GROWTH PERFORMANCE AND NUTRIENT DIGESTIBILITY OF FINISHER BROILER CHICKENS FED PEPER FRUIT (*Denettia tripelata*) LEAF MEAL AS FEED ADDITIVE

Essien, C. A., Sam, I. M. and Okon, U. M.
Department of Animal Science, Akwa Ibom State University, Obio Akpa Campus,
Akwa Ibom State, Nigeria.
Corresponding author: comfortabelessien@gmail.com

Abstract
This study was designed to determine the growth performance and nutrient digestibility of finisher broiler chickens fed *Denettia tripelata* leaf meal as feed additive. Two Hundred broiler chickens were used for the experiment. Four experimental diets were formulated and labeled T_1, T_2, T_3 and T_4. T_1 (control) had no *Denettia tripelata* leaf meal while T_2, T_3 and T_4 contain *Denettia tripelata* leaf meal at 100g, 200g and 300g/100kg feed respectively. The birds were divided into four groups of fifty birds and each group was assigned one treatment diet in a completely randomized design (CRD). Each group was sub-divided into five (5) replicates of 10 birds each. Feed and water were supplied *ad libitum* and data collected were analyzed. The result showed significant ($P<0.05$) differences in the final weight and body weight gain of the birds. T_4 had the highest significant ($P<0.05$) final weight and body weight gain values followed by T_3. The feed intake and feed conversion ratio of the birds were statistically similar ($P>0.05$) across the treatments. Significant differences ($P<0.05$) were observed in nutrient digestibility of the birds. Significant ($P<0.05$) differences were also observed in crude protein, crude fibre, Ash and ether extract values. It was concluded that *D. tripelata* leaf meal could be added to broiler diet at 300g/100kg feed without deleterious effect on the growth performance and nutrient digestibility of the birds.
Keywords: Broilers, nutrient digestibility, performance, final weight, *Denettia tripelata*

INTRODUCTION

Broilers are known for rapid growth which is a feature cherish by humans in order to satisfy the increasing demand for animal protein. Feed additives especially antibiotics growth promoter (AGP) has been used extensively in broiler production to achieved this purpose. Although birds raised with these feed additives achieved good performance but the massive use of antibiotics for growth promotion, disease prevention in animal nutrition has been implicated in the emergence of microbial drug resistance in animal products which cause public health concerns and hazards (Ndelekwute *et al.*, 2014) and these had led to their ban in animal feed by European Union (EU) and United State Department of Agriculture (USDA). Therefore the search for natural feed additives to replaced growth promoting antibiotics is on the increase. Spices and herbal products have been found to be useful to man because of their nutritional and medicinal properties (Czarra, 2009). Spice and herbal products are known to improve food palatability through their aroma, improve digestion by enhancing endogenous digestive enzyme secretion (Zang *et al*., 2009) and with minimal or no residue in their products when fed to livestock. Herb and spices are derived from plants and are made available in these forms; leaves, root, nut, bulb, seeds and fruits. The leaf of *Denettia tripelata* (pepper fruit) seems to have potentials to be among the league of these feed additives. The plant is mostly found in the Southern part of Nigeria. Okwu and Morah (2004) reported that it is rich in minerals, vitamins and other bioactive compounds. The fruit and leaves has a peppery and spicy taste when chewed and is used traditionally as remedy for cough, fever, toothache, diabetes and nausea in humans. The positive effect of *Denettia tripelata* on humans could qualify it as an alternative growth promoter to synthetic antibiotics in broiler diets. Thus this study was conducted to determine the growth performance and nutrient digestibility of finisher broiler chickens fed *Denettia tripelata* leaf meal as feed additive.

MATERIALS AND METHODS

Experimental site

The experiment was carried out at the Poultry Teaching and Research Unit of the Department of Animal Science Akwa Ibom State University, Obio Akpa Campus. Obio Akpa is situated between latitudes $5^0$17'N ad $5^0$27'N and between longitude 7^0 27'E and $7^0$58'E (SLUS-AK, 1994).

Source and preparation of experimental materials

The leaves of *Denettia tripelata* used in this trial were harvested from Akwa Ibom State University and its environs. The Stalk were removed and the leaves chopped to facilitate sun drying for 5 days until they become crispy while still retaining it greenish colouration. The dried leaves were milled to produce *Denettia tripelata* leaf meal (DTLM).

Experimental Diets

Four broiler finisher diets were formulated and labeled T_1, T_2, T_3 and T_4. *T_1* the control had no *Denettia tripelata* leaf meal while T_2, T_3 and T_4. Contained 100, 200 and 300g *Denettia tripelata* leaf meal per 100kg feed respectively. The diets were formulated to meet the nutrient requirements for poultry as recommended by NRC (1994). Ingredient and nutrient composition of the experimental diet is presented in Table 1.

