

EFFECT OF KING OF BITTER (*Andrographis paniculata*) LEAF MEAL AND GARLIC (*Allium sativum*) MEAL AS ALTERNATIVE TO ANTIBIOTIC ON GROWTH PERFORMANCE OF BROILER CHICKEN

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Abstract

A thirty-five day feeding trial was conducted to determine the effect of *Andrographispaniculata* leaf meal and *Allium sativum* meal on the growth performance of broiler chicken. One hundred and twenty (120) day old broiler chicks were randomly distributed into four (4) dietary treatments with three replicates each of ten (10) birds per replicate in a Complete Randomized Design (CRD). Four experimental diets were formulated as follows; T1: with inclusion of antibiotics (*Oxytetracycline*) 1.5g/3kg of feed, T2: basal feed + *Allium sativum* powder (ASP) at 50g/25kg of feed, T3: basal feed + *Andrographispaniculata* leaf meal (APLM) at 50g/25kg of feed, T4: basal feed + *Andrographis paniculata* + *Allium sativum* at 50g each/25kg of feed. Data were collected on growth performance at starter and finisher phase. There were no significant differences ($p>0.05$) observed on growth performance across the dietary treatments, except for feed conversion ratio (FCR) at starter phase. The birds fed T4 the lowest FCR of 1.96 compared to other treatments. At finisher, broiler chicken fed diet supplemented with antibiotics had a significantly lower final body weight (g/bird) of 1669.33 compared to other treatments (1890.67, 1808.30, 1803.77). Birds fed T2 and T3 had the lowest FCR when compared to broiler chicken fed diet supplemented with antibiotics. The study concludes that inclusion of *Andrographis paniculata* leaf powder (APLP) and *Allium sativum* powder (ASP) at 50g/25kg of feed had positive influence on final body weight gain and FCR of broiler and has high potential as alternative to antibiotics in broiler production.

Keywords: Garlic, King of bitters, Growth performance, Broiler, Antibiotics

Introduction

Antibiotics have been used widely to enhance broiler health and subsequently improve broiler production. However, this practice has led to the growth of multiple drug resistant bacteria (Wray and Davies, 2000). To prevent the risk of developing such pathogens and also to satisfy consumer demand for a food chain free of drugs, use of in-feed antibiotics in the European Community were totally banned in January 2006 (Steiner, 2009). Removal of antibiotics as growth promoters has led to animal performance problems, an increase of feed conversion ratio, and a rise in the incidence of certain animal diseases (Wierup, 2001) hence alternative growth promoters must be found (Steiner, 2009).

In recent times, the increase awareness of the use of herb, spices or plants extracts have drawn scientific attentions to exploring the possibility of herbs or plant extracts as alternatives to antibiotics. Studies have shown that plant-derived feed additives, which contain natural active compounds, can enhance growth performance and improve intestinal health and function common to poultry (Wierup, 2001). Most of the combination of such herbs and spices are not specified and as such could not be documented and ascertain the effectiveness of its blends for healthy production of poultry.

In response to this gap, scientific studies have identified some plants as having high potentials to substitute for antibiotics in poultry. Among the plant herbs and spices that have been considered are; king of bitters and garlic. Studies by Tipakorn (2002) and Mathivanan *et al.* (2006) showed that the use of 0.4% *A.paniculata* leaf powder in feed decreased mortality rates and injuries in the intestinal tract of broilers caused by coccidiosis. This study, therefore seek to have a blend of these plant and herb, examine its utilization on broilers as alternative to antibiotics and thus produce a blend of phytobiotics that can be easily accessible to farmers.

Allium sativum has been traditionally used to treat several ailments including fevers, diabetes, rheumatism, intestinal worms, colic, flatulence, dysentery, liver disorders, tuberculosis, facial paralysis, high blood pressure and bronchitis. The antioxidant properties of natural antioxidants like *Andrographispaniculata* and *Allium sativum* might decrease reactive oxygen species thus, decreasing protein oxidation that could affect poultry growth and metabolism. Keeping in view the medicinal

potential of *A. paniculata* and *A.sativum* effect of these two herbs was investigated on the growth performance.

MATERIALS AND METHODS

Sourcing and processing of test ingredients

Andrographis paniculata leaves were obtained from a farm at Bakatari, Ibadan. The leaves were washed with clean water, de-stalked and allowed to air dry under shade and thereafter were ground into powder and stored in a dark air-tight plastic bags at ambient temperature.

Allium sativum was purchased from a local market at Bodija, Ibadan. It was peeled, dissected and allow to sundry under shade and thereafter was ground into powder and stored in a dark airtight plastic bags at ambient temperature.

