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PERFORMANCE AND BLOOD PROFILE OF COCKEREL CHICKS SERVED AQUEOUS EXTRACT OF *TELFAIRIA OCCIDENTALIS* (HOOK. F)

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ABSTRACT

This study was conducted to determine the effect of aqueous extract of fluted pumpkin, Telfairia occidentalis (Hook. F) leaves on the performance, haematological and serum biochemical indices of cockerel chicks. A total of 180, 14-day old cockerel chicks were randomly allotted to six (6) treatments each with 3 replicate groups containing 10 chicks and fed with chicks mash (18.52% protein and 2,748 kcal/kg Metabolizable energy) for eight weeks. Telfairia occidentalis Leaf Extract (TOLE) was added at 0, 30, 60, 90, 120 and 150ml/litre of drinking water. Growth performance, haematological and serum biochemical indices were evaluated. Results showed that there was significant ($p<0.05$) difference in weight gain, daily feed intake and final body weight of birds among the treatments. Birds fed 90ml TOLE/litre of water had significantly ($p<0.05$) higher weight gain and final body weight than those on other treatments. However, there was no significant difference in the FCR among the treatments. Birds served 90ml TOLE/litre of water has a significantly ($p<0.05$) higher serum total protein and albumin while there were no significant changes in the aspartate aminotransferase, cholesterol and triglyceride among the treatments, while the values for the alanine aminotransferase significantly increased as the level of TOLE increased among the treatments. For improved weight gain and blood formation, 90ml TOLE/litre of water served at 4 days interval is advocated.

Key words: *Telfairia occidentalis* Leaf extract, Cockerel chicks, Performance, Blood chemistry.
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INTRODUCTION

Protein from plant leaf sources is perhaps the most naturally abundant and the cheapest potential source of protein. Some plants have been shown to provide not only nutritional but also medicinal benefits (Burkill, 1997). Green leafy vegetables are particularly important in promoting health because of their rich sources of nutrients (Gupta and Prakash, 2009). They can synthesize amino acids from a wide range of available primary minerals such as water, carbon dioxide and atmospheric nitrogen as in legume (Eroarome, 2012). Feed cost carries about 70% of the total cost of production (Alimi *et al.,* 2005), hence scientists have started looking inward to reducing feed cost by exploiting materials that are locally available as feed raw materials and medicaments. Therefore, widely cultivated vegetables in the tropics and subtropics need to be paid some attention

by exploiting their leaf extracts as protein and mineral supplements in poultry nutrition.

Telfairia occidentalis (Hook F.) of the family cucurbitaceae is a promising vegetable consumed by many ethnic groups in Nigeria. It is cultivated in some places especially in southern Nigeria and by some tribes in Ghana. It is grown on stakes or tended up trees and thrives best in a closed forests country. The leaves are rich sources of protein, oils, vitamins and minerals which enhance, nourish, protect and heal the body. The leaves are low in crude fibre but are rich sources of folic acid, calcium, zinc, potassium, cobalt, copper, iron, vitamins A, C and K besides its medicinal value (Ladeji *et al*., 1995; Ajibade *et al.*, 2006). Leaves of *Telfairia occidentalis* are rich in minerals, antioxidant, and vitamins, such as thiamine, riboflavin, nicotinamide and ascorbic acid (Kayode and Kayode, 2011) and due to its richness in iron the leaves can prevent and eliminate anaemia (Ajibade *et al*., 2006). The leaves has excellent proportion of essential amino acid to total nitrogen but methionine is the limiting amino acid with a chemical score of 16 (Eroarame, 2012). It is against this background that this study was designed to evaluate the effect of *Telfairia occidentalis* leaf extracts on the haematological and serum biochemistry of Nera black cockerel chicks.

MATERIALS AND METHODS

Preparation of *T. occidentalis* extract: One kilogram of freshly harvested *T. occidentalis* leaves with the stalk was separated from the stem, washed with clean water to remove dirt and sand, drained and chopped. This was then squeezed and filtered with cheese cloth to obtain a homogenous extract of the fluted pumpkin leaves. The homogenous leaf extract was prepared at interval of four days and served to the animals fresh according to treatments.

