

EFFECT OF BLACK PEPPER (*Piper nigrum*) ON GROWTH PARAMETERS OF BROILERS**Yahaya M.A., Salisu U.S.* and Muhammed N.**

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ABSTRACT

The study was conducted to test the effect of black pepper (BP) on growth parameters of broilers. One hundred and sixty day-old chicks were randomly allotted into four (4) dietary treatments of 40 chickens per treatment in four replicates of 10 chicks. The treatment groups were designated as T1, T2, T3 and T4 subjected to the following experimental diets: 0.5g/kg, 0.75g/kg, 0.0g/kg and 1g/kg BP in feed respectively. Data was collected on initial body weight (g/bird), final body weight, gain (g/bird), total body weight gain (g/bird), average daily body weight gain (g/bird), daily feed intake (g/bird), total feed intake (g/bird) and feed conversion ratio. Data was analyzed using Analysis of Variance (ANOVA) on the Statistical analysis software (SAS). The result revealed that birds exposed to the inclusion of BP as feed additive recorded significantly ($P<0.05$) higher body weight gain, high feed intake and positive feed conversion ratio than the birds fed the control diet free of the additive. It was thus concluded that BP at 1g/kg (0.1%) improved the growth performance of the broiler chickens and it was recommended to farmers and poultry feed producers as an additive in the diet of their birds.

Key Words – Black Pepper, Growth parameters, broilers, diet

INTRODUCTION

The sub-therapeutic use of antibiotics in poultry production has become undesirable in recent times due to its residual effect leading to the development of antibiotic resistant bacteria (Burgat, 1999; Botsoglou *et al.*, 2002). Feed additives that promote growth have been recommended as one of the strategic options to replace antibiotics in broiler industries. Generally, spices are reported to have positive effect on nutrient absorptive capacity of the villi and digester viscosity (Lee *et al.* 2004a; Lee *et al.* 2004b; Sirinivasan 2007). These positive properties could be explored for better broiler productivity. Herbs and spices have received an increasing attention as possible growth promoters in form of feed additives (Khalaf, 2008). Black pepper (*Piper nigrum* L.) is classified as a spice due to its pungent quality (Hassan, 2007). Black pepper is a flowering vine on the family Piperaceae, genus *Piper* and species *nigrum*. Black pepper improves digestibility (Moorthy *et al.*, 2009). Efficiency compounds of black pepper consist of piperine, cupsaesin, cupsisin and cupsantine. Black pepper was found to be rich in glutathione peroxidase and glucose-6-phosphate dehydrogenase. It has been shown that piperine can dramatically increase absorption of selenium, vitamin B complex, beta carotene and curcumin as well as other nutrients (Khalaf, 2008). Black pepper is a spice which is reported to have antibacterial and antioxidant properties in addition to its ability to enhance secretions of gastric and pancreatic enzymes thereby improving digestibility and offer additional health benefits (Orav *et al.* 2004). Piperine enhances the thermogenesis of lipid and accelerates energy metabolism in the body and also increases the serotonin and beta-endorphin production in the brain (Maliniet *et al.*, 1999). On the other hand, black pepper causes the stomach to increase the flow of digestive juice (Sahin *et al.*, 2002). Thus, the objective of this study was intended to provide information on the effect of utilizing black pepper as a natural feed additive on growth performance of broilers.

MATERIALS AND METHODS**Experimental site**

The experiment was conducted in the Teaching and Research Livestock Farm of the Department of Animal Science, Federal University Dutsin-ma, Katsina State. Dutsinma lies on longitude 07°29'29''E and latitude 12°26'18''N at an elevation of 605m with an average temperature of 25.2°C to 28.6°C (Jamilu *et al.*, 2018).

Experimental design and diets

One hundred and sixty (160) day-old chicks sourced from a reputable hatchery (Chikun[®]) in Kaduna State, Nigeria were used for this experiment. The birds were randomly partitioned into four (4) dietary treatments of 40 chickens per treatment in four replicates of 10 chicks in a completely randomized design (CRD). On arrival, the birds were weighed to obtain their initial body weight.

The treatments groups were designated as T1, T2, T3 and T4, the birds were subjected to the following experimental diets:

- T1 was served black pepper mixed with the feed at inclusion level of 0.5g/kg
- T2 was served black pepper mixed with the feed at inclusion level of 0.75g/kg
- T3 served as control group and were served diets free of additives
- T4 was served black pepper mixed with the feed at inclusion level of 1g/kg

Black pepper used in this study was sourced directly from Wednesday weekly market of Dutsinma Local Government Area, dried and grounded into powder before being incorporated into the basal diets accordingly.

