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Growth Response, Carcass and Internal Organ Characteristics of Finishing Broiler Chickens Fed Anthonotha Macrophylla (African Bean) Leaf Meal

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Abstract:
The effect of Anthonotha macrophylla (African bean) leaf meal on the growth response, carcass and internal organ characteristics of finisher broiler chickens were determined in a 35-day feeding trial. Chemical analysis indicated that the leaf meal is relatively high in crude protein (23.51%). Four experimental diets were formulated containing A. macrophylla leaf meal (ALM) at 0, 5, 7.5 and 10% levels; partly replacing soyabean in the diet. One hundred and sixty broiler chickens were used in the experiment. The birds were divided into four groups and each was randomly assigned to one of the diets using completely randomized design (CRD). Each group was further replicated four times and each replicate contained 10 birds. Feed and water were provided ad libitum for the period. At day-63 four birds were randomly selected from each treatment, the birds were starved overnight, weighed and sacrificed by cutting through the jugular veins. The results showed that live weight, final weight and body weight gain of the bird were not significant (P>0.05) affected by the diets. The feed intake and feed conversion ratio of the birds were similar; the control had the best feed conversion ratio. Live weight, dressed weight and dressing percentage(s) of the slaughtered birds did not indicate significant (P>0.05) difference in their values. The internal organs of the birds were not affected by the diets and there was no observed abnormality on the organs. The results of the study therefore revealed that A. macrophylla leaf meal can successfully replace soya bean meal in broilers diet up to 10% inclusion level without adverse effect on their performance.

Keywords: *Broilers, Anthonotha macrophylla leaf meal, performance, carcass*

1. Introduction

The production of sufficient animal protein to meet the ever increasing world population has become a serious challenge to the livestock industry. Research has shown that approximately two third of the world's population subsist on poorly balanced diet that retard normal growth. The main deficiency in their diet has been shown to be animal protein (william, 1986). Animal protein constitute a sizable proportion of the protein intake of the human. Therefore, the need to develop the poultry industry in order to raise the protein intake of the ever increasing world population becomes inevitable.

Poultry industry has made effort to bridge the existing animal protein gap but with little success due to shortage of feed resources and high cost of feed components. Cereal grains form the bulk of commercial poultry feeds. Dagir (1995) reported that high cost of feed is mainly as a result of grain production lagging behind demand due to numerous usage of the grain. The trend of increasing prices of animal feed has compelled researchers to direct their research effort at developing non-conventional feedstuff with particular reference to protein. The use of plant leaves as possible sources of protein is one among many possibilities that have come out of this effort (lopez 1986). Leaf meals from tropical leguminous crops, browse plants and trees have been used as sources of nutrients in the diet of broiler chickens (esonu et al 2002; nworgu and fapohunda 2002; maduibike and ekeyem 2006).

However, several plant species produces leaves that can be processed to provide high quality low cost feed stuff for non-ruminant animals, especially poultry if information on their nutritive value are available emenalom et al (2009). Some of these plant leaves that are readily available, cheap and are not major food items for humans can be used as source of leaf meal for non-ruminant. One of such plants is the anthonotha macrophylla (african bean).

Anthonotha macrophylla is a tropical legume tree. It grows in the rainforest and secondary rainforest, up to 1200m altitude. It is planted in nigeria to restore soil fertility. It yields heavily in seed and foliage. The leaves contain 23.51 % crude protein on dry matter basis. The leaves and bark has been reported to have some medicinal values (breteter, 2010).

Information on the feed value of anthonotha macrophylla leaves is limited. Therefore, the evaluation of proximate composition of anthontha macropylla leaf meal as well as performance, carcass and internal organs will provide valuable information for its assessment and use as a feed ingredient in poultry diets. The present study was therefore designed to determine the proximate composition of anthonotha macrophylla leaf meal, performance, carcass and internal organ of finishing broilers chicken fed graded levels of the leaf meal.

2. Material and Method

2.1. Experimental Site

The experiment was carried out at the poultry and research unit of the department of animal science, akwa ibom state university, obio akpa campus. Obio akpa is located between latitudes $5^{0}17^{1}$n and $5^{0}27^{1}$n and between longitudes $7^{0}27^{1}$n and $7^{0}58^{1}$e with an annual rainfall ranging from 3500 mm– 5000 mm and average monthly temperature of 25^{0}c, and relative humidity between 60-90%. (wikipedia, 2016).

2.2. Source and Processing of Anthonotha Macrophylla Leaf Meal

Fresh green a. Macrophylla leaves used in the study were harvested within the university community and air dried, until they become crispy to touch. The dried leaves were then grounded into meal using a motorized electrical grinding mill to produce anthonotha macrophylla leaf meal (alm).

