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Performance of broiler chickens fed bush marigold (*Aspilia Africana)* leaf extract

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Abstract

The effect of Aspilia africana (bush marigold) leaf extract on the performance of broiler chickens in a feeding trial lasting eight weeks was studied. A total of one hundred and twenty (120) day-old Arbor acre broiler chicks were randomly grouped into four treatments with three replicates containing ten birds per replicate in a completely randomized design (CRD). The Aspilia africana leaves were collected around the premises of Ebonyi State University Teaching and Research Farm, they were detached from the stem, sun dried and ground into fine powder. 5g of the powdered Aspilia africana was dissolved in 1 liter of warm water for the period of four (4) hours on daily basis and the extract was used for the research, T_1 served as control that is no extract in their drinking water of 2 liters, T_2 receive 150ml/2liters of water, T_3 received 200ml/2liters of water while T_4 received 250ml/2liters of water on daily basis for 8 weeks. Growth parameters measured were weight gain, feed intake, water intake and feed conversion ratio. The result showed that there are significant differences ($P<0.05$) in body weight gain, daily feed intake, daily water intake, feed conversion ratio while there were no significant differences in the daily weight gain and final body gain. T_4 showed the highest value when compared to T_2 and T_3. In conclusion, 250ml/2liters of water of Aspilia africana leaf extract can serve as a growth promoter hence recommended for broiler production.

Target Audience: Poultry farmers, Researchers

Keywords*: Aspilia africana leaf, Broilers, Growth, Performance.*

Description of Problem

Poultry meat and eggs offer considerable potentials for bridging the protein gap, because high yielding exotic poultry adapt easily to the tropical environment and the technology of production is relatively simple with returns on investment appreciably high (1). The incessant rise in feed cost and the resultant shortage in animal protein supply has encouraged the exploitation of locally, available and cheap animal and feed resources to forestall threat to the future of poultry production (2, 3).

Therefore, the growth rate of agricultural sector in Nigeria is still below the potentials of the country natural and human resources due to high cost of agricultural inputs, poor funding of agriculture, inadequate functional infrastructural facilities, inconsistencies of government agricultural policies, inadequate private sector participation, poor mechanized farming and little or no adoption of some simple agricultural technologies developed by scientists (4). In spite of her numerous human and natural resources, Nigeria still remains

among the least consumers of animal protein in Africa. The protein intake of an average Nigerian is about 53.8g with only 6.8-8.4g/head/day of animal origin (1).

The suitability of a number of plant species in the sustainable production of animal feed is being exploited (5). Medicinal ingredients of plant origin have different chemical nature and show a very wide range of pharmacological effects such as antibacterial activity, anti-inflammatory, astringent, anti-diarrhoeal, digestion-stimulating, laxative, sedative, spasmolytic and choleretic (6).

Plant such as marigold (*Aspilia africana*) also have high amount of vitamins, minerals and contain pigments such as oxy-carotenoids, xanthophylls useful for skin and egg pigmentations in birds (7). Plant materials such as herb, spices, plant extracts, essential oils and meals are also receiving increased attention as possible natural alternatives to antibiotic growth promoter to boost monogastric performance (8, 9).

Several in-vitro studies have been conducted on marigold (*Aspilia africana*) leaf as antimicrobial agents (11). However, limited published reports are available on the effect of bush marigold leaf meal or extracts as growth promoter in monogastric production. Therefore, this research examined the roles and functions of *Aspilia africana* in broiler chickens diet as a growth promoter against the use of synthetic antibiotics which is currently phasing out globally in animals destined for meat production. The usefulness of this leaf has brought about this study directed at showcasing various growth performance and quality traits of broiler chickens fed with graded level of *Aspillia africana* for 8 weeks.

Materials and Methods

Experimental Site

The experiment was carried out at Poultry Unit of the Department of Animal Science, Ebonyi State University Teaching and Research Farm Abakiliki. Abakaliki is within latitude $7^0$30E and longitude $5^0$40N and $6^0$45N. It has a mean elevation of 400m above sea level. The annual rainfall is about 1700mm to 2060mm spread between April and November. The experimental site receives an abundant and constant insulation from the sun with a maximum mean daily temperature of between 28-31^{0}C attended by the effects of cloud cover.

Experimental Birds and Management

A total of 120 birds were used for the experiment for a period of 8 weeks. The birds were obtained from a reputable source and were housed in an open sided poultry house whose sides were demarcated using wire gauze. The floor was a concrete floor and was covered with wood shavings as litter material. Few days before the arrival of the chicks, the brooder house was thoroughly cleaned and disinfected. The brooder house was partitioned into four different pens and each pen was demarcated to get different cells, this was done to avoid mix up and allow ventilation. Wood shavings were spread on the floor for brooding and were changed constantly every week to prevent disease infestation. Feeding troughs and drinkers were provided in the brooder house, the pen was pre-heated and the temperature was monitored (27^{o}C).