Table 1: Ingredient and calculated nutrient composition of the experimental diets (%)

Ingredients	T_1 0gTLM	T_2 100gDTLM	T_3 200gDTLM	T_4 300gDTLM
Maize	55.00	55.00	55.00	55.00
Soya bean	30.00	30.00	30.00	30.00
Fish meal	3.00	3.00	3.00	3.00
Palm kernel cake	7.00	7.00	7.00	7.00
Bone meal	4.00	4.00	4.00	4.00
Premix*	0.25	0.25	0.25	0.25
Common Salt	0.25	0.25	0.25	0.25
L-lysine	0.25	0.25	0.25	0.25
L-methonine	0.25	0.25	0.25	0.25
Total	100.00	100.00	100.00	100.00
Calculated analysis				
Crude protein (%)	21.43	21.43	21.43	21.43
ME(Kcal/kg)	2977.41	2977.4	2977.4	2977.4

* Vitamin-mineral premix provided per kg the following: Vit. A 1500 IU; Vit.D_3 3000 IU; Vit. E 30 IU; Vit. K 2.5mg; Thiamine B_1 3mg; Riboflavin B_2 6 mg; Pyridoxine B_6 4 mg; Niacin 40 mg; Vit. B_{12} 0.0 mg; Pantothenic acid 10 mg. DTLM = *Denettia tripelata* Leaf Meal

MANAGEMENT OF EXPERIMENTAL BIRDS

Two hundred day old (Abor acre) broiler birds were purchased from a local hatchery and used for the experiment. The broilers were brood for three weeks and fed *Denettia tripelata* leaf meal free commercial starter diet. At 35 – days of age, the birds were weighed and divided into four groups of 50 birds each and each group was randomly assigned one of the four treatment diet using completely Randomized Design (CRD). Each group was further divided into 5 replicates of 10 birds and housed in a pen measuring 2m x 2m. Wood shavings were used as litter material feed and water were provided *ad-libitum*. All necessary prophylactic medications and vaccinations were also provided. The birds were weighed weekly thereafter, feed intake were recorded over the period of the experiment.

Nutrient Digestibility Trial

At the end of the feeding trial (63-day), two birds were randomly selected from each replicate and kept in a constructed metabolic cage. The birds were fed a known quantity of feed after allowing three days of acclimatization, followed by five days total faecal collection from each replicate. Faecal droppings were collected for each day from the aluminum tray placed under each of the cage cells. The faeces were weighed and oven dried at 85^0C until a constant weight was obtained. At the end of the collection period dropping from each replicate of the same treatment were bulked, milled and representative sample was taken for proximate analysis. Digestibility was calculated using the formula;

Digestibility (g/g) = $\frac{\text{Nutrient in feed – Nutrient in faeces x 100}}{\text{Nutrient in feed}}$

Statistical Analysis

All data collected on growth performance and nutrient digestibility were subjected to One-way analysis of variance (ANOVA) using SAS Version 9.2 (SAS, 2015). Where means were significantly different at 5% ($P<0.05$), they were separated using Duncan's Multiple Range Test.

RESULTS AND DISCUSSION

The result of the performance of finisher broilers fed *D. tripetala* leaf meal is presented in Table 2. Significant difference ($P<0.05$) existed in the final weight and body weight gain of the birds. Birds in T_4 recorded the highest significant ($P<0.05$) final weight and body weight gain values followed by T_3 which was significantly ($P<0.05$) higher than T_2 and T_1. T_1 recorded the least value for the two parameters. The result obtained in the present study showed that the birds were able to utilize the nutrients in the feed efficiently. The result tends to highlight the functions of herbs and spices which promote digestion by creating a favourable environment for nutrient digestion absorption and utilization. This result agrees with the report of Essien and Udoh (2021) where significant increase was observed with broilers fed *Ocimum gratissimum* leaf meal. The feed intake of birds in this study were statistically similar ($P>0.05$) across the treatments. T_4 had the best and the lowest feed conversion ratio followed by T_3.