2.3. Proximate Composition

The leaf meal moisture content was determined by following the method of rajaran and janardhanan (1990). Nitrogen content was determined according to kjeldahl method (humphries, 1956) and the percentage of crude protein was calculated using the factor 6.25. The crude fat, crude fibre and ash content were determined in accordance with the standard methods of the aoac (1990). Carbohydrate was obtained by difference. The energy value of the meal in kg. According to siddhuraju et al (1996) by multiplying the percentage of crude protein, crude fat and carbohydrates by the factors 16.7, 37.7 and 16.7, respectively.

2.4. Experimental Diets

Four experimental diets t_1, t_2, t_3 and t_4 were formulated incorporating the leaf meal at 0%, 5%,7.5% and 10% levels respectively; partly replacing soybeans in the diet. Other ingredients were added such that the diet met the nutritional requirements for finisher broiler birds. Ingredients and nutrients composition of the experimental diet is presented in table1.

2.5. Experimental Birds and Design

One hundred and sixty (160) day old broiler chickens of mixed sex were used for the experiment. The birds were purchased from a local hatchery and were brood together for three weeks and fed leaf meal free commercial starter diet. At 35-day of age the chickens were weighed and divided into four (4) groups and each group was randomly assigned to one of the four experimental diet using completely randomized design. Each group was further replicated four times and each replicate housed in a pen measuring 2m by2m. Wood shavings were used as litter materials. Feed and water were provided ad libitum. The finisher phase lasted four weeks. The birds were weighed at the beginning of the experiment and weekly thereafter. Feed intake and mortality were recorded over the period.

2.6. Carcass and Internal Organ Evaluation

At day-63 four birds were randomly selected from each treatment, starved overnight of feed, weighed and sacrificed by cutting their jugular veins. The carcasses were scalded in hot water of about 80^{0}c for a minute and the feathers were plucked manually. The carcasses were eviscerated by cutting through the vent and the viscera were removed. Weights were obtained for the carcass and internal organs, the weights were expressed as percentage of live weight.

2.7. Data Analysis

Data generated were subjected to analysis of variance (anova) in a statistical analysis package (sas 2002). Where anova detected treatment effects means were compared using ducan new multiple range test(dnmrt) as outlined by obi (1990.)

3. Results and Discussion

The proximate composition of a. Macrophylla leaf meal is presented in table 2. The leaf meal of a. Macrophylla contains 23.51% crude protein, 9.72% crude fiber, 2.31% ether extracts, 5.06% crude ash and 57.4% nitrogen free extract.

The value of crude protein (23.51%) in this study suggest that, anthonotha macrophylla leaf meal can serve as a source of protein in the diet of non-ruminant.

Data on the performance of broiler fed anthonotha macrophylla leaf meal diet is presented in table 3. The initial body weight of the experimental birds did not indicate significance ($p>0.05$) difference across treatment. The final body weight gain

of birds in all the treatment were comparable. The 10% a. Macrophylla leaf meal group competed favorably with the control, 5% and 7.5% groups. The feed intake and feed conversion ratio of all the birds were similar. The 0% (control) had the best feed conversion ratio.

Data on the carcass and internal organs evaluation of broilers fed a.macrophylla leaf meal diet are presented in table 4. The experimental diets had no significant ($p>0.05$) effect on the live weights, dressed weights and dressing percentage(s) of the birds. The internal organs (liver, gizzard, kidney and heart) were not significantly ($p>0.05$) affected by the experimental diet and there was no observed abnormality on the organs.

The varied but non-significant($p>0.05$) body weight gain value obtained in the study suggested that at 5, 7.5 and 10% inclusion of a.macrophylla leaf meal in the diet, the digestibility of the crude protein component of whole diet meal did not reduce and the birds were able to utilize the feed. These results disagree with (tangendjaja et al., 1990) who reported that when leaf meal forms substantial part of concentrate diet, digestibility of the crude protein of the diet is markedly reduced.

The non-significant ($p>0.05$) effect of the diet on the feed intake of the birds indicated that the diet were palatable that was why the birds accepted it even at 10% inclusion level. The results of the study showed that the liver, kidney and heart of the experimental birds were free from toxic of any kind. The normal gizzard weight in the study was as a result of diet being free of hulls, wood shavings and cereal particles. Biggs and parson, 2009; clark et al 2008 reported that enlargement in gizzard size is observed when structural component such as hulls, cereal particle and wood shavings are in diet.

