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Responses of Broiler Chickens Fed Varying Levels of Dietary Telfaira Occidentalis Leaf (Pumkin Leaf) as Feed Supplement

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ABSTRACT

A Total of one hundred and twenty broiler chickens at five weeks old were used in an experiment to determine the responses of broiler chickens fed varying levels (0,5,10, 15%) of dietary supplement of *Telfaira occidentalis* leaf (pumpkin leaf) meal. The experiment was laid out in a completely randomized design having four treatment groups and each treatment group was replicated thrice with each replicate having a total of ten birds. Birds were fed and watered *ad libitum* and the study lasted for 28 days. Results obtained showed that daily body weight gain (g) were significantly ($p<0.05$) influenced by 10 and 15% experimental diets supplementation, having depressed body weight gain compare with 5% level of supplementation and the control diets that were similar in terms of body weight gain. Feed conversion ration were similar in all the experimental groups, however, mortality was highest in the control group. No significant differences ($p>0.05$) were observed for the groups with respect to all the internal organs measured, with the exception of the small and large intestine. The longest small intestine (which was thus significant, ($p<0.05$) were recorded in the 10 and 15% group when compares with the control and 5% treatment groups. Similarly, the large intestine was significantly ($p<0.05$) longer in all the test diet supplemented with *T. occidentalis* leaf meal. Haematological parameters assessed shows that significant ($p<0.05$) difference existed in Parked Cell Volume (PCV%), mean corpsular haemoglobin (MCH p g^{-1}) and Mean Corpuscular Haemoglobin Concentration, (MCHC g dL^{-1}). The lowest values were observed in the control group which was significantly ($p<0.05$) lower compare with those broiler chicken offered *T. occidentalis* leaf meal. It was concluded that 5% level of dietary supplementation with sun dried *T. occidentalis* leaf meal gave the best result.

Key words: Telfaira Occidentalis, pumkin leaf, feed supplement, haematological parameters

INTRODUCTION

Over the years broiler chicken have been selected and genetically improved to grow fast and this condition of fattening of birds is sometimes really stressful resulting in impaired performance. Therefore, for a long time antibiotics have been supplemented to animal diets to allow animals to cope better with harsh conditions. The increase in resistance to antibiotics both in humans and animals were ascribed partly to the feeding of growth promoting antibiotics which are consumed indirectly by man as a result of the residual effect in animals administered these drugs. This led to the ban of antibiotics in animal diets in the European Union in 2006. Meanwhile, more states are considering the ban of these drugs in animal nutrition (Grashorn, 2010).

In Nigeria and many other tropical and subtropical countries, there abound many plants that have found widespread acceptance and utilization scientifically as a way of improving the health status and performance of animals (Onu, 2012). In recent years, there has been particular interest

in the antioxidant ability and benefit of phytochemicals in vegetables and other tropical plant feed ingredients which have been used for a large range of purpose including nutrition, medicine, flavouring, amongst other industrial uses (Oboh, 2005).

Since pre-historical time, vegetables and herbs have been the basis of nearly all medicinal therapy until synthetic drugs were developed in the 19th century (Zheng and Wang, 2001). However, of recent increasing emphasis is now being placed on the uses of natural drugs.

Supplementing diet with vitamins C and E, Zinc and Selenium can help protect animals from free radical damages to some internal organs. Recently, conventional medicine pursues a more integrated approach to managing disease(s) and promoting growth. Natural products are being revisited and evaluated for their health and growth promoting effects as well as reduction of free radicals in the body system. Many vegetables contain health promoting constituents that are essential to preventing diseases and maintaining a state of well-being (Appel *et al*., 1997).

These vegetables and herbs contain phytochemicals, which possess significant antioxidant capabilities to lessen the toxic load (Oxidative stress) in animals by aggressively binding to various harmful substances including heavy metals. The use of these vegetables along with other herbs is still increasingly being examined because of the numerous phytochemicals in addition to antioxidant present in them (Oboh and Akindahunsi, 2004).

