

GROWTH PERFORMANCE OF STARTER BROILER CHICKENS FED DIET CONTAINING LEAF MEAL COMPOSITE AS ALTERNATIVE TO COMMERCIAL BROILER PREMIX

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ABSTRACT

This study produced composite leaf meal (CLM) from four vegetables to replace commercial premix in broiler diets. Fresh *Telfairia occidentalis*, *Vernonia amygdalina*, *Piper quinenses* and *Ipomea batata* leaves were harvested, air-dried and milled separately and were later mixed in equal proportion (ratio 1:1:1:1) into a composite meal and used to replace broiler commercial premix at 0.00 (0.25% premix), 0.125 (0.125% premix), 0.63 (0.0% premix), 0.125 (0.0% premix), 0.188 (0.0% premix) and 0.25% (0.0% premix) reduction levels of commercial premix and designated diets 1, 2, 3, 4, 5 and 6 respectively. Treatment one (T1) served as the control. One hundred and eighty broiler chickens were used in a three weeks experiment. The chicks were allocated to six dietary treatment each having thirty birds, replicated thrice with ten birds each in a Completely Randomized Design. The birds were fed formulated diet, the test material was introduced from the first day, feed and water were provided *ad libitum*. Data was obtained for analysis. The result reveals that the Average Daily Feed Intake (ADFI), Average Daily Weight Gain (ADWG), Total Feed Intake (TFI) and Final Body Weight (FBW) were all significantly ($P < 0.05$) affected by the dietary treatment. Feed Conversion Ratio (FCR) was not significantly ($P > 0.05$) different among all treatment groups including the control, although, the control was numerically lower than T2, T3 and T6 while T4 and T5 were lower than the control. In all parameters evaluated for growth performance, T4 and T2 were different from the control, though T3, T5 and T6 were not significantly ($p > 0.05$) different from the control, there were all numerically higher than the control. It can be concluded conceivably within the limit of this study that the replacement of commercial broiler premix with CLM could help to stem over dependence of broiler farmers on importation of premix.

Keywords. Broiler chicken, Leaves, Leaf Meal Composite, Premix, Growth Performance

INTRODUCTION

Vitamin-mineral premix remained an essential component of feed for broiler chicken as the gut of broilers cannot synthesize adequate vitamin and minerals (Onunkwo *et al.*, 2018). Synthetic single vitamin and minerals for producing Vitamin-mineral premix are manufactured by few companies globally. They are, therefore, expensive and subject to sporadic scarcity, which makes it imperative to seek for viable alternatives to address economic challenges faced by farmers in the rural areas of the developing world.

Vegetable-based feeds are rich source of essential plant amino acids, vitamins and minerals. Furthermore, it has been established that green vegetable leaves are the cheapest and most abundant source of proteins because of their ability to synthesize amino acids from a wide range of available primary materials such as water, carbon dioxide and atmospheric nitrogen (Agbede *et al.*, 2004; Fasuyi, 2006). Thus, in the course of world clamour for sustained food security through organic farming enhancement, the combination of *Telfairia occidentalis*, *Vernonia amygdalina*, *Piper quinenses* and *Ipomea batata* leaves could be as a replacer for the expensive commercial premix often used in poultry diets production. This thus forms the main focus of the compendium of studies reported herein. Hence, this study examined the nutritive potentials of composite leaf meal from four leaves available locally as alternative premix in broiler chicken diets.

A standard quantity and combination of composite leaf meal has not yet been accepted as an alternative to premix, information on it is scanty and still in the infancy stage hence researchers are still searching for

the right combination of leaves that could serve this purpose. On this note, *Telfairia occidentalis*, *Vernonia amygdalina*, *Piper quinenses* and *Ipomea batata* were employed in this study to evaluate the growth performance of broiler chickens when used as an alternative to vitamin-mineral premix in different proportions.

MATERIALS AND METHODS

The study was carried out at the Poultry unit of Teaching and Research Farm, Michael Okpara University of Agriculture, Umudike, Abia State. Umudike is situated on latitude 05° 21' N and longitude 07° 33' E, with an elevation of about 112m above sea level with an annual rainfall of 177 - 2,000mm (April to October) and a short period of dry season (November to March) with a relative humidity of about 50-90% and monthly temperature range of 17°C -36°C (NRCRI, 2020).

