

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.

The leaves of these four plant species (*Telfairia occidentalis*, *Vernonia amygdalina*, *Piper quinense* and *Ipomea batata*) are edible and they form a part of traditional diet in many tropical and sub-tropical countries. Therefore, as the world clamor for sustained food security through organic farming and in a bid to reduce cost of feed for livestock, the combination of pumpkin leaf (*Telfairia occidentalis*), bitter leaf (*Vernonia amygdalina*) uziza leaf (*Piper quinense*) and sweet potato leaf (*Ipomea batata*) are being tested for their potential as a replacement of the expensive commercial premix often used in poultry feed production.

Production and utilization of alternative natural

vitamin-mineral premix from leaf composite in animal production will not only help poultry farmers to reduce expenses or eliminate doubtful potency of commercial vitamin–mineral premixes, but also improve the efficiency of their production as well as reduce health risk, environmental pollution and make it readily available when needed.

The use of leaf meals as a replacer for vitamin-mineral broiler premix has been tested on broiler chicken with beneficial results (Bolu and Balogun, 2003; Malik *et al.*, 2010; Oyewole *et al.*, 2013), this might significantly reduce the cost of feed, protect consumer health, enhance production and in turn reduce the cost of poultry products and assure more economic benefit to the farmer. More so, using leaf meal as alternative to vitamin-mineral premix in animal feed will partially satisfy the need for organic production in the livestock industry since there is rapid increase in demand for organic produce to curb the antimicrobial resistance arising from synthetic products.

In contribution to organic livestock farming for sustained food security globally, the combination of fluted pumpkin (*Telfairia occidentalis*), bitter leaf (*Vernonia amygdalina*), sweet potato (*Ipomoea batata*) and uziza (*Piper quinense*) leaves is tested in this study as a replacer for the commercial vitamin-mineral premix used in poultry diet formulation. These leaves provide relatively cheaper alternative to commercial vitamin-mineral premix, consequently become a boost to broiler production in the developing countries especially Nigeria where these leaves are abundant locally and at a relatively low cost.

Therefore, this study was designed to evaluate performance of broiler chickens fed diets containing composite leaf meal (CLM) as an alternative to commercial vitamin-mineral premix.

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 four 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 adequate 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.

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