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Research Article

Performance and Quality Assessment of Broiler Chickens Fed Different Graded Levels of *Aspilia africana* Leaf Meal

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Abstract: This research was carried out to assess the effectiveness of different level of inclusion of dried and grinded powered *Aspilia africana* leaf on the performance and quality of broiler chickens in a completely randomized design. The experiment lasted for 12weeks and it was conducted on 120 day-old chick of Arbo ache broiler strain which were divided into four different dietary group (A, B, C and Control) with (50g, 60g, 70g and 0g respectively)/kg of feed. Data were obtained on performance characteristics (feed intake (g), weight gain (g) and feed to gain ratio), quality assessment (primal cuts, visceral organs and organoleptic properties). Performance characteristics revealed that birds on 70g/kg of feed showed the highest feed intake and weight gain, comparable to the control. Birds on 60g/kg of feed had the lowest feed intake and weight gain. Carcass characteristics also revealed that birds on 70g/kg of feed was significantly ($P<0.05$) better compared to the control, however, an exception was seen in the defeathered weight with inclusion of *Aspiliaafricana* had no effect on it. The lowest ($p>0.05$)value was observed in birds on control for the back meat. For the organ weight, there was a dramatic influence of broiler fed *Aspilia africana* inclusion in their feed when compared with the control. The eating qualities were generally lower than that of control; this might be because of the presence of tannin in the leave of *Aspilia africana.*
Keywords: *Aspilia Africana,* broiler chickens, growth performance, quality evaluation

INTRODUCTION

It is believed that the use of antibiotics in meat producing animals especially in poultry increase feed conversion efficiency along with daily growth rates by approximately 2.5%, also mortality rates associated with proliferative enteritis are 10-15 % lower compared to where antimicrobial growth promoters are not use. According to the National office of Animal Health [1], antibiotics growth promoters are used in helping growing animals digest their food more efficiently, get maximum benefit from it, and allow them to develop into strong healthy individuals. Usage of antibiotic has negative effects on animal's health and production such as residue in tissue, long withdrawal period and development of resistance in micro-organism allergies and genetoxicity [2].

In putting an end to the use of antibiotics growth promoters, the alternative available must be assessed very well and must have being tested efficiently in other to reduce dependency on antibiotics which have been discourage in poultry. Due to the over usage of antibiotics over a long period of time, it has led to some bacterial population becoming resistant to antibiotics and also, potential transfer of resistant bacteria from poultry products to human population may occur through consumption and direct injection or handling meat contaminated with pathogens [3].

An obvious choice is to develop an alternative to antibiotics that work via similar mechanism promoting growth while enhancing the efficiency of feed conversion to body weight with a storage duration and availability at low cost. According to researchers, [4], the use of ethno-vet has being proved efficiently acceptable to replace and improve the quality of synthetic antibiotics in farming industry.

Over 50% of all modern chemical drugs are of natural plants products origin and it is essential in drug development programs of the pharmaceutical industry [5]. Active component of these plants are now being investigated, extracted and developed in to drugs with little or no negative effects or contradiction [6]. Rural farmers in most part of the world do not depend on the orthodox of medicine and synthetic antibiotics to cure diseases or treat their animal anymore; this is because most of them are too expensive to afford. As a result of this, a larger section has resulted to the use of traditional medicines which are believed to be less expensive and of little or no side effects [7].

Extracts from leaves, seeds, fruits, bark and root of plants have being used in the preparation of syrup and infusion in traditional medicine and these preparations have being used to treat so many ailments. The active constituent contributing to these protective effects are the photochemical, vitamins and minerals [8]and such plant is *Aspillia africana* (composite).*Aspillia africana* is one of the plants that contain a wide range of biological activity including anti-viral, fungicide and anti-bacterial due to the presence of *Thiarubrines*, a derivative of 1,2-dithiocyclohexa -3,5- diene [9]. It has being evaluated that the potential of the leaves possess constituent of arresting wound bleeding, inhibiting the growth of microbial wound contaminant. It is anti-sting and possesses anti-malarial activity against plasmodium. Therefore, aim of the study focuses on the effect of *Aspillia africana* on performance and quality assessment of broiler chicken at 12weeks of age.

MATERIALS AND METHODS

Site of the experiment

The experiment was carried out at the Poultry unit of Teaching and Research Farm Ladoke Akintola University of Technology, Ogbomoso, Oyo State, Nigeria. Ogbomoso is a derived Savanna Zone of Nigeria that lie within the latitude 8^1 15^0 North and longitude $4^1 15^0$ East. The area has a annual rainfall of 1247mm with altitude between 300-600 meter above the sea level while the mean annual temperature is about 27^0C [10].

