibiotic residue problems in animal products, especially in meat and eggs (Kelley *et al*., 1998). These residues might pose a potential health hazard to humans (Dipeolu *et al.,* 2005). Therefore, in response to the restriction and drug resistance problem emanating from their use has made nutritionists to look inward for alternatives. Such alternative feed additives are probiotics, yeast, prebiotics, organic acids and feed grade enzymes (Windisch *et al.,* 2007; Ndelekwute *et al*., 2014).

The search is continuing and bioactive plant materials otherwise known as phytogenics have been adjudged to be other good alternative (Wei and Shibamoto, 2007). Phytogenic compounds such as essential oils and spices have been reported to exhibit growth promoting properties (Windisch *et al*., 2007). Ginseng (*Panax ginseng Meyer*) is a perennial plant that grows in shaded and humid areas throughout Korea, Japan, and China. Several researches have well documented that ginseng contains saponins, antioxidants, peptides, polysaccharides, alkaloids, lignin etc. Among these, saponins (ginsenoside) are considered to be the principal bioactive ingredients (Palazon *et al*., 2003). Saponins are believed to boost the immune system and to provide pharmaceutical and antioxidant benefits to humans and animals (Kim and In, 2010; Yildirim *et al.,* 2013). These positive properties could be explored for better broiler productivity.

Therefore, the objective of the experiment was to determine the effect of ginseng on growth performance and haematology of broiler chickens

Materials and Methods

Location of the experiment: The experiment was carried out at the poultry Unit of the Teaching and Research Farm, Department of Animal Science, University of Nigeria, Nsukka in Enugu State, Nigeria.

Experimental diets, animals and management: A total of eighty (80) day old broiler chicks were used in a completely randomized design consisting of four dietary treatments and four replicate per treatment. Each treatment had five birds per replicate, reared on a deep litter system. Routine management practices including vaccination and drug administration where necessary were observed with water and feed provided *ad libitum*. Four treatment diets were formulated which were

T_0 = Birds in this treatment received 0 g ginseng per 5 kg feed (control).
T_1 = Birds in this treatment received 2 g ginseng per 5 kg feed inclusion in their diet.
T_2 = Birds in this treatment received 4 g ginseng per 5 kg feed Inclusion in their diet.
T_3 = Birds in this treatment received 6 g ginseng per 5 kg feed inclusion in their diet.

Initial and final weights of birds were taken at the beginning and at the end of the experiment. Daily feed intake and weekly weight gain were measured and recorded per group. Data on feed intake, water intake, body weight gain, feed conversion ratio and mortality were recorded as they occurred. The study lasted for a period of eight weeks.

Blood haematology: At the end of the finisher phase, 2 ml blood samples were taken from four birds per treatment over EDTA and taken to the laboratory for haematological study. The samples were analysed for packed cell volume (PCV), Haemoglobin (Hb) count, total white blood cell counts (TWBCC) and red blood cell count (RBCC)

Statistical analysis: All data collected were subjected to analysis of variance using SPSS (2013) and mean separation was done using Duncan's New Multiple Range Test (DNMRT) (Duncan, 1955) and accepted 5 or 1% level of probability.

Table 1. Percentage composition of broiler finisher diets

	Dietary inclusion of Korean ginseng			
Ingredients	T_1 (0.g)	T_2(2g)	T_3(4g)	T_4(6g)
Maize	41.50	41.50	41.50	41.50
Wheat Offal	20.00	20.00	20.00	20.00
Palm kernel meal	12.30	12.30	12.30	12.30
Soybean meal	7.00	7.00	7.00	7.00
Groundnut cake	12.20	12.20	12.20	12.20
Fish meal	2.00	2.00	2.00	2.00
Salt	0.25	0.25	0.25	0.25
Bone Meal	4.00	4.00	4.00	4.00
Vit-Min Premix*	0.25	0.25	0.25	0.25
Lysine	0.25	0.25	0.25	0.25
Methionine	0.25	0.25	0.25	0.25
Total	100	100	100	100
Calculated composition:				
Crude protein (%)	19	19	19	19
Energy (Mcal/kgME)	2.90	2.90	2.90	2.90

*Vit A – 10,000.00 iu., D_3-2,000 iu., B_1-0.75 g., B_2-5 g., Nicotinic acid – 25 g., Calcium pantothenate 12.5 g., B_i2-0.015 g., K_3-2.5 g., E-25 g., Biotin – 0.050 g., Folic acid –1 g., Manganese 64g., Choline chloride 250 g., Cobalt-0.8 g., Copper 8 g., Manganese 64 g., Iron –32 g., Zn-40 g., Iodine-0.8 g., Flavomycin-100 g., Spiramycin 5 g., Dl-methionie-50 g, Selenium 0.6 g., Lysine 120 g., BAT-5 g.