Experimental animals and management: One hundred and eighty (180) 14-day old Nera black cockerel chicks were randomly allotted to six treatments in a completely randomized design. Each treatment was replicated 3 times with ten (10) birds per replicates and fed with the same diet (Table 1). *Telfairia occidentalis* leaf extract was added at 30, 60, 90, 120 and 160ml/litre of drinking water representing T_2, T_3, T_4, T_5 and T_6 respectively. A treatment without TOLE (0%) served as the control and designated as T_1. Composition of the chick's diet is as presented in Table 1. Feed and water were served *ad libitum* for eight weeks. Routine management practices were duly carried out. Feed intake was recorded daily while body weight was measured at the beginning of the study and subsequently every week.

Blood sampling and analysis: Blood collection was carried out at the end of the 6th week of the experiment. Six (6) birds were selected at random from each of the treatments and bled via wing veins using sterile needles and syringe into properly labeled sterilized bottles containing Ethylene diamine tetra-acetic acid (EDTA) as anti-coagulant for haematological analyses while blood samples for serum biochemical analysis were collected into plain vacutainers for serum separation. Serum was obtained by centrifugation and used for analysis. The Packed Cell Volume (PCV), Red Blood Cell (RBC), White Blood Cell (WBC) and Haemoglobin (Hb) concentrations were measured using the Wintrobe's micro-haematocrit, improved neubauer haemocytometer, and cyanomethaemoglobin method respectively (Coles, 1986). Mean Corpuscular Haemoglobin (MCH), Mean Corpuscular Volume (MCV), and Mean Corpuscular Haemoglobin Concentration (MCHC) levels were calculated from PCV, Hb and RBC according to Bush (1991). Total protein (TP) was determined by Kjedahl

method as outlined by Kohn and Allen (1995). The albumin was determined using the BCG (Bromocrosol green) method (Peter *et al.,* 1982), while globulin was calculated according to Coles (1986). Cholesterol was determined according to procedure described by Davice and Leavis (1991), while serum creatinine and triglyceride were determined using the Randox reagent kit. Aspartate aminotransferase (AST) and alanine amino transferase (ALT) activities were determined using spectrophotometric method (Holder, 1983).

Table 1: Gross composition of experimental diet fed to cockerel chicks

Ingredients	**Composition (%)**
Maize	45.30
Corn bran	7.00
Wheat offal	20.0
Soya meal	20.0
Fish meal	2.00
Dicalcium phosphate	2.00
Oyster shell	3.00
Methionine	0.10
Lysine	0.10
*Chick premix	0.25
Table salt	0.25
Total	**100**
Calculated analysis:	
Dry matter	89.74
Crude protein	18.52
Crude fibre	6.31
Ether extract	3.46
Lysine	1.10
Methionine	0.40
Calcium	1.80
Phosphorus	0.79
Metabolizable energy (kcal/kg)	2748

*To provide the following per kg of diet: Vit A, 1000 iu, Vit D2, 2000iu, Vit E, 5iu, Vit K 20mg, Riboflavin 4.20mg, Nicotinic acid 20mg, Vit. B12, 0.01mg Pantothenic acid, 5mg, folic acid, 0.05mg, choline 3mg, Mg56mg, Fe20mg, Cu, 10mg, Zn, 50mg, Co, 125mg and Iodine, 0.08mg

Data analysis: Data collected were subjected to one way analysis of variance of statistical analysis SAS (1999). Treatment means were compared using Duncan's New Multiply Range Test (Obi, 1990).

RESULTS AND DISCUSSION

The performance of cockerel chicks fed TOLE is presented in Table 2. There were significant ($p < 0.05$) differences in the final body weight, body weight gain and feed intake among birds on the treatments. However, there was no significant variation in the feed conversion ratio among the treatments.

