

GROWTH PERFORMANCE OF BROILER CHICKENS FED DIETS SUPPLEMENTED WITH AFRICAN STAR APPLE (*CHRYSOPHYLLUM ALBIDUM*) LEAF MEAL

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Abstract

A six-week trial was conducted to investigate the effect of dietary supplementation of African star apple (*Chrysophyllum albidum*) leaf meal on the growth performance of broiler chickens. A total of 250 Arbor Acres plus one day old chicks were allotted into five treatments (T) and five replicates in a completely randomized design. T₁ served as Control with 0g/kg inclusion of African star apple leaf meal in the feed, T₂, T₃, T₄, and T₅ were diets containing 0.5, 1.0, 1.5 and 2.0g/kg African star apple leaf meal as dietary additive respectively. Parameters were collected on feed intake, weight changes, and Feed conversion ratio was computed. Data obtained were subjected to ANOVA. The results of the study showed that there were significant ($p < 0.05$) differences in the weights obtained at the starter phase, the average daily weight gain and feed conversion ratio were also significantly ($p < 0.05$) different at the finisher phase. 0.5g/kg dietary supplementation of African star apple leaf meal gave the highest value (434.80g/b) for the final weight at the starter phase. The highest average daily weight of 52.08g/b/d was obtained in birds fed 2.0g/kg dietary supplementation of African star apple leaf meal. It was therefore concluded that broiler chickens could efficiently utilize African star apple leaf meal for improved growth at the finisher phase.

Keywords: *Chrysophyllum albidum*, feed utilization, weight changes, broiler chickens, dietary supplementation

Introduction

Feed additives represent various classes of molecules, compounds, or organisms that promote ingestion, absorption, assimilation of nutrients, growth, and health. They affect physiological processes, such as immune function, stress resistance, and reproduction. Feed additives include feeding attractants, immunostimulants, prebiotics, probiotics, acidifiers, essential oils, or other inclusions. These additives are usually not required nutrients. (Stephen *et al.*, 2020)

Feed additives are added in poultry feed to improve nutritive value of ingredients and enhance broiler performance by increasing growth rate and improving feed conversion efficiency (Rehman *et al.*, 2014). Recent research works on phytogenic feed additives have shown promising results as regards weight gain, feed efficiency, lowered mortality and increased livability in poultry birds (Mishra *et al.*, 2000). Phytogenic substances are supposed to increase performance of birds by stimulating secretion of digestive enzymes, leading to enhanced digestion and absorption. Furthermore, the presence of active ingredients and phenolic compounds can reduce numbers of intestinal pathogens, thus minimizing nutrient loss and improving performance. Both effects may result in better intestinal health and may lend to more protein deposition in body tissues. But, the effects of native ingredients on performance and health of animals are inconsistent, as unaffected by the number of environmental and agronomical factors leading to differences in amount and activities of active ingredients. In literature, no clear-cut effect of phytogenic compounds on performance parameters in different species of poultry has been reported. (Windisch *et al.* 2008).

Chrysophyllum albidum, commonly known as Africa Star Apple, is a native to many parts of tropical Africa. It is widely distributed in West, Central, and East Africa for edible fruits and various ethno-medical uses (Orwa *et al.*, 2009). The fruit tree grows as a wild plant and belongs to the family Sapotaceae. It has up to 800 species and make up almost half of the order Ebernales (Ehiagbonare *et al.*, 2009). Ecologically, the tree has an efficient nutrient cycling and the high rate of mineralization of the leaves improves the quality of the top soil (Adesina, 2005). *Chrysophyllum albidum* is among the forest tree species that provide Non Timber Forest Products (NTFPs) of enormous domestic significant to both rural dwellers in West Africa, with great export potentials. Other parts of *Chrysophyllum albidum* (such as leaves, seeds, roots and bark) are also used for curing of different diseases such as diabetes, ulcer, sterility and sexual weakness, blood pressure, asthma etc. (Houessou,

2012). However, there is paucity of information on the effect of its dietary supplementation of leaf meal on growth performance indices of broiler chickens.

Materials and Methods

Experimental site: The study was carried out at the Teaching and Research Farm, Broiler Chickens production unit of the Federal College of Animal Health and Production Technology, Moor plantation, Ibadan.