Animal housing and management

Few days before the arrival of the chicks, the brooder house was been toughly cleansed and disinfected with morigad. The brooder house was partitioned into five different pens and each pen was demarcated to get different cells, this was done to avoid mix up and in a way that allow ventilation. The already gotten wood shavings were spread on the ground for brooding and were constantly changed every week to prevent diseases. Feeding trough and drinkers were provided in the brooder house, the pen was pre heated and the temperature was been monitored (27^0C). 120 day - old chicks of Abor ache broiler strain was purchased from Ajanla farm, Lagos-Ibadan express way, they were randomly divided into 4 treatment groups A, B, C and control having 30 birds each with 3 replicate per group and 10 birds per replicate.

Leaf meal preparation

The fresh leaves of *Aspillia africana* were collected at the CTC section of Lautech Teaching and Research farm, Ogbomoso. After collecting enough quantity of *Aspillia africana* leaf, leaves were air dried to a constant weight for several days and then grounded into a powered form.

Experimental diets

The control diet had 0g of *Aspilia africana*, the chicks in treatment. A was placed on 50g of dried grounded *Aspilia africana*/1kg of feed, treatment B on 60g of dried grounded *Aspilia africana*/1kg of feed while treatment C was placed on 70g of dried *Aspilia africana*/1kg of feed. The compositions of the diets are shown in tables (1 and 2). Proximate composition of the experiment diets were analysed according to AOAC (1990) [11] method as shown in table 3.All animals were housed under identical conditions of temperature and humidity. Clean water was readily available to the birds *ad-libitum*,vaccination and medication was done as at when necessary.

Table 1: Diet composition of the birds at starter phase

Ingredients	Control	Group A	Group B	Group C
Maize	55.00	55.00	55.00	55.00
GNC	15.00	15.00	15.00	15.00
Soybean	10.00	10.00	10.00	10.00
Fishmeal	2.00	2.00	2.00	2.00
Wheatoffal	8.30	8.30	8.30	8.30
Oystershell	1.00	1.00	1.00	1.00
Bonemeal	2.00	2.00	2.00	2.00
PKC	5.00	5.00	5.00	5.00
Salt	0.25	0.25	0.25	0.25
Blood Meal	3.00	3.00	3.00	3.00
Methionine	0.10	0.10	0.10	0.10
Lysine	0.10	0.10	0.10	0.10
Premix	0.25	0.25	0.25	0.25
Total (kg)	100	100	100	100
A.africana (g)	Nil	50.00	60.00	70.00
Crude protein (%)	22.65	22.65	22.65	22.65
ME (Kcal/kg)	2960	2960	2960	2960

Table 2: Diet composition of the birds at finisher phase

Ingredients	Control	Group A	Group B	Group C
Maize	50.00	50.00	50.00	50.00
Soy meal	6.00	6.00	6.00	6.00
GNC	13.00	13.00	13.00	13.00
PKC	8.50	8.50	8.50	8.50
Fishmeal	3.00	3.00	3.00	3.00
Wheat offal	13.30	13.30	13.30	13.30
Oystershell	1.50	1.50	1.50	1.50
Bonemeal	2.00	2.00	2.00	2.00
Blood meal	3.00	3.00	3.00	3.00
Salt	0.25	0.25	0.25	0.25
Methionine	0.10	0.10	0.10	0.10
Lysine	0.10	0.10	0.10	0.10
Premix	0.25	0.25	0.25	0.25
Total (kg)	100	100	100	100
A.africana (g)	NIL	50.00	60.00	70.00
Crude protein (%)	21.06	21.06	21.06	21.06
ME (Kcal/kg)	2797	2797	2797	2797

Table 3: Proximate composition of experimental diets

Parameters(%)	Control	Group A	Group B	Group C
Crude protein	10.50	8.75	7.26	7.08
Crude fibre	9.80	6.02	4.11	8.23
Ether extracts	22.08	21.45	20.65	20.71
Ash	9.45	11.35	9.58	8.05

Data collection

Data were collected for the assessment of growth performance, such as feed intake (g) on a daily basis, weight gain (g) and feed to gain ratio., carcass evaluation was obtained from 27 birds from each treatment, totaling 108 broiler chickens were randomly selected, primal cuts (breast, thigh, drumstick, back, wing, neck, shank and head) and visceral organs (Liver, kidney, lungs, heart, empty gizzard, whole gizzard and GIT), Organoleptic (colour, favour, juiciness, tenderness and general acceptance) and physical properties (cooking loss and water holding capacity).The organoleptic properties were determined by meat preparation which was done using a wet cooking method after samples were being obtained from the breast, thigh and wing of the birds and the samples were wrapped in a impervious polythene pouches that can't be destroyed by cooking process. The samples were cooked for 20 minutes in a water bath without any spices added to the meat. The meat was served to 10 member's panels comprising mainly students and staff of LAUTECH. The panellists evaluated the samples for colour, flavour, juiciness, tenderness and general acceptability and it was based on a 9 point hedonic scale. The score was arranged in a descending order in which the maximum score was given to extremely like condition and the lowest score was given the poorest judge.