Pumpkin leaf was sourced from the Cross River Basin Abak, Akwa Ibom State while Sweet potato, Moringa and Bitter leaves were obtained within Michael Okpara University of Agriculture, Umudike premises. Each type of leaf was harvested fresh, sliced to reduce the particle size and increase the surface area for quick drying then air dried at room temperature for four days. Thereafter, it was ground to fine powder and stored in an air-tight container. For compounding the feed, equal quantity of each ground leaf was measured out and mixed thoroughly using an improvised mixer; this made up the Leaf Meal Composite (LMC) used to replace commercial premix in the diet at different levels (T1 = 0.0% CLM : 0.25% premix; T2 = 0.125% CLM : 0.125% premix; T3 = 0.63% CLM : 0.0% premix; T4 = 0.125% CLM : 0.0% premix; T5 = 0.188% CLM : 0.0% premix and T6 = 0.25% CLM : 0.0% premix). The CLM sample were mixed along with other feed ingredients used to formulate the experimental diets (Table 1). The Completely Randomized Design was used. The experiment lasted for three weeks. Standard brooding and rearing protocols were strictly adhered to, as scheduled for broiler. Feed and water were supplied *ad libitum* throughout the experimental period. Medication and vaccination were given as at when due. Daily feed consumption was recorded by subtracting the left over feed from the feed supplied. Chickens were weighed weekly and accurate records of body weight changes were taken at the beginning and end of the starter (day 1-21). The feed conversion ratio (FCR) was calculated from the values obtained from daily feed consumption and weekly weight changes.

All data generated were subjected to analysis of variance (ANOVA) and treatment means that were significantly different were separated using Duncan's Multiple Range Test (Duncan, 1955) according to Steel and Torrie (1980) using computer software IBM SPSS Statistic version 20 (SPSS, 2009).

Table 1: Gross percent composition of experimental starter broiler diet

INGREDIENTS	T1	T2	T3	T4	T5	T6
Maize	50.00	50.00	50.00	50.00	50.00	50.00
Wheat offal	1.00	1.00	1.00	1.00	1.00	1.00
PKC	10.00	10.00	10.00	10.00	10.00	10.00
Rice Bran	2.00	2.00	2.00	2.00	2.00	2.00
SBM	30.00	30.00	30.00	30.00	30.00	30.00
Fishmeal 65	3.00	3.00	3.00	3.00	3.00	3.00
Bone meal	3.00	3.00	3.20	3.15	3.1	3.00
Salt	0.25	0.25	0.25	0.25	0.25	0.25
Lysine	0.25	0.25	0.25	0.25	0.25	0.25
Methionine	0.25	0.25	0.25	0.25	0.25	0.25
Vit/Min Premix	0.25	0.125	0.00	0.00	0.00	0.00
CLM	0.00	0.125	0.063	0.125	0.188	0.25
TOTAL	100.00	100.00	100.01	100.02	100.03	100.00

*Premix supplied per kg diet: vitamin A 15,000 I.U, vitamin D3 13000 iu, thiamine 2mg, Riboflavin 6mg, pyridoxine 4mg, Niacin 40mg, cobalamine 0.05g, Biotin 0.08mg, choline chloride 0.05g, Manganese 0.096g, Zinc 0.06g, Iron 0.024g, Copper 0.006g, Iodine 0.014g, Selenium 0.24mg, Cobalt 0.024mg and Antioxidant 0.125g, NFE = Nitrogen free extract.

RESULTS AND DISCUSSION

The growth performance of broiler starter chickens fed diet containing composite leaf meal is presented in Table 2. The result reveals that the Average Daily Feed Intake (ADFI), Average Daily Weight Gain (ADWG), Total Feed Intake (TFI) and Final Body Weight (FBW) were all significantly ($P<0.05$) affected by the dietary treatment. In all the growth parameters evaluated for performance, T4 and T2 were different from the control, though T3, T5 and T6 were not significantly ($p>0.05$) different from the control, there were all numerically higher than the control.

The higher performance in T4 and T2 is indicative of the fact that both treatments had received adequate nutrients including a blend of vitamins and minerals from the composite leaf meal which influenced feed intake and resulted in higher weight gain than the control, there was a better feed utilization. Minerals and vitamins biologically available in broiler chicken diet improves feed intake, this is in tandem with the report of Oluyemi and Roberts, (2007) who found that both micro and macro elements improve feed intake in poultry. The decrease in feed intake in T3 could be due to inadequacy of vitamins, minerals and protein in the leaf meal to meet the requirement for optimal performance. Although T5 and T6 received higher quantity of composite leaf meal, there was reduced feed intake which affected its general performance, this could be as a result the birds not being able to tolerate the bitter taste of the leaf meal at high concentration which made the feed unpalatable. Increasing levels of bitter leaf (Onunkwo *et al.*, 2019) and moringa (Onunkwo and George, 2015) decreases feed intake, Ndelekwute *et al.* (2014) reported a reduced performance with increasing levels of leaf meal. The leaf meal could also have increased the fibre content of the feed which impairs efficient feed utilization. Birds here could not eat enough because of the bitter taste of the feed and the little quantity eaten could not be adequately utilized because of the high fibre. This is in support of Esonu *et al.*, 2003

Feed conversion ratio (FCR) in broiler chicken production measures the efficiency of converting feed into muscle. In this study, FCR was not significantly different among all treatment groups including the control, although, the control was numerically lower than T2, T3 and T6 while T4 and T5 were lower than the control. A lower FCR is desirable in broiler production as it indicates efficiency of production. Higher FCR in T6 shows depressed growth, T4 indicates better efficiency of feed utilization having higher live weight.

