

The utilization of African black pepper (*Piper guineense*) as feed additive on the growth performance of broiler chickens

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Target Audience: Animal Scientists, Poultry Farmers, Researchers

Abstract

A seven-week feeding trial was carried out using one-day-old Cobb 500 broiler chicks. The broilers were fed diets supplemented with varying levels of African black pepper (*Piper guineense*) to determine their growth performance. The completely randomized design (CRD) was used for the experiment and birds were randomly assigned to four treatments each replicated thrice. Each replicate consisted of ten birds making a total of thirty birds per treatment. Treatment 1 was the control (0%) without the supplementation of *Piper guineense*, while birds on treatments 2, 3 and 4 were fed diets supplemented with 0.40, 0.80 and 1.20 % of *Piper guineense* meal respectively. Diets formulated for broilers were iso-caloric and iso-nitrogenous in a single-phase feeding regime. Throughout the experimental period, feed and water were supplied ad libitum. The findings of this research revealed that dietary treatments did not have a significant effect ($P>0.05$) on the final live weight, daily weight gain, daily feed intake and percentage mortality of the experimental birds. Notably, however, the feed efficiency was significantly affected ($P<0.05$) by dietary treatments with the supplementation of 0.80% *Piper guineense* recorded the best feed efficiency of 68.10% while treatment 1 (the control) had the lowest feed efficiency of 55.34%. It is, therefore, evident from the results obtained in this study that *Piper guineense* possesses the potential to boost feed efficiency in broiler production.

Keywords: *Piper guineense*; feed additive; growth performance; feed efficiency; broilers

Description of Problem

In poultry production, generally, the cost of feeding has been widely known to be very expensive. Many researchers have attempted to decrease the feeding cost without compromising animal performance and at the same time maintaining a high-quality and safe poultry product [1]. Additionally, the high cost of synthetic antibiotics, the adverse effects of antibiotics coupled with the undesirable residual effect in meat and other products as well as the possible resistance of diseases to antibiotics [2] are all challenges that led to the search for better alternatives. The use of natural plant products has become necessary to curtail the negative effects of the use of

antibiotics and other synthetic compounds as growth stimulants and promoters in poultry production [3].

There has been a growing interest in the use of phyto-additives in animal diets due to their several beneficial properties and potential role as alternatives to antibiotic growth promoters [4]. Plants possess the ability to synthesize bioactive compounds that are beneficial medicinally and nutritionally to both humans and animals. The use of phyto-genic substances from spices and herbs as feed additives can produce growth-promoting effects and other health benefits (4;5). Importantly, *Piper* species from Africa serve mainly as sources of valued spices for use as condiments in

food preparation and medicinal purposes in the treatment and management of some diseases [6]. Piper species may be recommended for utilization as one of the sources of potential natural antioxidants [7]. *Piper guineense* (African black pepper) are among the most prominent specie of commonly used spices in Africa [8]. It is an aromatic spice that is indigenous to Africa and it is commonly used in certain regions of East, Central and Western Africa and particularly in countries like Nigeria and Cameroon, owing to its nutritional, medicinal and other useful properties (9; 10; 11).

Phytochemical analysis has shown the presence of flavonoids, alkaloids, tannins and saponins in the seeds of African black pepper [11]. The seed extracts possess free radical scavenging properties that can help to avert oxidative damage, cell injury and cell death. It also can inhibit lipid peroxidation, reducing the production of free radicals and increasing the antioxidant defence system of the body [12]. It was, therefore, recommended for daily inclusion in the diets (11; 13).

A lot of research work has been carried out on the medicinal properties of African black pepper, but limited nutritional experimentation and feeding trials have been conducted on livestock animals.

This research was therefore conducted to determine the effect of supplementing different levels of African black pepper on the growth performance of broiler chickens as a potential feed additive.

Materials and Methods

Location of the Study

This research work was carried out at the Teaching and Research Farm of the Department of Animal Production, School of Agriculture and Agricultural Technology, Federal University of Technology, Minna,

Niger State, Nigeria.

Experimental Design

One-day-old Cobb 500 unsexed broiler chicks were used in this experiment. There were 4 experimental treatment groups replicated thrice in a completely randomized design (CRD). Each replicate consisted of 10 birds making a total of 30 birds per treatment. Treatment 1 was the control (0%) without the supplementation of *Piper guineense*, while treatments 2, 3 and 4 were diets supplemented with 0.40, 0.80 and 1.20 % of *Piper guineense* meal respectively. The feeding trial lasted for seven weeks. The single-phase feeding was used for the experiment, the diets formulated were iso-caloric and iso-nitrogenous, with 22% crude protein (Table 1).