Statistical Analysis

All data collected were subjected to one way analysis of variance (ANOVA) using SAS [12], Duncan's multiple range tests were used to separate the means.

RESULTS AND DISCUSSION

Table 4 shows the result of growth performance of broiler chicken at 12^{th} week of age. The birds on control showed the highest significant difference ($P < 0.05$) in the total feed consumed and it was followed by treatment C while birds on diet B had the lowest feed intake. Similar trend was also observed in the weight gain as the birds on control diet gained the highest ($p<0.05$) significant weight while the least was found on diet B. Feed to weight gained ratio also favoured the birds on control diet while 0.21, 0.19 and 0.23 were recorded for birds on diet A, B and C respectively. The result of the control diet had influence on the feed intake and weight gained. However, diet C with 70g inclusion of *Aspilia africana* showed a highest feed intake comparable to the control and the weekly body weight gain was also observed in treatment C to have the highest weight gain. This showed that the quantity consumed was better utilized at 70g inclusion and this may be due to the antibacterial or growth promoting tendency of *Aspilia africana*. Also photochemical analysis of the plant reveals that it has high crude oil and protein Content [13] and it is also

rich in saponin, tannins, glycoside and alkaloids [14, 15]. As a result of these, the acceptability to the feed containing *Aspilia africana* inclusion is low compared to the control which reflected on the feed to gain ratio, this is because of the anti- nutritional properties of *Aspilia africana*. It is reported [16] that tannins bind feed protein to the salivary gland and epithelium of the mouth, making feed unpalatable, thereby depressing voluntary intake.

The carcass characteristics of birds fed *Aspilia africana* for 12 weeks were reveals in table 5. The control was significantly different (P<0.05) for both live weight and the dressing percentage compared to the treatment A and treatment C. The present results was similar to the observation of Adedeji [17] and Castellini *et al*. [18] that conventional fed poultry birds were better in live weight, dressing percentage and defeathered percent compared with organically reared poultry birds.

Table 6 shows the primal cuts of broiler chickens fed *Aspilia africana* for 12 weeks. The results reveals that control diet was significantly difference (P <0.05) to the other treatment for breast weight, thigh, drumstick, wing and shanks weight and followed closely by diet A while back, neck and heads values were highest for birds in diets A. This present results was in line with finding of Sarica*et al*. [19] that reported convention fed birds were higher in primal cuts than the organically reared poultry birds. Organ weight of birds fed *Aspilia Africana* for 12 weeks was shown in table 7. The observation seen was that there was significant different (P <0.05) between the organ weight of the birds at 12th weeks of age. For the kidney, lung, whole and empty gizzard, treatment C had the highest value while control diet had the lowest value. In the liver of the bird, treatment B showed the highest significant and the least was seen in the control diet. The organ weight of birds fed *Aspilia africana* were much higher than that of the control because the haemostatic, antibacterial, membrane stabilization and anti-inflammatory activities of *Aspilia Africana* have been reported and it has being evaluated that the potential of the leaves possess constituent of inhibiting the growth of microbial wound contaminant.

The results of organoleptic properties of broiler fed graded level of *Aspilia africana* were shown in table 8. It was observed that colour of control diet was slightly acceptable, while diet A was moderately acceptable, diet B and C were very acceptable. For the flavour, control diet and treatment B were very desirable while treatment A and treatment C were moderately desirable. Juiciness of the control diet was observed to be very dry while the juiciness of the three treatments was moderately dry. The tenderness of birds in control diet was slightly loose, also loose for treatment A birds; it was moderately loose for diet B while the tenderness of birds in diet C was also moderately loose. The general acceptability of the treatments follow this trend was control diet and treatment C were moderately like, treatment A was also moderately like, only treatment B was very like. Thus, the present results were in accordance with the finding of Castellini *et al*. [20] and Melton [21] that organically poultry production had branded low-fat meat products with exceptional flavour characteristics and feeds had a significant effect on the flavour of red meat respectively.

Table 4: Growth performance of birds fed *Aspiliaafricana*for 12 weeks

Parameters	Control	A(50g)	B(60g)	C(70g)	SEM
Feed intake (g)	6773.25^{a}	6421.50^{c}	6108.00^{d}	6647.50^{b}	45.83
Weight gain (g)	2272.50^{a}	1355.00^{c}	1140.00^{d}	1455.00^{b}	78.30
Feed to weight gain	0.34^{a}	0.21^{b}	0.19^{c}	0.23^{b}	0.01

^{abc} Means in the same row followed different superscripts are significantly different (P < 0.05). SEM = standard error of means, Control has no inclusion of *Aspilia Africana,* A: 50g inclusion of *Aspilia Africana,* B: 60g inclusion of *Aspilia Africana,*C: 70g inclusion of *Aspiliaafricana*