Table 2: Performance of broiler finisher fed varying levels of *Denettia tripetala* leaf meal

Parameters	T_1 0%DTLM	T_2 100gDTLM	T_3 200gDTLM	T_4 300gDTLM	SEM
Initial body weight (g)	931.00	928.21	930.43	929.11	0.12
Final body weight (g)	2341.42^{c}	2386.14^{c}	2587.11^{b}	2713.4^{a}	2.51
Body weight gain (g)	$1.410.42^{c}$	1457.93^{c}	1656.68^{b}	1784.10^{a}	3.14
Daily weight gain (g/day)	50.37	52.07^{c}	59.16^{b}	63.71^{a}	0.21
Feed Intake	130.11	130.21	128.11	126.35	0.15
Feed conversion ratio	2.58	2.50	2.17	1.98	0.03
Mortality	0.00	0.00	0.00	0.00	0.00

abc – means on the same row with different superscript are significantly different (P<0.05)

The result of the nutrient digestibility of broilers chickens fed *D. tripetala* leaf meal is presented in Table 3. Significant difference ($P<0.05$) were observed in the result of nutrient digestibility. All the levels of *D. tripetala* leaf meal improved crude, fibre and ash. This result revealed that as the levels of *D. tripetala* leaf meal increase in the diet, nutrient digestibility also increases. The result agree with the reports of Leekwe *et al.* (2003) and Essien (2021), that spices could be used to aid digestion in monogastric animals. Ejechi and Akpomedaye (2005) also suggested that oil and phenolic extracts of *D. tripelata* fruit can inhibit growth of micro-organisms in the gut thereby improving nutrient digestibility.

Table 3: Effect of *Denettia tripetala* leaf meal on nutrient digestibility of finisher broiler chickens

Parameters (%)	T_1 0%DTLM	T_2 100gDTLM	T_3 200gDTLM	T_4 300gDTLM	SEM
Dry matter	90.73	90.85	90.76	91.51	0.03
Crude protein	70.40^{c}	82.31^{b}	85.53^{a}	87.15^{a}	1.10
Ether extract	65.71^{d}	74.81^{c}	80.12^{b}	83.38^{a}	1.23
Crude fibre	60.51^{d}	68.11^{c}	70.71^{b}	75.80^{a}	1.41
Ash	70.61^{d}	75.72^{c}	84.51^{b}	86.39^{a}	1.03

abc – means on the same row bearing different superscript are significantly different (P<0.05). DTLM – Denettia tripetala leaf meal

CONCLUSION

The study showed that *D. tripetala* leaf meal could be incorporated in broiler chicken diets at 200g/100kg feed without deleterious effect.

REFERENCES

AOAC (1995). Official method of analysis 15th Edition. Association of official analytical chemists Washington, DC. P 68 – 69.

Czarra, F. (2009). *Spices*: a global history reaction Books, London.

Essien, C. A. (2021). Effects of *tetrapleura tetraptera* on performance, carcass characteristics and organ indices of broiler chickens. *Animal Research International*, 18 (2): 4134 – 4144.

Essien, C. A. and Udoh, V. S. (2021). Efficacy of *Ocimum gratissium* leaf meal on growth performance carcass characteristics and blood profiles of broiler chickens. *Journal of Animal Science and Veterinary Medicine*, 6(4):135 – 143.

Ejechi, B. O., Akpomedaye, D. E. (2005) Activity of essential oil and phenolic acid extracts of pepper fruit against some food borne micro-organisms. *Afri. J. Biochem*. 4(3) 258 – 261.

Lee, K. W. Evertse, H. and Kappert, H. J. (2003) Dietary Carvarol lowers body weight gain but improves feed conversion ratio in female broiler chickens. *J. Applied Poult. Res*. 12 (4) 394 – 398.

National Research Council (1994). National Requirement of Poultry 9th. Revised Edition. National Research Council. National Academy of Science, Washington, Dc. P. 176.

Ndelekwute, E. K., Okonkwo, A. C., Umoh, B. I, and Nwokoro, C. (2014). Growth performance and economic returns of Broiler Chickens feed with acetic-acid treated diets at finisher phase. *Nigerian Journal of Agriculture Food and Environment.*

Okwu, D. E. and Morah, F. N. (2004). Mineral and Nutritive value of *Denettia tripelata* fruits.

SAS (2013). Statistical Analysis System institute. Statistical Analysis user's guide. Version 9.2 Cary: NC

SLUS-AK (1994). Soil and Land use studies. Government Print office Uyo. Akwa Ibom State. Soil Survey Staff. Key to Soil Taxonomy, Soil Management Support Service (SMSS), Tech Monogr. No. 19. 306 p.

Zhang, G. F., Yang, Z. B., Wang, Y., Yang, W. R., Tiang, S. Z. and Gal, G. S. (2009). Effects of ginger root (*Zingiber offinale*) processed to different particle sizes on growth performance, antioxidant status, and serum metabolites of broiler chickens. *Poultry Science*, 88(10): 2159 – 2166.