Results and Discussion

Growth performance of broiler birds fed diets containing varying levels of Korean ginseng is presented in Table 2. Result shows that there was no significant ($p>0.05$) difference among treatments in daily feed intake (DFI). However supplementing the diets with ginseng significantly influenced ($p<0.05$) final body weight (FBW), body weight gain (BWG), daily weight gain (DWG), feed intake (FI), feed conversion ratio (FCR) and mortality when compared with the control group. (L.Yan *et al.,* 2011) reported that inclusion of wild-ginseng adventitious root meal (WGM) in broiler diet increased their growth performance. Jenkins and Atwal (1994) reported that dietary saponins (ginsenosides) had adverse effect on feed intake of chicks due to their bitter taste which is similar to the findings of this study. Irrespective of the lowered feed intake observed in the ginseng treated group, feed conversion ratio (FCR) was improved. This improvement is attributed to the mechanism of action of saponins (ginsenosides) based on the alteration of the intestinal microbiota and increased enzyme secretion (Yildirim *et al.,* 2013). This in turn enhanced feed digestion and utilization thereby improving the growth performance of broilers.

Table 2: Growth performance of broiler birds fed diets containing varying levels of Korean ginseng

Parameters	T_0	T_1	T_2	T_3	p
IBW (g)	353.30±0.35	356.71±0.05	343.33±0.01	353.33±0.09	NS
FBW (g)	2142.00±0.02^b	1931.33±0.14^c	2218.67±0.19^b	2718.33±0.329^a	*
BWG (g)	1788.70±0.35^b	1574.63±0.16^b	1875.34±0.18^b	2365.00±0.29^a	*
DFI (g)	117.86±0.05	104.36±0.15	103.82±0.25	109.91±0.22	NS
DWG(g)	42.59±0.23^b	37.49±0.11^c	44.65±0.33^b	51.07±0.33^a	*
FI (g)	4950.00±0.22^a	4383.10±0.11^b	4360.80±0.23^b	4300.00±0.08^b	*

FCR	2.76±0.12[a]	2.78±0.94[a]	2.32±0.48[b]	2.30±0.82[b]	*
Mortality	4.00[a]	1.00[b]	0.00[c]	0.00[c]	*

[abc]Means on the same row with different superscript are significantly ($p<0.05$) different. *=Significant. T1 = 0g of ginseng, T2= 2g of ginseng, T3= 4g of ginseng, T4= 6g of ginseng. IBW= initial body weight, FBW= final body weight, BDW= body weight gain, DFI= daily feed intake, DWG= daily weight gain, FI= feed intake, FCR= feed conversion ratio.

However, the finding of this study is not in agreement with the reports of (Ao *et al*, 2011) who reported that inclusion of ginseng in diet of broilers had no positive effect on their growth performance. Also from the results of the experimental study it shows that Korean ginseng had positive significant effect on the mortality rate of broiler birds because ginseng is believed to exert immune-stimulatory, anti-fatigue and hepatoprotective physiological effects. Mortality in the present study was significantly reduced in the groups fed ginseng supplement. The lowest mortality was observed in T2 (4 g ginseng) and T3 (6 g ginseng), followed by T1 (2 g ginseng), with the highest mortality observed in the control group. Ginseng inclusion in poultry diets enhances the immune function by increasing lymphocyte levels as previously observed in broilers and laying hens (Ilsely *et al.,* 2005; Ao *et al.,* 2011). This benefit is primarily due to the specific effects of saponins which is the main bioactive ingredient in ginseng, on immune system. Kim *et al*. (2014) also found that supplementing broiler diets with 3% red ginseng marc markedly decreased mortality.

The result in table 3 shows there was no significant difference ($p>0.05$) between treatments on total white blood cell counts (TWBCC), red blood cell count and haemoglobin values. However, significant difference ($p<0.05$) was observed among treatments on Packed cell volume of broilers fed Korean ginseng. Blood represent a means of assessing clinical and nutritional health of animals in feeding trials (Agbede and Aletor 2003). The results above showed a decrease in packed cell volume and was observed to differ significantly ($p<0.05$). A decrease in packed cell volume is an indication of liver and kidney diseases (Demoranvilles and Best, 2013). However, the values obtained from this study were within the range (21.25 – 30.45) reported by Aguihe *et al*. (2014). Result shows there was no positive effect of ginseng on white blood cell counts and red blood cell counts. This is in line with the result of (Tolba, 2015) who reported that inclusion of ginseng in the diet of broilers had no positive significance in red blood cell and white blood cell. However higher RBCC was observed in T4, indicating that ginseng inclusion may have accelerated red blood cell formation from the bone marrow.

Table 3: The result of the effect of Korean ginseng inclusion on haematological indices of broiler birds

Parameters	T1	T2	T3	T4	P
Hb (%)	9.12±0.65	7.73±0,=.41	7.92±0.60	8.63±0.59	NS
PCV (%)	28.75±0.75[a]	22.25±0.75[b]	24.50±2.50[ab]	24.50±0.50[ab]	*
RBC (10^6/µ)	3.44±0.38	3.33±0.37	2.64±0.07	3.75±1.06	NS
TWBC (10^6/µ)	69.00±1.00	74.00±12.00	60.00±18.00	86.50±39.50	NS

[abc] Means on the same row with different superscript are significantly ($p < 0.05$) different; *=Significant. T1 = 0g of ginseng, T2= 2g of ginseng, T3= 4g of ginseng, T4= 6g of ginseng. TWBCC= total white blood cell counts, RBCC= red blood cell counts, HB= haemoglobin, PCV=packed cell volume.

Conclusion

The present study shows that the inclusion of Korean ginseng improved broiler growth performance. In particular, the dietary supplementation of 4g and 6g ginseng increased broiler weight gain, improved feed conversion ratio and reduced mortality to 0%

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