All the birds were housed on deep litter system with pen compartments measuring 2*3m² dimensions demarcated with wire mesh and wooden frame. The birds were provided with clean water and feed *ad-libitum* on daily basis, while all management practices were strictly adhered to throughout the experiment.

Data Collection

Data were collected on the following growth parameters - Initial body weight (g/bird), final body weight, gain (g/bird), total body weight gain (g/bird), average daily body weight gain (g/bird), daily feed intake (g/bird), total feed intake (g/bird), feed conversion ratio and mortality as it occurred.

Data Analysis

All data obtain were subjected to the analysis of Variance (ANOVA) according to steel and Torrie (1980) and the means were separated using Duncan Multiple Range Test (DMRT) according to Duncan (1995) using the Statistical analysis software (SAS).

RESULTS AND DISCUSSION

The performance of broiler chickens fed diets containing graded levels of black pepper supplementation is presented in Table 1. The result revealed that birds exposed to the inclusion of BP as feed additive recorded significant higher body weight gain, high feed intake and positive feed conversion ratio than the birds fed the control diet free of the additive. Table 1 showed that the initial weights of the broilers were homogenous amongst the entire treatment groups. However, there was a significant differences in the average daily weight, final weight and total weight gains with the treatment 2 (0.75g/kg BP) recording the highest weight gain followed by treatment 4 (1g/kg BP) and 1 (0.5g/kg BP), while birds on the control group recorded the lowest weight gain. There was significant difference ($P < 0.05$) observed for Final weight gain, daily weight gain and average daily weight gain. This result is in consonance with the work of Al-Kassie *et al.* (2011) who carried out a study to determine the performance of broilers fed diets with black pepper (*Piper nigrum*) at inclusion levels of 0.00%, 0.25%, 0.50%, 0.75% and 1% incorporated into the basal diet of broilers for six weeks, the results revealed that the inclusion of black pepper at the levels of 0.50%, 0.75% and 1% in the diets improved body weight gain ($2704 \pm 42.32b$, $2784 \pm 33.44a$, and $2799 \pm 31.40a$), feed intake ($4867 \pm 8.12a$, $4900 \pm 9.13a$ and $4870 \pm 7.26a$) and conversion ratio ($1.80 \pm 0.07b$, $1.76 \pm 0.06b$ and $1.74 \pm 0.51b$) with the highest weight gain recorded at 1% level showed best results.

The body weight gain was found to be significantly ($p < 0.01$) higher in T2 (0.75g/kg BP) among the treated groups while the control T3 recorded the least weight gain. Mansoub (2011) also incorporated 0.5%, 0.75% and 1% level of black pepper and had significant effects at 0.75% inclusion rate on body weight gain and feed conversion ratio of the broilers. Myandoab and Mansoub (2011) in a study using black pepper in Japanese quails diet and recorded significant ($P < 0.05$) effects on the broilers growth performance, daily feed intake and body weight gain observed in the diet incorporated with 2% Black pepper.

Al-Kassie *et al.*, (2012) investigated the efficiency of inclusion of a mixture of Black pepper (*Piper nigrum*) and hot red pepper (*Capsicum Annum*) to broiler diets on their productive performance and they found that diet incorporated with 0.75% Black pepper and diet incorporated with a 1% the mixture of Black pepper and Hot red pepper recorded a significant ($P>0.05$) increase in live weight gain, feed consumption and feed conversion ratio.

Table 1: Performance of Finisher Chickens Fed Diets Containing Graded Levels of Black Pepper Supplementation

Parameter	Treatment				SEM
	T1	T2	T3	T4	
Initial weight (kg)	0.4800	0.4700	0.4600	0.4700	0.00
Final weight (kg)	2.0233	2.1533	1.9833	2.1400	0.11
Total weight (kg)	2.3267 ^b	2.6167 ^a	2.2200 ^b	2.3900 ^{ab}	0.12
ADWG (kg)	0.00962	0.01442	0.00861	0.00897	0.00

Means with the same superscripts letters are not significantly different ($P>0.0001$)

SEM- Standard Error of Mean

T1 contain 0.50g/BP/kg

T2 contain 0.75g/BP/kg

T3 control 0.00gBP/kg

T4 contain 1% g/BP/kg

ADWG- Average daily weight gain

Feed Intake

There was significant ($p<0.05$) difference observed in daily and total feed intake during starter phase as well as feed conversion ratio of the experimental birds. Table 2 shows that, T2 had the highest feed intake, T1 and T4 were statistically the same while T3 has the lowest feed intake. This study is in line with *Safa et al.* (2014) studied the effect of feeding broiler chicks on diets containing different levels of black pepper as natural feed additive on their performance, they observed that the diet supplemented with (1%) black pepper had significantly ($P<0.05$) higher body weight gain, feed intake, dressed weight and better feed conversion ratio.