Experimental Design

One hundred and twenty (120) birds were randomly allocated to four (4) treatments identified as T_1, T_2, T_3, and T_4 in a Completely Randomized Design (CRD). Each treatment was replicated into three (3) having ten (10) birds per replicate. T_1 served as control. The birds were provided with two (2) liters of water with no *Aspilia africana* leaf extract in T_1. In T_2, the birds were provided with two litres of water with 150ml of *Aspilia africana* leaf extract, T_3, the birds were provided with two litres of water with 200ml of *Aspilia africana* leaf extract, while T_4 were provided

with two liters of water with 250ml of *Aspilia africana* leaf extract.

Leaf extract preparation

The plant material, *Aspilia africana* leaves were collected within the premises of Ebonyi State University Teaching and Research farm Abakaliki Ebonyi State. The leaves were detached from the stem, sun-dried and ground into fine powder. 5g of the powdered *Aspilia africana* leaf was dissolved in 1 litre of warm water for 4hours, filtered and the filtrate is administered to the birds according to their treatment level.

Experimental Diet

The starter and finisher broiler diets were formulated for the starter and finisher phase respectively as shown in Table 1. The diets were formulated to meet nutrient requirements of broiler chicks as outlined by National Research Council (12).

Data collection

Feed intake: The daily feed intake was weighed per replicate using weighting scale and the feeds were served between 7:30am and 8am daily. The left-overs were collected per replicate the following morning and weighed also. The daily feed intake was obtained from subtracting the left over from the feed given to each treatment. Mathematically:

Feed Intake (g): =

$$\frac{\text{Quantity of feed consumed – Leftover}}{\text{Number of bird x Number of days the experiment lasted}}$$

Table 1: Percentage composition of the starter and finisher experimental diets

Ingredients	Starter phase (0%)	Finisher phase (0%)
Maize	55.00	51.00
Groundnut cake	15.00	13.00
Soya bean meal	10.00	6.00
Wheat offal	8.00	14.00
Palm kernel cake	5.00	9.00
Fishmeal	3.00	3.00
Blood meal	3.00	3.00
Bone meal	0.30	0.30
Salt	0.25	0.25
Methionine	0.10	0.10
Lysine	0.10	0.10
Premix	0.25	0.25
Total	100	100
Crude Protein (%)	23.65	21.08
ME(Kcal/kg)	2960	2897

Body weight gain: The initial weight of the chicks were determined on day one of the experiment and subsequently on weekly basis while the body weight gain were obtained by subtracting the initial weight from the final weight of birds. Mathematically:

Weight Gain (g): =

$$\frac{\text{Final Weight-Initial Weight}}{\text{Number of bird x Number of days the experiment lasted}}$$

Feed conversion ratio (FCR): The feed conversion ratio of the birds was computed by dividing the feed intake by weight gain. Mathematically:

Feed Conversion Ratio (g): =

$$\frac{\text{Average daily feed intake}}{\text{Average daily weight gain}}$$

Statistical Analysis

The data collected on various parameters were subjected to one way analysis of variance, while the means were separated by Fishers least significant difference. The Linear additive model for this design is:

$X_{ij} = \mu + T_i + \epsilon_{ij}$

X_{ij} = Any observation made in the experiment

μ(mu) = The Population Mean

T_i (Tau subi) = Treatment Effect

ϵ_{ij}(Epsilosnsubij) =Experimental Error

Result

The result on the performance of broiler birds fed with *Aspilia Africana* leaf extract is presented in Table 2. There was no significant difference ($p > 0.05$) in the final weight gain and daily weight gain. However statistically there was no significant ($p > 0.05$) difference on those parameters but numerically, there was an increase in the body weight, daily weight gain, and final weight gain on the birds in T_2 and T_3 respectively. The birds on T_4 showed the highest significant difference ($P<0.05$) in the total feed consumed and it was followed by T_1 (Control) while birds on T_3 had the lowest feed intake. Similar trend was also followed in the body weight gain as the birds on T_3 gained the highest ($P<0.05$) significant weight (2752.60g) followed by T_2 (2747.10g) and T_4 (2710.16g) while the least (2563.38g) was found in T_1 (control). Feed conversion ratio also favored the birds on T_3, which has 2.48 while 2.77, 2.56, and 2.65 were recorded for birds on T_1, T_2 and T_4 respectively. For daily water intake, T_4 (380.86g) differed significantly from T_3 (375.78g) and T_2 (370.84g) while T_1 (349.28g) were the least recorded value.