Ingredients (%)	**T_1 Control**	**T_2 5% Alm**	**T_3 7.5% Alm**	**T_4 10% Alm**
Maize	55.00	55.00	55.00	55.00
Soya Bean Meal	22.00	17.00	17.00	15.00
Anthonotha Macrophylla	0.00	5.00	7.50	10.00
Fish Meal	4.00	4.00	4.00	4.00
Palm Kernel Cake	5.00	5.00	2.50	2.00
Wheat Offal	9.00	9.00	9.00	9.00
Bone Meal	4.00	4.00	4.00	4.00
Common Salt	0.25	0.25	0.25	0.25
Vit/Min Premix	0.25	0.25	0.25	0.25
L- Lysine	0.25	0.25	0.25	0.25
L- Methionine	0.25	0.25	0.25	0.25
Total	100	100	100	100
Calculated Chemical	Composition(%Dm)			
Crude Protein	19.50	20.65	19.63	19.19
Crude Fibre	3.61	3.41	3.20	3.08
Ether Extract	4.17	4.14	4.02	4.04
Ash	2.61	2.61	2.61	2.61
Me(Mcal/Kg)	2.74	2.72	2.68	2.65

Table 1: Ingredients and Nutrient Composition f The Experimental Finishing Broilers Diets
**ALM - Anthonotha Macrophylla Leaf Meal*

To provide the following per kg of feed; vitamin a, 10,000iu; vitamin d3 2000iu; vitamin e, 5iu; vitamin k, 2mg; riboflavin, 4.2mg; vitamin b1, 15mg; vitamin b6, 1.5mg; vitamin b12, 0.01mg;nicotinic acid, 20mg; pantothenic acid, 5mg; folic acid, 0.5mg; biotin, 2mg; choline , 3mg; manganese, 56mg; zinc,5mg, iron, 20mg; copper, 1.0 mg; iodine, 0.8mg; selenium, 2.0mg; cobalt, 1.25mg; antioxidant, 125mg.

Constituents	**Composition (%)**
Moisture	12.56
Crude Protein	23.51
Ether Extracts	2.31
Crude Fibre	9.72
Ash	5.06
Nitrogen Free Extracts	59.40

Table 2: Proximate Composition of Anthonotha Macrophylla Leaf Meal

Parameters (%)	T_1 Control	T_2 5% Alm	T_3 7.5% Alm	T_4 10% Alm	Sem
Initial Body Weight (G)	*924.12*	*926.31*	*927.10*	*926.56*	*0.02*
Final Body Weight (G)	*231.03*	*2364.58*	*2359.78*	*2331.78*	*0.14*
Weight Gain (G)	*1456.91*	*1438.27*	*1432.68*	*1415.22*	*0.31*
Daily Weight Gain (G)	*52.03*	*51.37*	*51.17*	*50.54*	*1.32*
Feed Intake G/Day	*138.01*	*140.01*	*139.33*	*140.35*	*6.31*
Feed Conversion Ratio (Gfeed/Ggain)	*2.65*	*2.73*	*2.72*	*2.77*	*0.12*
Mortality	*0.00*	*0.00*	*0.00*	*0.00*	

Table 3: Performance of Finishing Broiler Birds Fed Anthonotha Macrophylla Leaf Meal
**ALM - Anthonotha Macrophylla Leaf Meal*

Parameters (%)	T_1 Control	T_2 5% Alm	T_3 7.5% Alm	T_4 10% Alm	Sem
Live Weight (Kg)	2.40	2.32	2.31	2.29	0.11
Dressed Weight (Kg)	1.50	1.42	1.41	1.39	0.17
Dressing Percentage (%)	62.50	61.21	61.04	60.70	1.10
Liver (% Of Lw)	2.76	2.67	2.77	2.62	0.11
Gizzard (% Of Lw)	2.16	2.08	2.13	2.09	0.01
Kidney (% Of Lw)	0.50	0.51	0.54	0.53	0.02
Heart (% Of Lw)	0.20	0.25	0.21	0.25	0.05

Table 4: Carcass and Internal organ Characteristics of Finishing Broiler Birds Fed Anthonotha Macrophylla Leaf Meal
**ALM - Anthonotha Macrophylla Leaf Meal*

4. Conclusion

The information presented herein has shown that a. Macrophylla leaf could serve as a source of feed ingredient in poultry and therefore merits processing attention as a leaf meal. Knowledge of its xanthophylls level will encourage its use in the broiler pigmentation and egg yolk coloration in laying hens.
More research should be carried out using higher levels of inclusion of leaf meal in order to examine its effect on broilers.

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