Birds on T_4 had the highest feed intake (41.86g/bird) which was not significantly ($P>0.05$) different from the values obtained for birds on treatments 1, 2, 3 and 5 but birds on T_6 (38.66g/bird). The lower feed intake observed for birds in this group could be because at higher levels the extract could have imparted unpalatable taste which consequently influenced birds from consuming adequate quantities of feed and hence poor weight gain. This was contrary to the observation of Onu (2012) who reported a non-significant variation in the feed intake of starter broiler served *T. occidentalis* leaf extract at 40-160ml/litre of drinking water.

Birds on T_4 (90ml TOLE/litre of water) recorded a value of 554.83g/bird for body weight gain which was similar to the mean body weight gain for birds on T_1, T_2, T_3 and T_5 but significantly ($p < 0.05$) higher than the body weight gain for birds on T_6 (481.67g). The result corroborated the findings of Nworgu (2007) and Fasuyi and Nonyerem (2007) who reported that broilers tolerated lower levels of fluted pumpkin leaves extract and *Telfairia occidentalis* leaf meal. The comparable body weight gain of birds fed higher levels of TOLE (120ml and

150ml) and the control (0 ml) is an indication that the concentration was within the tolerable limits of the birds and as such did not suppress the growth of the birds. According to Ladeji *et al*. (1995) and Nworgu *et al.* (2007), *T. occidentalis* contains low levels of saponins, tannins acid, phytates and oxalates which are anti-nutritional factors that depressed animal growth.

The feed conversion ratio (4.14 – 3.24) was not significant ($p < 0.05$) among treatments. The least FCR (3.14) was obtained for chicks on control diet (without TOLE) and the highest value (3.39) was obtained for those served 150mlTOLE/litre. This was at variance with the report of Onu (2012) who reported a better feed conversion ratio for broiler starter given aqueous extract of *T. occidentalis* than birds on the control treatment.

Table 2: Growth indices of cockerel chicks served *T. occidentalis* leaf extract

Treatments	**T1**	**T2**	**T3**	**T4**	**T5**	**T6**	**SEM**
Levels of TOLE (ml/l)	**0**	**30**	**60**	**90**	**120**	**150**	
Parameters:							
Initial BW (g/bird)	80.00	80.00	80.00	81.67	80.83	80.00	0.24
Total FI (g/bird)	1693.47^{ab}	1688.43^{ab}	1733.10^{a}	1758.61^{a}	1695.20^{ab}	1623.67^{b}	8.45
Daily FI (g/bird)	40.32^{ab}	40.20^{ab}	41.27^{a}	41.86^{a}	40.36^{ab}	38.66^{b}	0.20
Weight gain (g/bird)	526.67^{ab}	540.67^{a}	546.67^{a}	554.83^{a}	524.17^{ab}	481.67^{b}	4.31
Daily WG (g/bird)	12.54^{ab}	12.71^{ab}	13.03^{a}	13.21^{a}	12.81^{ab}	11.47^{b}	0.11
Final BW (g/bird)	606.70^{ab}	608.33^{ab}	628.33^{ab}	656.67^{a}	605.00	595.00^{b}	5.14
FCR	3.14	3.16	3.17	3.17	3.24	3.39	0.07

$^{a-c}$ Means along the same rows with different superscripts are significantly ($p < 0.05$) different.
SEM = Standard Error of Mean; BW = Body weight; FI = Feed intake; WG = Weight gain; FCR = Feed conversion ratio.