Experimental animals and their management: A total number of two hundred and fifty broiler chicks were purchased from a reputable hatchery and initial weight of the birds were taken with the use of sensitive weighing scale, the birds were transferred into well disinfected brooding house. Brooding commenced immediately on the arrival of the chicks and all the factors for an effective brooding were strictly adhered to. Feed and clean, cool water were provided *ad-libitum* throughout the experimental period. Vaccines and medication were administered as at when due.

Sourcing and processing of test ingredient and basal diets: African star apple leaves were harvested on a farm in Oyo town, Oyo state Nigeria. They were air dried, milled and stored in air tight containers until used. Basal diets fed to the birds were obtained from commercial feed distributors, the test ingredient was added as an additive to the feed. Nutrient composition of the basal diets for both the starter and finisher phases is presented in table 1.

Table 1: Nutrient composition of the basal diets for the starter and finisher phases

Parameters	Starter phase	Finisher phase
Protein(%)	22.00	17.00
Fat(%)	6.00	4.00
Fiber(%)	3.50	3.50
Calcium(%)	1.00	0.80
Available phosphorus	0.48	0.40
Energy(kcal/kg)	3000	2900
Lysine(%)	1.38	0.88
Methionine(%)	0.68	0.37
Salt(%)	0.30	0.30
Moisture(%)	14.00	14.00
Ash(%)	6.50	6.50

Experimental treatments and design: the birds were randomly allotted into five dietary treatments of fifty birds each and further divided into five replicates with ten birds in each replicate. The experimental treatments were; treatment 1 also termed as control and had no dietary supplementation of African star apple leaf meal, treatments 2, 3, 4 and 5 were dietary treatments containing 0.5, 1.0, 1.5 and 2.0g/kg dietary supplementation of African star apple leaf meal. The experiment was completely randomized.

Duration of the experiment: the experiment lasted for 6 weeks. Three weeks each for the starter and finisher phases respectively.

Data collection: during the course of the experiment, data were collected on the following growth parameters:

1. Feed intake: also known as feed consumed was derived after feed left over was deducted from feed given
2. Weight gain: also known as weight changes was obtained by subtracting the initial weight from final weight
3. Feed conversion ratio: this was computed by dividing feed intake by weight gain

Data analysis: data obtained from the study were subjected to analysis of variance using SAS statistical tool package (SAS 2003). Variations in means were separated using Duncan Multiple Range test of the same software.

Results and Discussion

The effects of dietary supplementation of African star apple (*Chrysophyllum albidum*) leaf meal on growth performance of broiler chicken at the starter phase (0 – 3 weeks) are shown in Table 2. Significant ($P < 0.05$) differences were observed in the final weight, total weight gain and average daily weight gain at the starter phase. For the final weight and total weight gain, birds fed 0.5g/kg inclusion

of African star apple leaf meal had the highest values while birds fed 1.0g/kg inclusion of African star apple leaf meal had the least values.

Table 2: Effects of dietary supplementation of African star apple (*Chrysophyllum albidum*) leaf meal on growth performance of broiler chickens at the starter phase (0-3 weeks).

Parameters	T ₁ (0)	T ₂ (0.5g)	T ₃ (1.0g)	T ₄ (1.5g)	T ₅ (2.0g)	SEM(±)
Initial weight (g/bird)	41.00	41.00	39.22	38.24	39.22	0.22
Final weight (g/bird)	428.66 ^{ab}	434.80 ^a	387.99 ^b	414.13 ^{ab}	416.63 ^{ab}	6.33
Total weight gain (g/bird)	387.66 ^{ab}	393.80 ^a	348.77 ^b	375.89 ^{ab}	376.44 ^{ab}	6.37
Average Daily weight gain (g/bird/day)	13.27 ^a	12.88 ^a	11.35 ^b	12.26 ^{ab}	12.31 ^{ab}	0.22
Total feed intake (g/bird)	712.60	684.83	636.15	663.99	645.18	12.23
Average daily feed intake (g/bird/day)	25.45	24.44	22.72	23.71	23.04	0.44
Feed conversion ratio	1.84	1.74	1.82	1.78	1.72	0.03