Telfaira ocidentalis leaves are popularly consumed in many homes in Nigeria as a result of the various medicinal potentials ascribed to the plant. Preliminary investigation by Oboh (2005) revealed that the leaf of this plant is very rich in phytochemicals and antioxidant activity e.g., phenols and ascorbic acid. Many phenolics, such as flavonoids, have antioxidant capacities that are much stronger than those of vitamins C and E. Favonols and flavones are falavonoids of particular importance because they have been found to possess antioxidant and free radicals scavenging activity in the feeds and some research evidence has shown that flavonoids could protect cell membrane lipids from oxidative damage (Amic *et al*., 2003).

Apart from the antioxidant properties of this plant (*T. occidentalis*) and it leaves; its uses locally in the treatments of some ailment such as leukemia, convulsion and anaemia have been reported by Omoregie and Osagie (2002). As a result, there has been increased consumption of the leaves or its water extract amongst anaemic and pregnant human with claims that it increases the blood volume and potency.

This study therefore was designed to evaluate ways of mitigating anticipated stress in broiler chicken as a result of the fast growth rate expected from these broiler chickens using sun dried *T. occidentalis* leaves at varying levels of supplementation in broiler chicken finisher diet.
The main objectives of this research therefore are:

- To assess growth performance of broiler chickens finisher fed varying levels of sundried *Telfairia occidentalis* leaves as dietary feed supplemented
- To assess the effect of this treatments on the length of small intestine, large intestine and other internal organs such as liver, heart and kidney
- And to evaluate the hemaetological response of the birds to the experiment diets

MATERIALS AND METHODS

This experiment was conducted in a commercial poultry farm situated in Benin City, Edo State, Nigeria that lies between latitude 5° 45'-7°N and longitude 5°-6°52'E, located in the rainforest zone of Nigeria with an average annual rainfall of about 1500-2000 mm per annum, relative humidity of about 75% with a mean temperature of 27°C. The experiment was conducted between December, 2012 and January 2013 and lasted for 4 weeks.

Table 1: Proximate nutrient composition of broiler finisher diet used in the experiment

Nutrients	Values (%)
Crude protein	18.00
Fat and oil	6.00
Crude fibre	5.00
Calcium	1.00
Available phosphorus	0.40
Lysine	0.85
Methionine	0.35
Salt	0.30

Metabolizable energy, 2900 Kcal, Source: Top feed broiler finisher

Table 2: Proximate composition of *Telfaira occidentalis* leaves

Nutrients	Conc. (g 100 g^{-1} fresh wt)
Moisture	8.46±0.03
Total ash	7.36±0.10
Crude protein	3.15±0.16
Crude fat	3.36±0.13
Crude carbohydrates	3.69±0.02
Fibre	1.46±0.02
Minerals	Conc. (mg kg^{-1} dry wt)
Sodium (Na^{+})	0.27±0.03
Potassium K^{+})	0.06±0.01
Calcium (Ca^{2+})	22.45±1.15
Magnesium Mg^{2+})	0.21±0.04
Iron (Fe^{2+})	1.59±0.05

Values are expressed as mean values±SEM, Source: Omoregie and Osagie (2002)

Preparation of pumpkin leaves (T*elfaira occidentalis*) meals and its inclusion in the experimental diets: Freshly harvested *T. occidentalis* leaves were separated from the stem, washed with clean water, drained, chopped with sharp kitchen knives and sun dried (30-35°C) for seven days. The dried leaves were then milled into powder form and stored in jute bag.

The Powdered Pumpkin Leaf Meal (PPLM) was then used to mix a commercially prepared broiler finisher diets purchased from Top Feeds Nigeria Plc (a subsidiary of life flower a multi-national company in Nigeria) at varying levels of dietary supplementation. The varying levels of experimental diets supplementation were as follows:

Treatment 1: 0% level of inclusion (Control treatment)
Treatment 2: 5% level of inclusion of PPLM
Treatment 3: 10% level of inclusion and
Treatment 4: 15% level of inclusion

The proximate chemical composition of feeds and leaves used in the experiment are as shown in Table 1 and 2, respectively.

Experimental design and management of birds: A total of 120 broiler chickens of mixed sex, at 5 weeks of age were used for this experiment. Each treatment was allotted 30 birds per treatment such that there were 10 birds per replicate, thus having three replicate per treatment.

The experiment was therefore laid out in completely randomized design. Each treatment groups of broiler chickens were housed in raised cage measuring 1.25×1.35 m, thereby providing a floor space of about 0.17 m square per bird.