Table 2: Growth Performance of Starter Broiler Chicken Fed Composite Leaf Meal

Parameter	1	2	3	4	5	6	S.E.M
IBW	39.00	39.00	39.00	39.00	39.00	39.00	0.00
ADFI	22.69 ^a	31.61 ^b	25.16 ^a	30.89 ^b	24.89 ^b	24.56 ^a	24.69
ADWG	15.02 ^a	19.06 ^b	15.17 ^a	20.52 ^b	14.84 ^a	15.05 ^a	0.64
TFI	635.45 ^a	885.20 ^b	704.59 ^a	865.12 ^b	696.80 ^a	687.75 ^a	691.53
FBW	420.60 ^a	533.6 ^b	424.77 ^a	574.57 ^b	415.42 ^a	421.47 ^a	17.98
FCR	1.51	1.66	1.66	1.50	1.50	1.68	1.5

IBW- Initial body weight, ADFI-Average daily feed intake, ADWG-Average daily weight gain, FBW-Final body weight, FCR-Feed Conversion ratio

CONCLUSION AND RECOMMENDATION.

It can be concluded conceivably within the limit of this study that the replacement of commercial broiler premix with CLM could help to stem over dependence of broiler farmers on importation of premix. This

combination of leaf meal composite had no detrimental effect. More research is required since age of leaves before was not considered and this influences the nutrient content in leaves.

REFERENCES

- Agbede, J. O., Arimah, A. A., Adu, O. A., Olaleye, M. T. and Aletor V. A. (2011). Growth-enhancing, health impact and bacteria suppressive property of lanthanum supplementation in broiler chicken. *Archiva Zootechnica*, 4 (2): 44 – 56.
- Duncan, D.B. (1955). Multiple range and multiple F tests. *Biometrics*, 11:1-42.
- Fasuyi, A. O. (2006). Nutritional potentials of some tropical vegetable leaf meals: chemical characterization and functional properties. *African Journal of Biotechnology*. Vol. 5 (1), pp. 049-053
- Esonu, B.O.; Iheukwumere, T.C.; Emenalom, O.O.; Uchegbu, M.C. and Etuk, E.B. (2002). Performance, nutrient utilization and organ characteristics of broiler fed *Microdesmis puberula* leaf meal. *Livestock Research and Rural Development*. 14. <http://www.lrrd.org/lrrd14/6/eson146.htm> (13/03/2015).
- Ndelekwute, E. K., Ekere, P. C., Assam, E. D. and Okonkwo, A. C. (2014). Dietary Effect Of Bitter Leaf (*Vernonia Amygdalina*) Meal On Growth Performance, Carcass And Internal Organs Characteristics Of Finisher Broilers. *Journal of Animal Production Research* (2017) 29(1): 295-300
- NRCRI (2020). Agro-meterologic unit, National Root Crops Research Institute, Umudike, Umuahia, Nig
- Oluyemi, A .K., Omotuyi, O. I., Jimoh, R .O., Adesanya, A. O., Saalu, C. L., & Josiah, L. S (2007). *Biotechnol. Appl. Biochemistry* 46, 69 -72.
- Onunkwo, D. N and George, O. S. (2015). Effects of *Moringa oleifera* leaf meal on the growth performance and carcass characteristics of broiler birds. *Journal of Agricultural Veterinary Science* 8(3), 63-66.
- Onunkwo, D. N., Ugwuene, M. C., Eze, J. C. R. and Okpechi, F. C. (2018). Replacement value of palm kernel meal for maize on growth, egg quality and economic parameters of local duck hens. *Nigerian Journal of Animal Science*, 20(1):145-151.
- Onunkwo, D. N., Nathaniel, J., Ezike, J.C., Amaduruonye, W., and Daniel-Igwe, G (2019). Effect of garlic rhizome (*Allium sativum*) powder supplemented diets on the haematology and serum biochemistry of broiler birds at starter and finisher phases. *Nigerian Journal of Animal Production*, 46(1): 149-156.
- SPSS (2012). Statistical Package for Social Science, SPSS 20 for Windows. SPSS Inc. Chicago, Illinois.
- Steel, R. G. D. and Torrie, J. H. (1980). Principle and Procedures of Statistics: A Biometrical Approach