Table 1: Composition of basal diet in a single phase feeding

Ingredient	Percentage (%)
Maize	44.10
Full fat soybeans	36.65
Maize offal	12.00
Fish meal	4.00
Bone meal	1.82
Limestone	0.58
Methionine	0.25
Lysine	0.10
Salt	0.25
Vitamin premix*	0.25
Total	100
Calculated	
Crude protein (%)	22.15
Energy (kcal/kg ME)	3048.74

*Supplied per 1kg diet is the following:-

Vitamin A (30,000.00 IU), Vitamin D3 (6,000.00 IU), Vitamin E (30.00 IU), Vitamin K (2.00mg), Vitamin B2 (5.00mg), Vitamin C (20.00mg), Niacin (40.00mg), Pantothenic acid (12.00mg), Vitamin B6 (1.50mg), Vitamin B12 (10.00mg), Folic acid (1.00mg), Biotin (0.40mg), Choline Chloride (300.00mg), Cobalt (0.20mg), Copper (1.20mg), Iodine (20.00mg), Iron (40.00mg), Manganese (100.00mg), Selenium (1.50mg), Zinc (30.00mg).

ME = Metabolizable energy

Source of Test Ingredient

Piper guineense seed was purchased from Kure ultra-modern market, Minna, Niger State, Nigeria. The seeds were sorted to remove any foreign materials and afterwards it was ground to powder using a hammer mill.

Management of Experimental Birds

In preparation for the arrival of birds, the pens were washed and disinfected, drinkers and feeders were thoroughly washed and made ready for use. Wood shavings were spread uniformly on the floor and a foot dip was provided at the entrance of the poultry house.

Table 2: Effect of the supplementation of African black pepper on the growth performance of broilers

Parameters	T1	T2	T3	T4	SEM	P value	Significance
Initial weight (g)	86.00	86.00	86.67	86.33	0.250	0.802	NS
Final weight (g)	1868.67	1942.67	2025.17	1918.33	29.051	0.311	NS
Daily weight gain (g)	37.13	38.67	40.38	38.17	0.604	0.313	NS
Daily feed intake (g)	67.10	64.45	59.56	61.03	1.874	0.542	NS
Feed efficiency (%)	55.34 ^b	60.17 ^{ab}	68.10 ^a	63.40 ^{ab}	1.871	0.039	*
Mortality (%)	10.00	6.67	10.00	6.67	2.410	0.945	NS

Note: Means bearing different superscripts within the same row differ significantly

* = $P < 0.05$

NS=Not significant; SEM = Standard error of mean

The treatment groups were designated as follows:

T1 = basal diet supplemented with 0% African black pepper (Control)

T2 = basal diet supplemented with 0.40% African black pepper

T3 = basal diet supplemented with 0.80% African black pepper

T4 = basal diet supplemented with 1.20% African black pepper

On arrival of the chicks, their initial weights were obtained and after which they were randomly distributed to the four treatment groups. Birds were raised in a deep litter housing system. The feeding trial was conducted for seven (7) weeks. Feed intake was measured daily while the weighing of birds were done on weekly basis. Mortality was recorded as it occurred.

Statistical Data Analysis

Data obtained from the experiment were subjected one-way analysis of variance (ANOVA) using SPSS 17.0 and the significant means were separated using the same statistical software.

Results and Discussion

The dietary effect of *Piper guineense* on the growth performance of broiler

chickens is presented in Table 2. The results showed that dietary treatments did not have a significant effect ($P > 0.05$) on the final live weight, weight gain, feed intake and percentage mortality of birds. Dietary treatments not showing significant differences in feed intake of birds on diets supplemented with varying levels of African black pepper when compared with the control group agreed with the findings of [3] when they supplemented broiler diets with black pepper, turmeric and coriander either separately or in combination. The outcomes of this study on the non-significant effect of African black pepper on feed intake as well as body weight gain are also in line with the reports of [14].

Nevertheless, the feed efficiency was significantly ($P < 0.05$) influenced by dietary

treatments. It was observed that the treatment groups that had African black pepper were better than the control birds, a similar report was made by [15].

According to [1], the inclusion of *Piper guineense* leaf and seed meals in the diets of birds significantly enhanced the feed conversion ratio, with the best value of 1.23 recorded for birds fed 0.60 % *Piper guineense* seed meal. Whereas, broilers fed the control diet had the most inferior feed conversion ratio of 2.06. [1] also opined that this aforementioned effect may be linked to the presence of growth-promoting properties in the seed and leaf meal of African black pepper.

Conclusion and Applications

1. The study revealed that *Piper guineense* can be utilized as a potential phytogetic feed additive for growth promotion and improved feed efficiency of broiler chickens. All the treatment groups with the supplementation of *Piper guineense* did better than the control group (treatment 1) without *Piper guineense* in their diet.
2. The supplementation of 0.80% *Piper guineense* (treatment 3) had the best feed efficiency of 68.10%. This implies that birds on the diet supplemented with 0.80% were able to efficiently convert feed consumed into meat.
3. Therefore, the supplementation of 0.80% *Piper guineense* in broiler diets is recommended for optimum enhancement of feed efficiency.

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