The birds were fed and watered *ad libitium*, however, the quantity of feeds offered everyday was measured and left over was also measured the following morning (08.00 hr) before cleaning the feeder and watering trough. The difference between feed offered and feed left over were recorded daily to compute total feed intake by each experimental treatment group.

All other management practices applicable to broilers production (Oluyemi and Vofet, 2007) were strictly adhered to in the course of the experiments. Weekly body weight changes were recorded, with mortality if any recorded too, on daily basis.

At the end of the experiment that lasted for 4 weeks, 3 birds per treatment were isolated and fasted overnight for blood sample collection and thereafter slaughtered for measurement of dressed internal organ weight and intestinal length.

Blood sample collection and analysis: Blood samples were collected from three over-night fasted broiler chickens per treatment using syringe and needle through the wing vein. Samples were collected into a set of sterilized tubes containing Ethylene Diamin Tetra-acetic Acid (EDTA) labeled bottles as anti-coagulant, for the analysis of haemotological parameters.

Packed Cell Volume (PCV), Red Blood Cell count (RBC), White Blood Cell count (WBC) and Haemoglobin (HB) were determined using improved neubaur haemycytometer after dilution and cyanomethamoglobin methods respectively as described by Dacie and Lewis (1991). Mean Corpuscular Volume (MCV), Mean Corpuscular Haemoglobin (MCH) and Mean Corpusular Haemoglobin Concentration (MCHC) were determine by the method of Hyduke (1995).

Statistical analysis: Data generated were subjected to a one way Analysis of Variance (ANOVA) and treatment means were compared using Duncan's Multiple Range Test as outline by Steel and Torrie (1990) with the aid of SAS (1997) package.

RESULTS

Results on performances of broiler finisher fed varying levels of sun dried *T. occidentalis* leaf meal as dietary supplements (Table3) reveals that the average daily body weight gain as computed from the differences between average final body weight gain and the average initial body weight of birds were significantly influenced by the test diet, as birds on the Control diet (Treatment 1) and those in Treatment 2 gave significantly ($p<0.05$) higher body weight gains compared to Treatments 3 and 4.

Table 3: Performance of broiler finisher chicken fed varying levels of sun dried *T. occidentali* leaf meal as dietary supplement

	Treatment			
Parameter	1 (0%)	2 (5%)	3 (10%)	4 (15%)
Average Initial b.wt (kg)	1.83±0.53^a	1.84±0.50^a	1.8±0.590^a	1.78±0.91^a
Average final b.wt (kg)	2.70±0.15^a	2.72±0.55^a	2.56±0.20^b	2.53±0.70^b
Average daily wt gain (g bird^{-1})	31.07±1.98^a	31.42±2.05^a	25.71±1.78^b	26.79±1.58^b
Average daily feed intake (g bird^{-1})	104.44±0.35^a	106.56±58.0^a	103.78±45.0^a	101.31±0.58^b
Feed Conversion Ratio (FCR)	3.36±0.85^a	3.39±0.45^a	3.91±0.56^a	3.78±0.55^a

a,b: Same row with different superscript are significantly ($p<0.05$) different, ±SEM: Standard error of mean

Table 4: Heamatological responses of broiler finisher chicken fed varying levels of sun dried *T. occidentali* leaf meal as dietary supplement

	Treatment			
Parameters	1(0%)	2 (5%)	3 (10%)	4 (15%)
PCV (%)	36.80±1.23^{b}	38.7±1.100^{a}	39.7±2.150^{a}	35.5±2.250^{b}
Hb (dL)	12.00±0.45^{a}	13.7±0.650^{a}	12.7±0.550^{a}	11.2±0.750^{a}
Red blood cell ($\times10^{6}$ mm)	6.45±0.25^{a}	6.67±0.27^{a}	6.54±0.27^{a}	6.64±0.24^{a}
MCH (pg)	30.26±2.37^{b}	35.63±3.05^{a}	34.23±3.45^{a}	35.45±2.85^{a}
MCHC (g dL^{-1})	31.55±4.58^{b}	36.45±3.40^{a}	32.23±2.85^{a}	34.24±2.49^{a}
MCV (fL)	51.55±4.58^{a}	52.35±5.68^{a}	51.68±5.65^{a}	54.22±5.55^{a}
White blood cell ($\times10^{6}$mm)	7.86±0.45^{a}	8.37±0.84^{a}	8.29±0.52^{a}	6.96±0.44^{b}

a,b: Same row with different superscript are significantly ($p<0.05$) different, ±SEM: Standard error of mean