Haematological parameters of birds administered TOLE is as shown in Table 3. The haemoglobin (9.23 – 9.58g/l), packed cell volume (27.23 – 28.72%), red blood cells (2.09 – 2.26 x 10^6/mm), WBC (12.42 – 13.26 x 10^6/mm), MCV (123.92 – 137.88 μ^3), MCH (43.03 – 46.54%) and MCHC (33.29 – 33.55%) were not significantly different ($p > 0.05$) among treatments. Babatunde *et al*. (1992) reported that blood parameters are the major indices of physiological, pathological and nutritional status of an organism and changes in the constituents, compounds of blood when compared to normal values could be used to interpret the metabolic stage of an animal as well as the quality of feed. The observation on the haematological indices in this study was similar to earlier findings of Onu (2012) and Fasuyi and Nonyerem (2007) when broiler chicks were served *Telfairia occidentalis* leaves extract and *Telfairia occidentalis* leaf meal respectively. However, Adedapo *et al.* (2008) reported that aqueous extract of leaves of *T. occidentialis* caused increased packed cell volume, haemoglobin, red blood cell but decrease white blood cell and platelet counts. Salman *et al.* (2008) also reported that aqueous extract of *T. occidentalis* cause significant increase in packed cell volume, haemoglobin concentration, red blood cell count and white blood cell. The haematological indices recorded in the present study were within the normal range for a healthy cockerel chicken reported by Mitruka and Rawnsly (1981). This portrays the nutritional status of the

birds and thus suggesting adequate nourishment of the birds. It also suggests that immune system of the birds was adequate and not compromised.

Table 3: Haematological parameters of cockerel chicks served *T. occidentalis* leaf extract

Treatments	**T1**	**T2**	**T3**	**T4**	**T5**	**T6**	**SEM**
Levels of TOLE (ml/l)	**0**	**30**	**60**	**90**	**120**	**150**	
Parameters:							
Haemoglobin (g/L)	9.38	9.23	9.30	9.58	9.48	9.56	0.03
Pack cell volume (%)	28.00	27.08	27.92	28.72	28.39	28.50	0.15
Red blood cell ($x10^6$/mm)	2.09	2.09	2.12	2.12	2.20	2.26	0.04
White blood cell ($x10^6$/mm)	12.64	12.93	12.42	12.73	13.26	13.13	0.18
Mean corpuscular volume (μ^3)	133.68	133.72	123.92	136.39	128.88	137.88	1.16
MCH (%)	45.24	46.44	44.03	45.53	43.03	46.54	0.43
MCHC (%)	33.38	33.39	33.36	33.29	33.38	33.55	0.06

[a-c] Means with similar superscripts are not significantly ($p > 0.05$) different
MCH = Mean corpuscular haemoglobin; MCHC = Mean corpuscular haemoglobin concentration; SEM = Standard error of mean.

The serum biochemical parameters of cockerel chicks served *T. occidentalis* leaf extract is as shown in Table 4 below. The total protein were significantly ($p < 0.05$) higher for birds on T_4 with a value of 5.07g/dl. This was similar to the report of Adedapo *et al*. (2008) that aqueous extract of *T. occidentalis* caused significant increase in the levels of total protein, Alabi *et al*. (2008) also reported an increase in the total protein of broilers given oral administration of *Telfairia occidentalis* leaf extract at the finisher phase. However, Fasuyi (2006) did not observe any significant changes in the total protein of broiler fed *T. occidentalis* leaf meal. The albumin increased significantly ($p < 0.05$) with cockerels T_4 and T_5 having the value of 2.60g/dl and 2.61g/dl respectively while birds on the control (T_1) and those on T_6 (150ml FPLE/l) recorded the least values of 2.17g/dl and 2.22g/dl, respectively. The higher value for albumin in birds on TOLE treatments corroborates with the findings of Nworgu *et al.* (2007) who reported an increase in the albumin as the level of TOLE increased when compared with the control. However, Fasuyi and Nonyerem (2007) did not obtain any significant difference in the total protein, albumin, globulin and albumin/globulin ratio for all birds offered *Telfairia occidentalis* leaf meal diets while Adedapo *et al.* (2008) reported a decrease in the albumin level for rats on aqueous extract of *T. occidentalis* leaves. The globulins are important fractions of the serum proteins that are involved in various immunological responses (Murray *et al.*, 1988) and it increases as the level of the TOLE increased in the treatments. The higher value of globulin for birds on T_6 could be as a result of possible accumulation of anti-nutritional factors at higher dose of extract which can increase globulin protein while decreasing albumin leaving the total serum protein values within the normal range even though a problem exists (Coles, 1986). The result corroborates with the findings of Adedapo *et al.* (2008) who reported an increase in globulin when rats were administered aqueous extract of *T. occidentalis* leaves. Nworgu *et al*. (2007) also reported lower globulin values for broilers on fluted pumpkin leaves extract treatment.