Experimental birds

This experiment was carried out at the poultry unit, Federal College of Agriculture, Moor Plantation, Apata, Ibadan, Oyo state, Nigeria. One hundred and twenty (120) day old Ross 308 broiler chicks were used for this study. The birds were weighed and randomly allotted into four treatments of three replicates each, with ten birds per replicate in a Completely Randomized Design (CRD). The experiment lasted for 7 - 42 days. Four (4) experimental diets was formulated with the inclusion of *Andrographispaniculata* Leaf Powder and *Allium sativum* powder

The diets were made as followings:

- (1) T1 control: basal feed + Oxytetracycline at (13g/25kg of feed)
- (2) T2: basal feed + *Aliumsativum* at (50g/25kg of feed)
- (3) T3: basal feed + *Andrographispaniculata* at (50g/25kg of feed)
- (4) T4: basal feed + *Andrographispaniculata* + *Allium sativum* at (50g / 25kg of feed)

Data were collected on the data were collected on the growth performance parameters at the end of the starter and finisher phases. All data collected were subjected to one-way Analysis of Variance (ANOVA) using the General Linear Model of SAS (1999) and means were separated using the Duncan Multiple Range Test (Duncan, 1995).

Table 1: Gross Composition of the Experimental Diet

	Starter Phase 7-21days	Finisher Phase 22-49 days
Maize	58.00	63.00
Soybean Meal	37.00	32.00
Limestone	2.50	2.50
Di-calcium Phosphate	1.50	1.50
Di-methionine	0.20	0.20
Lysine	0.30	0.30
Mineral Premix	0.25	0.25
Salt	0.25	0.25
Total	100	100
Calculated analysis		
Crude Protein	23.00	20.00
ME (kcal/kg)	3000	3200
Lysine (%)	1.30	1.00
Methionine (%)	0.52	0.38
Calcium (%)	1.00	0.90
Phosphorus (%)	0.80	0.75

RESULT AND DISCUSSION

Table 2 shows the effect of *Andrographis paniculata* leaf meal and *Allium Sativum* meal on growth performance of broiler chicken at starter phase. There were no significant differences ($P < 0.5$) among the treatments for initial body weight, final body weight, average daily weight gain, average total feed intake and average daily feed intake. The final body weight ranged from 570.48 – 597.63g for (T₁ – T₄), though they were not significantly different ($p < 0.05$). These results agree with that of Fadlalla *et al.*, (2010) and Issa and Omer (2012), who reported that body weight was not affected by the supplementation of garlic powder in broiler chicken. This is also in contrast to the observations made by Lukanov *et al.*, (2015) who reported that supplementation of garlic powder, improved the final

body weight at the finisher phase of broiler chicken. The difference in the result could be due to processing methods and the quantity of garlic used. Birds on T₄ had a better feed conversion ratio (FCR) of 1.96 compared to T₂ (2.01), T₃ (2.11) and T₄ (2.19) respectively.

Meanwhile the final body weight ranged from 570.48 – 597.63g for (T₁ – T₄). Average total feed intake recorded were 900.93g, 882.13g, 894.97g, 861.63g for T₁, T₂, T₃, and T₄ respectively. T₂ had the highest value (P<0.05) for final body weight gain (597.63), average weight gain (439.13g) and average daily weight gain (20.93) but was not significantly different (P>0.05) from treatment T₁ and T₄ with least value recorded for T₁ (570.48). T₄ had the significantly best (P< 0.05) feed conversion ratio (FCR) of 1.96 followed by T₂ (2.01) and T₃ (2.11) respectively. While T₄ had the worst feed conversion ratio of 2.19.

It was observed from this research that there were no significant differences in the body weight gain of the birds, across the treatment at starter phase although birds fed with garlic had highest numerical value compared to the control. Similar observations were made by Lukanov *et al.*, (2015) and Brzoska *et al.*, (2015), who reported that supplementation of garlic powder, improved the final body weight at finisher phase of broiler chicken. Contrary to the present observation, Fadlalla *et al.*, (2010) and Issa and Omer (2012) reported that body weight was not affected by the supplementation of garlic powder in broiler chicken. The difference in the result could be due to processing methods and the quantity of garlic used.

Table 3: The Effect of *Andrographis paniculata* leaf meal and *Allium Sativum* meal on Growth performance of broiler chicken at starter phase (Age 2 – 4 weeks)

Parameters	T1	T2	T3	T4	±SEM
Initial body weight (g/bird)	158.27	158.50	158.27	158.07	0.20
Final body weight (g/bird)	570.48	597.63	582.60	596.80	8.96
Average weight gain (g/bird)	412.20	439.13	424.33	438.73	9.09
Average daily weight gain (g/bird)	19.53	20.93	20.20	20.90	0.45
Average total feed intake (g/bird)	900.93	882.13	894.97	861.63	8.00
Daily feed intake (g/bird)	42.90	42.01	42.62	41.03	0.39
FCR	2.19 ^a	2.01 ^{bc}	2.11 ^b	1.96 ^c	0.02

^{ab}means along the same row with different superscripts are significantly different at P < 0.05

T1 control: basal feed + Oxytetracycline at (13g/25kg of feed)

T2: basal feed + *Allium sativum* at (50g/25kg of feed)