Table 5: Digestive tract morphology and some internal organ weight of broiler chicken feed varying levels of sun dried *T. occidentalis* leaf meal as dietary supplement

	Treatment			
Parameters	1 (0%)	2 (5%)	3 (10%)	4 (15%)
Small intestine (cm)	155.00±11.0^{b}	163.00±10.0^{b}	188.00±11.5^{a}	186.00±10.75^{a}
Large intestine (cm)	6.60±5.20^{b}	11.50±5.50^{a}	12.50±1.50^{a}	10.25±1.750^{a}
**Gizzard (%)	1.95±0.03^{b}	2.20±0.05^{a}	2.35±0.08^{a}	2.40±0.100^{a}
**Heart (%)	0.42±0.50^{a}	0.45±0.12^{b}	0.46±0.11^{a}	0.48±40.08^{a}
**Kidney (%)	0.48±0.13^{a}	0.46±0.12^{a}	0.49±0.11^{a}	0.48±0.090^{a}
**Liver (%)	1.75±0.25^{a}	1.72±0.30^{a}	1.78±0.28^{a}	1.76±0.220^{a}
**Lungs (%)	1.05±0.06^{a}	1.07±0.08^{a}	0.98±0.05^{a}	1.05±0.070^{a}
**Pancreas (%)	0.35±0.03^{a}	0.38±0.02^{a}	0.39±0.05^{a}	0.36±0.040^{a}

**Organs weight expressed as percentage of live weight of chickens, a,b: Same row with different superscript are significantly ($p<0.05$) different, ±SEM: Standard error of mean

Although, the values for feed conversion ratio in all the treatment were not significantly ($p>0.05$) different, it shows that they were higher in all the test diets (5, 10 and 15%) in which sun dried *T. occidentalis* leaf meal was included as dietary supplements. The highest mortality was also observed in the treatment 1 (Control), compared with other Treatment groups.

The various haematological values of broiler finisher fed sun dried *T. occidentalis* leaf meal as dietary supplements as shown in Table 4 reveals that packed cell volume (PVC%), mean corpuscular haemoglobin (MCH pg) and mean corpuscular haemoglobin concentration (MCHC g dL^{-1}) were significantly ($p<0.05$) higher in all the treatment groups offered leaf meal supplemental diet. Whereas, haemoglobin concentration Hb (g dL^{-1}), Red Blood Cell ($\times10^{6}$ mm^{3}), mean corpuscular volume (MCV f1) and White Blood Cell ($\times10^{6}$ mm^{3}) were not significantly influenced by the treatments.

Results on digestive tract morphology and some internal organ weight of broiler fed varying levels of sun dried *T. occidentalis* leaf meal as dietary supplement as shown Table 5 revealed that the small intestinal length becomes progressively longer as the leaf meal inclusion increases in the test diet and were significantly ($p<0.05$) longer in treatment 3 and 4 compared to Treatment 1 and 2. The large intestine was significantly ($p<0.05$) shorter only in the Control group when compared with other broiler chickens on supplementary diets (5, 10 and 15%).

Similarly, the size of the gizzard as express in percentage live body weight of birds reveals that Treatment 1 had significantly ($p<0.05$) lower value. Other internal organs, such as the heart,

kidney, liver, lungs and pancreas were not significantly ($p>0.05$) different in all the treatment groups, when the internal organs were expressed as percentage of live body weight of broiler finisher.

DISCUSSION

The significantly higher ($p<0.05$) body weight observed in birds on Treatments 1 and 2 may be due to available protein and metabolizable energy in their diet since increasing leaf meal supplementation in the diet of broiler finisher as observed in Treatment 3 and 4 would have decreased available energy and protein in their diets. Similar differences have been observed by Nworgu *et al.* (2007) when broiler chickens were served with heat treated pumpkin leaves extract supplement. Furthermore, increasing pumpkin leaf in the diet of broiler would have lead to increase fibre levels in their diets and according to Bray (1988) such high fibre in diets could lead to lose stool and incipient diarrhea. It could also mean optimum levels of utilized nutrient from supplements, while also reducing the bioavailability of a number of minerals in the diet.