^{a,b}: Means with different superscript along a row are significantly different ($p < 0.05$); T₁: Control with no Inclusion level of African star apple leaf meal; T₂: 0.5g Inclusion level of African star apple leaf meal ; T₃: 1.0g Inclusion level of African star apple leaf meal; T₄: 1.5g Inclusion level of African star apple leaf meal; T₅: 2.0g Inclusion level of African star apple leaf meal; SEM: Standard Error Mean

The effect of dietary supplementation of African star apple leaf meal (*Chrysophyllum albidum*) on growth performance of broiler chickens at the finisher phase (4-6 weeks) is presented in Table 3. At the finisher phase, there were significant differences in the average daily weight gain and the feed conversion ratio. Birds fed 2.0g/kg dietary supplementation of African star apple leaf meal had the highest average daily weight gain while birds fed 1.5g inclusion level of African star apple leaf meal had the least average daily weight gain. For FCR, control (with no dietary supplementation of African star apple leaf meal) had the highest value (2.95), treatment fed dietary supplementation of African star apple leaf meal at 2.0g/kg and 1.5g/kg were statistically similar and had the same value of 2.64.

Table 3: Effect of dietary supplementation of African star apple (*Chrysophyllum albidum*) leaf meal on growth performance of broiler chickens at the finisher phase (4-8 weeks).

Parameters	T ₁ (0)	T ₂ (0.5g)	T ₃ (1.0g)	T ₄ (1.5g)	T ₅ (2.0g)	SEM(±)
Initial weight (g/bird)	428.66	434.80	387.99	414.13	416.63	6.34
Final weight (g/bird)	1462.70	1587.80	1670.80	1443.30	1513.70	37.09
Total weight gain (g/bird)	1034.00	1153.00	1282.80	1029.20	1097.10	38.31
Average daily weight gain (g/bird/day)	39.29 ^b	42.40 ^{ab}	47.21 ^a	38.93 ^b	52.08 ^a	1.53
Total feed intake (g/bird)	2980.10	3022.90	2926.30	2670.40	2904.20	69.54
Average daily feed intake (g/bird/day)	106.43	107.96	104.51	95.37	109.72	2.48
Feed conversion ratio	2.95 ^a	2.62 ^{ab}	2.33 ^b	2.64 ^{ab}	2.64 ^{ab}	0.07

^{a,b}: Means with different superscript along a row are significantly different ($p < 0.05$); T₁: Control with no

Inclusion level of African star apple leaf meal; T₂: 0.5g Inclusion level of African star apple leaf meal; T₃: 1.0g Inclusion level of African star apple leaf meal; T₄: 1.5g Inclusion level of African star apple leaf meal; T₅: 2.0g Inclusion level of African star apple leaf meal; SEM: Standard Error Mean

Dietary supplementation of African star apple leaf meal at 0.5g inclusion level significantly influenced the final weight, total weight gain and average daily weight gain of broiler chickens at the starter phase. Significantly reduced final weight, total weight gain and average daily weight gain were observed in treatment 3, birds fed 1.0g/kg inclusion of Africa star apple leaf meal. This corresponds with the findings of Ojiako and Igwe (2008) that African star apple tree and its products contain many anti-nutrients or phytochemicals including cyanogen, flavonoids, oxalate, phenolic, phytate, saponins, tannins, terpenoids which might have depressing effects on nutrition by diminishing nutrient bio-availability or utilization if ingested in high levels either solely or in combination with basal diets. Significant increase of average daily weight gain of the broiler chickens fed with dietary supplementation of African star apple leaf meal at 1.0g and 2.0g inclusion level at the finisher phase could be due to progressive increase after adaptation. The best feed conversion ratio observed in birds fed 1.0g/kg (2.33) African star apple leaf meal supplemented diet could imply that the birds better utilized the feed at this level. Dietary supplementation of African star apple leaf meal above 1.0g/kg and at 0.5g/kg inclusion

were however statistically similar to the control which had the highest FCR and hence poorest feed utilization.

Conclusion

It was concluded that 0.5 g/kg of African star apple leaf (*Chrysophyllum albidum*) could be added to the feed of broiler chicken chickens at the starter phase while 2.0 g/kg of African star apple leaf at finisher phase because it has better influence in the growth of broiler chickens.

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