The result of this study shows significance difference ($P<0.05$) in the total feed intake (TFI) for starter phase with T2 recording the highest followed by T1 and T4, while T3 had the least. This work agrees with the work of *Al-Kassie et al.* (2012) who investigated the efficiency of utilization of supplemented mixture of Black pepper (BP) *Piper nigrum* and hot red pepper (Hrp) *Capsicum Annum* to broiler on their productive performance. They showed that diet incorporated with 0.75% Black pepper and Hot red pepper and diet incorporated the mixture of 1% Black pepper and Hot red pepper indicated a significant ($P<0.05$) results in live weight gain, feed consumption and feed conversion ratio.

This result is similar with *Shahverdi et al.* (2013) who assessed the effect of red pepper, black pepper and their mixture powder on performance of broiler chicks, the chicks were fed by basal diet as control, 0.02% red pepper (T1), 0.02% black pepper (T2) and 0.01% red pepper + 0.01 %black pepper powder (T3). The result revealed that the inclusion of red and black pepper in broilers diet improved body weight gain (37.26, 38.33 and 38.83 g/day), feed intake and conversion ratio (1.85, 1.83 and 1.85).

Feed conversion ratio result revealed that T2 had the highest value followed by T1 and T4 where T3 recorded the least value. This result is in agreement with the work of *Tripathi et al.* (2013) who reported that, there was a significant ($P<0.05$) improvement in FCR and body weight gain in Japanese quail fed diet containing 0.5% hot red pepper followed by 0.25% black pepper treated group in comparison with 0.5% Ajwain supplemented group and control group only on basal diet. They concluded that feeding of hot red pepper and black pepper significantly ($P<0.05$) improved the performance of broilers. It is also similar to the investigation by *Ghaedi et al.* (2013) on the effect of black pepper extract on the performance of broiler chicks, chicks were fed by T1 diet as control; T2 diet with virginiamycin powder

200 (gr/ton); T3 diet with using black pepper extract on their water of 2 (mg/ml). The results showed that body weight gain (43.06a and 41.27a g/day) and feed to gain ratio were improved significantly ($P < 0.05$) in the treatment groups when compared with control. This study is also similar to the work of Puvaca *et al.* (2015) who concluded that the addition of garlic, black pepper and hot red pepper in the diet of broiler chicken had positive effect on productive performances. Hot red pepper at 0.5 g/100g inclusion level indicated highest final body weight, lower feed conversion ratio and higher feed utilization, with the highest percentage of European broiler index.

Table 2: Feed Intake of Broilers at Starter Phase Fed Diets Containing Graded Levels of Black Pepper Supplementation

Parameter	T1	T2	T3	T4	SEM
DFI (kg/bird)	0.0366 ^b	0.0497 ^a	0.0294 ^c	0.0357 ^b	0.0015
TFI (kg/bird)	1.7940 ^b	2.4367 ^a	1.4390 ^c	1.7500 ^b	0.0738
FCR	4.0749 ^b	5.8037 ^a	2.4879 ^c	3.0545 ^b	0.1689
Total Feed Cost	259.825 ^b	363.221 ^a	212.477 ^c	265.959 ^b	6.2669
Feed cost/kg gain	450.05 ^c	867.19 ^a	369.22 ^c	605.23 ^b	31.0356

Means with different superscripts along rows are significantly different ($P > 0.05$)

FCR – Feed Conversion Ratio

DFI – Daily Feed Intake

TFI – Total Feed Intake

CONCLUSION AND RECOMMENDATIONS

At the end of this study, significant ($P < 0.001$) difference was observed in T4 when compared with T1 and T2, while T3 performed poorly in comparison with the treated groups. It was therefore concluded that Black pepper at 1g/kg improved the performance of the broiler chickens, thus farmers are encouraged to incorporate black pepper as an additive in the diet of their poultry birds at rate of 1% g/kg of feed.

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