This go to show that the level of inclusion of pumpkin leaf meal in the diet of broiler must be guided by the level of the leaf meal to be offered and in this study five percent level of supplementation seems to give better performance of broiler chickens in terms of average body weight gain and the overall feed intake (Table 3).

The result shows that those broiler finisher offered pumpkin leaf meal supplement at 5% level of inclusion compared favourably with the Control. Whereas, broiler chickens on 10 and 15% levels of supplementation with *T. occidentalis* gave significantly ($p<0.05$) depressed body weight gain. This observation agrees with that reported by Khajarem *et al.* (1997) when *Veronia amaygdalina* leaf meal was used as carotenoid in diet of layers, they observed that 5% level of inclusion gave better results compared to other levels of dietary inclusion.

Onu (2012) observed that there were significant ($p<0.05$) differences in feed conversion ratio and body weight gain when aqueous extract of pumpkin leaf was fed to broiler starter, this observation partially disagreed with this current study as no significant different ($p>0.05$) was observed in feed conversion ratio but only in body weight gain. This difference could be due to differences in processing of the pumpkin leaf meal offered to the broiler as well as the age of broiler, season of production, ecological region amongst others.

To further buttress the importance of leaf meal in the diet of broiler finisher, result from this study shows that mortality was highest in the control group that were not offered any leaf meal. Leaf meal apart from serving the purpose of food may also serve as medicine as their photochemical properties could impact some medicinal value in the diets of animals (Grashorn, 2010).

The observed differences in the digestive tract morphology as shown in Table 4, reveal that the small intestinal length (cm) were reduced in the control group and this may be due to the higher fibre content in the diets of broiler in Treatments 3 and 4 since absorption of nutrients take place in the small intestine, it tends to become longer when animals are fed high fibre diet (Uni *et al*., 1999), this is to allow longer surface area of the intestinal wall for nutrient absorption.

Since animal cannot go beyond their natural limit, the amont of the febre utilization by broiler birds have been well documented and the implications of such high fibrous feed in poultry are reduced body weight gain, poor nutrient utilization, loose stool and incipient diarrhea (Abiola and Tewe, 1992; Abiola and Adekunle, 2002; Bray, 1988). Similarly, the significantly decreased large intestinal length in the Control diet may also be accounted for by the low fibre content in their diets.

All the internal organ weights (in relation to life weight of birds) as presented in Table 4, reveals that no significant ($p>0.05$) differences exist in all the internal organs except in the gizzard that was significantly ($p<0.05$) lower in treatment 1 compared to other treatment groups. This was expected since the gizzard was the only organ closely associated with the digestive tract in broilers. This finding agrees with previous study by Uni and Ferket (2004) when they reported that cells of various organs of digestive tract morphology tend to proliferate as they are more actively used during the early stage of growth.

Haemotological responses of broiler finishers as shown in Table 5 reveals that all animals were in good health state since all blood parameters were within normal range reported by several other authors (Imasuen and Gene, 2008; Banerjee, 2008; Onu, 2012). The observed differences in parked cell volume, mean corpsular harmoglobin and mean corpsular haemoglobin concentration may be due to slight difference in the individual birds and not as a result of Dietary Treatments. This trend can be buttress by the fact that the formed element of blood component cannot be easily altered by nutrition but by disease and genetic makeup of individual animals (Frandson *et al*., 2009).

CONCLUSION

The use of sundried pumpkin leaf meal as supplementary diet informed this study and result shows that the leaf meal should not exceed 5% level of inclusion in the diets of broiler finisher as any increase above this level may lead to depressed growth performance. It was also observed that the method of processing may influence the level of inclusion of pumpkin leaf in the diets of broiler chickens.

Furthermore, the use of pumpkin leaf as photochemical in the feeds of birds should be further investigated as mortality rate in this experiment shows that inclusion of pumpkin leaf meal in diet of broiler chickens may have some advantageous effect on birds, since mortality was not recorded in all the groups of birds fed pumpkin leaf meal supplemented diet.

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