Table 2: Growth Performance of Birds Fed Experimental Diet

Parameters	T_1	T_2	T_3	T_4	±SEM
Initial body weight (g)	50.91	50.90	50.73	50.95	0.10
Final body weight (g)	2614.29	2798.01	2803.33	2761.11	110.40
Weight gain (g)	2563.38^{c}	2747.10^{ab}	2752.60^{a}	2710.16^{b}	94.53
Daily weight gain (g)	45.77	49.05	49.14	48.39	2.01
Daily feed intake (g/bird)	120.95^{ab}	120.18^{ab}	116.73^{b}	123.93^{a}	3.76
Feed conversion ratio	2.77^{c}	2.56^{ab}	2.48^{a}	2.65^{bc}	0.23
Daily water intake (ml/bird)	349.28^{c}	370.84^{ab}	375.78^{ab}	380.86^{a}	12.82

$^{abc:}$ Mean with different superscript are significantly different

Discussion

The result showed that there was an increase in the body weight gain as the level of inclusion of *Aspilia africana* leaf extract increases. The enhanced weight could be as a result of higher intake of the active ingredient that is high in crude oil, protein, sterols and it is also rich in saponins, tannins (2).

Growth performance characteristics of broiler chickens fed with *Aspilia africana* leaf extract inclusion in the water given when compared to the control group had influence on the feed intake and weight gain. T_4 with an inclusion of 250ml/2litres of water *Aspilia africana* leaf extract showed the highest feed intake compared to the control. The best performance was observed at 150ml/L of water inclusion of *Aspilia africana* leaf extract. This present study was also similar to the findings of earlier reports of (10) that the presence of some toxic factors inherent in leaf products have been implicated for the depression in feed intake as observed in broiler chicken fed with *Aspilia africana* leaf extract but contradicted the findings of (8); that *Aspilia africana* leaf extract had no significant effects on body weight of birds.

This beneficial effect may be due to positive effect of active phytochemical ingredients such as high crude protein and sterol present in *Aspilia africana* leaves that resulted in the greater efficiency in the utilization of feed, resulting in enhanced growth and production. Also the improved performance of birds served (T_2) 150ml/L of water extract may be due to the increased secretion of digestive enzymes which helped in the improved digestion of the feed consumed leading to the proper utilization of the nutrient in the liver there by enhancing the growth performance of the birds.

Furthermore, the improved performance of the birds in T_2, T_3 and T_4 may be due to the enhanced nutritive value of the treatment diet which beneficially influenced the gastrointestinal ecosystem through growth inhibition of pathogenic microorganism' growth leading to improved health status of the digestive system thereby reducing the exposure of the birds to toxins of microbiological origins, stress situations and increment in the absorption of the essential nutrients, thus improving the growth performance. This is in line with the report of (9) , who reported that plant extracts promotes feed stability, inhibits pathogenic microorganism's growth, increase resistance to stress situation of the birds and as well increase absorption of essential nutrients thereby improving animal's growth performance.

Therefore, the increment in the feed consumption of birds as the levels of inclusion of *Aspilia africana* leaf extract per 2 litres of water increases showed that it has appetite stimulating properties. This is in agreement with the findings of (4) who reported that leaf extracts have appetizing and digestion stimulating properties and anti-microbial effects. It equally agrees with the findings of (3) who reported also that herbal extracts have appetite and digestion stimulating properties.

From the findings in table 2, it shows that the increment in the consumption of water is not affected by the taste of the extract, so the taste of *Aspilia africana* leaf extract does not decrease water consumption of the birds as the inclusion level increases across the treatments unlike some of other extracts like bitter leaf (*Vernonia amygdalina)* which has bitter taste and when served to the birds in their drinking water could possibly reduce the quantity of their water intake (6). As water aids easy digestion of feed ingredients and the absorption of nutrients hence, resulting to enhanced growth in both human and animals.

The birds in treatment group 3 (T_3) had the best feed conversion ratio (2.48). This could be as a result of the effect of *Aspilia africana* leaf extract on enhancing the gastro-intestinal enzyme thereby improving digestion and assimilation of nutrient and hence improved feed conversion rate.

Conclusions and Applications

The findings from this study conclude as follows:

1. That *Aspilia africana* leaf extract when served in water as high as 250ml/l of water enhances growth and feed conversion ratio and the general performance of broiler birds.
2. Inclusion of *Aspilia africana* leaf extract at 250ml which is the highest inclusion level could be used as growth promoting additive in broiler feed.

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