For the serum enzyme activities, AST was not significantly ($p > 0.05$) different among treatments but ALT was significantly

($p < 0.05$) influenced by the treatments. The value of the ALT increased as the level of TOLE administration increases. The observation was in line with the findings of Adedapo *et al*. (2008) when aqueous extract of the leaf was administered to rats, however, they also observed a significant increase in the AST. Iweala and Obioda (2009) did not observe any significant changes in the values of the AST and ALT in *Telfairia occidentalis* supplemented diet in rat. There was significant ($p < 0.05$) increase in the creatinine levels of birds, although this did not follow any particular trend. Creatinine is one of the useful test used to predict renal injury (Bush 1991) therefore, any abnormal rise in the creatinine level suggests abnormality in the kidney. Adedapo *et al.* (2008), observed an increase in creatinine level of rat served aqueous extract of *T. occidentalis* while Alabi *et al.* (2008) reported no significant changes in the creatinine levels of broilers served *T. occidentalis* leaf extract. Values obtained for creatinine in this study is within the range of values reported by Mitruka and Rawnsley (1981) for a normal healthy male chicken. The levels of cholesterol and triglyceride in this study were not statistically different ($p > 0.05$) across treatments. This was contrary to the findings of Adaramoye *et al*. (2007) who reported that *Telfairia occidentalis* leaves has hypolipodermic effect on rat and may be a useful therapy in hypercholesterolemia.

Table 4: Serum biochemical parameters of cockerel chicks served *T. occidentalis* leaf extract

Treatments	**T1**	**T2**	**T3**	**T4**	**T5**	**T6**	**SEM**
Levels of TOLE (ml/l)	**0**	**30**	**60**	**90**	**120**	**150**	
Parameters							
Total protein (g/dL)	4.15^{c}	4.23^{c}	4.73^{b}	5.07^{a}	4.98^{a}	4.74^{b}	0.02
Albumin (g/dL)	2.17^{c}	2.26^{bc}	2.39^{b}	2.60^{a}	2.61^{a}	2.22^{c}	0.02
Globulin (g/dL)	1.97^{c}	2.00^{c}	2.28^{b}	2.47^{a}	2.37^{ab}	2.53^{a}	0.02
Albumin: Globulin	1.10^{ab}	1.12^{ab}	1.39^{a}	1.11^{ab}	1.12^{ab}	0.88^{b}	0.04
AST (i.u/L)	11.700	114.30	116.57	109.37	110.43	112.16	3.86
ALT (i.u/L)	22.41^{e}	23.41^{de}	23.81^{d}	25.15^{c}	26.35^{b}	28.83^{a}	0.11
Creatinine (g/dL)	1.50^{ab}	1.63^{a}	1.63^{a}	1.47^{ab}	1.20^{b}	1.40^{ab}	0.03
Cholesterol (mg/dL)	149.86	152.20	155.72	152.32	146.02	136.81	2.53
Triglycerides (mg/dL)	183.16	185.92	165.71	196.41	146.75	183.07	5.09

$^{a-e}$Means along the same rows with different superscripts are significantly ($p < 0.05$) different
A.G = Albumin/Globulin ratio, AST = Aspartate amino transferase, ALT = Alanine amino transferase; SEM = Standard Error of Mean.

CONCLUSION

- Serving up to 90ml/litre aqueous extract of *Telfairia occidentalis* improved weight gain, feed intake, haematological and serum biochemical parameters without any significant adverse effect on the blood profile of cockerel chicks.

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