Table 5: Carcass characteristics of birds fed *Aspiliaafricana* for 12 weeks

Parameters	Control	A(50g)	B(60g)	C(70g)	SEM
Live weight (g)	2.39^{a}	1.54^{b}	1.19^{c}	1.50^{b}	0.81
DefeatheredWeight (g)	89.73	89.11	89.71	88.75	0.30
DressingPercentage (%)	63.73^{a}	58.52^{b}	54.59^{c}	57.82^{b}	0·73

^{abc} Means in the same row followed different superscripts are significantly different (P < 0.05).SEM = standard error of means, Control has no inclusion of *Aspilia Africana,* A: 50g inclusion of *Aspilia Africana,* B: 60g inclusion of *Aspilia Africana,*C: 70g inclusion of *AspiliaAfricana*

`Table 6: Primal cuts of birds fed with *Aspiliaafricana* for 12 weeks

Parameters	Control	A(50g)	B(60g)	C(70g)	SEM
Breast weight	19.91[a]	15.96[b]	15.48[b]	16.88[b]	0.40
Thigh	10.69[a]	10.71[a]	8.82[c]	9.69[b]	0.16
Drumstick	11.32[a]	10.71[a]	9.27[c]	10.27[b]	0.17
Back	13.00[b]	13.28[ab]	13.45[ab]	13.66[a]	0.98
Wing	8.81[a]	7.80[b]	7.57[bc]	7.32[c]	0.11
Neck	3.78[b]	4.17[a]	3.40[c]	3.66[bc]	0.77
Shank	4.62[a]	4.88[a]	4.25[b]	4.65[a]	0.07
Head	2.43[c]	2.92[b]	3.40[a]	2.10[b]	0.07

[abc] Means in the same row followed different superscripts are significantly different (P < 0.05). SEM = standard error of means, Control has no inclusion of *Aspilia Africana,* A: 50g inclusion of *Aspilia Africana,* B: 60g inclusion of *Aspilia Africana,*C: 70g inclusion of *Aspilia africana*

Table 7: Organ weight of birds fed *Aspillia Africana* for 12 weeks

Parameters	Control	A(50g)	B(60g)	C(70g)	SEM
Liver	2.10[c]	2.56[b]	2.94[a]	2.68[ab]	0.80
Kidney	0.63	0.62	0.54	0.64	0.02
Lungs	0.63[bc]	0.59[c]	0.81[ab]	0.98[a]	0.42
WG	2.94[c]	3.57[bc]	4.25[ab]	4.78[a]	0.20
EG	1.89 [b]	2.26[ab]	2.55[a]	2.73[a]	0.09
Git	1.89[b]	5.84[a]	2.55[b]	2.73[b]	0.42
Heart	0.38[b]	0.52[a]	0.54[a]	0.43[b]	0.02

[abc]Means in the same row followed different superscripts are significantly different (P < 0.05). SEM = standard error of means GIT = Gastro intestinal tract, WG= Whole gizzard, EG= Empty gizzard, Control has no inclusion of *Aspillia africana,* A: 50g inclusion of *Aspillia africana,* B: 60g inclusion of *Aspillia africana,*C: 70g inclusion of *Aspillia africana*

Table 8: Organoleptic and physical properties of broiler fed *Aspilia africana* for 12Weeks

Parameters	Control	A(50g)	B(60g)	C(70g)	SEM
Colour	6	7.0	8.0	7.78	
Flavour	7.75	6.75	7.75	6.75	
Juiciness	7.5	6.75	7.0	7.25	
Tenderness	6.0	5.5	6.5	6.75	
G. accept	6.67	6.5	7.5	6.75	
Physical Properties					
Cooking loss	32.38[ab]	27.90[b]	33.80[a]	27.95[b]	0.87
WHC	67.62	72.10	66.20	72.05	0.13

[abc]Means in the same row followed different superscripts are significantly different (P < 0.05). WHC= Water holding capacity, G. accept= general Acceptability, SEM = standard error of means, Control has no inclusion of *Aspilia africana,* A: 50g inclusion of *Aspillia africana,* B: 60g inclusion of *Aspilia Africana,*C: 70g inclusion of *Aspilia africana.*

CONCLUSION

Based on the result observed from this experiment, it was seen that carcass evaluation of the birds increased significantly in the economical parts of the bird fed with 50g and 70g inclusion of *Aspilia africana* at the end of 12 weeks. Such an economical part as the drumstick, back, breast and the wing. Also, the eating qualities and the weight gained were also influenced by the inclusion of *Aspilia africana* in feed which was in favour of diet C (70g inclusion). Although, comparing the utilisation of feed of birds on treatment with the control experiment, the intake is low but had high meat conversion ration and good organoleptic properties.

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