T3: basal feed + *Andrographis paniculata* at (50g/25kg of feed)

T4: basal feed + *Andrographis paniculata* + *Allium sativum* at (50g / 25kg of feed)

Table 4: Shows the Effect of *Andrographis Paniculata* leaf meal and *Allium sativum* Meal on Performance Characteristics at Finisher Phase.(Age 4 – 8 weeks)

Parameters	T1	T2	T3	T4	±SEM
Initial body weight(g/bird)	570.47	597.63	582.60	596.80	8.96
Final body weight(g/bird)	1669.33 ^b	1890.67 ^a	1808.30 ^a	1803.77 ^a	29.29
Average weight gain(g/bird)	1098.87 ^b	1293.03 ^a	1225.70 ^{ab}	1206.97 ^{ab}	26.90
Average daily weight gain(g/bird)	52.33 ^b	61.60 ^a	58.40 ^{ab}	57.47 ^{ab}	1.28
Average total feed intake(g/bird)	4223.03	4240.90	4244.37	4258.10	8.37
Daily feed intake(g/bird)	201.11	201.95	202.12	202.77	0.40
FCR	3.84	3.28	3.46	3.53	0.37

^{ab}means along the same row with different superscripts are significantly different at P < 0.05

T1 control: basal feed + Oxytetracycline at (13g/25kg of feed)

T2: basal feed + *Allium sativum* at (50g/25kg of feed)

T3: basal feed + *Andrographis paniculata* at (50g/25kg of feed)

T4: basal feed + *Andrographis paniculata* + *Allium sativum* at (50g / 25kg of feed)

At the end of finisher phase, there were no significant differences (P>0.05) among the treatments for initial body weight, average total feed intake and average daily feed intake. There were significant differences (P<0.05) among the treatments for final body weight; (1669.33g) is significantly lower than T2 (1890.67g), T3 (1808.30g) and T4 (1803.77g) respectively. Meanwhile, the average weight gain and average daily weight gain values of T2 is significantly higher than T3 and T4, which are

comparable to each other. While T1 had significantly ($P<0.05$) lowest value of 1098.87g and 52.33g respectively. T2 and T3 had the best significantly ($P<0.05$) feed conversion ratio (FCR) of 3.28 and 3.46 respectively, followed by T4 (3.53) while T1 had the worst feed conversion ratio of 3.84.

Birds that were fed with mixture garlic and king of bitters had the best FCR. The better feed conversion ratio can be attributed to the anti-bacterial properties of the garlic powder which resulted in better absorption of the nutrients in the gut and finally leading to improvement in feed conversion ratio. Similar observations were reported in broiler chicken by Lukanov *et al.* (2015) who found significantly ($P<0.05$) improved FCR due to supplementation of garlic powder at various levels. Contrary to the present findings, Issa and Omer, (2012) found no significant differences in FCR due to supplementation of garlic powder in feed of broiler chickens. The improved performance traits in respect of feed consumption, body weight and FCR in garlic treated groups might be due to the fact that garlic contained high levels of allicin, diallyl disulfide and S-methylcysteinesulfoxide (Lee *et al.*, 2000).

At the end of the finisher phase, there were no significant differences ($P>0.05$) among the treatments for initial body weight, average total feed intake, and average daily feed intake. The results revealed that the birds on T2 achieved the highest weight gain (1293.03g) compared to other treatment groups. The findings are in line with Makwana *et al.* (2019), Chitra (2020), and Hayat *et al.* (2022), who found that supplementing garlic powder with the basal diet of broilers improved growth performance. The improvement in broiler performance could be attributed to the antimicrobial and antioxidant properties of garlic (Chitra, 2020). The values of the feed conversion ratio (FCR) were very similar among the treatments. The results showed that all the treatments had poor feed conversion ratios (3.84, 3.28, 3.46, and 3.53 respectively). Contrary to the present findings, Issa and Omer, (2012) found no significant differences in FCR due to the supplementation of garlic powder in the feed of broiler chickens. Contrary observations were also reported in broiler chicken by Lukanov *et al.* (2015) who found improved FCR due to the supplementation of garlic powder at various levels. Issa and Omer, (2012) also found no significant differences in FCR due to the supplementation of garlic powder in the feed of broiler chickens.

CONCLUSION AND RECOMMENDATION

Based on the result, it is therefore concluded that the inclusion of *Allium sativum* meal to basal feed at 50g/25kg, increased the feed intake (boost appetite) and as well increased the average daily weight gain of broilers birds. Similarly inclusion of *Andrographis paniculata* meal to basal feed at 50g/25kg only, *Andrographis paniculata* + *Allium sativum* (at 50g each per 25kg of feed) also increased the growth performance of broiler birds without having any adverse effects on the birds.

Addition of *Allium sativum* and *Andrographis paniculata* meal could be potential alternatives to Antibiotic Growth Promoter (AGP) in broiler diets due to their positive impacts on growth performance of broiler chicken.

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