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Responses of Broilers Chickens to Dietary Levels of Adansona Digitata (L) Leaf Meal

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Abstract **– The objectives of this study were to evaluate the effects of dietary levels of *Adansonia digitata* Leaf Meal (ADLM) on the performance and carcass characteristics of broiler chickens. One hundred and eighty day old oba marshal broilers were used in this study. The birds were grouped into four dietary treatments replicated thrice with fifteen birds per replicate in a complete randomized design. ADLM at the rates of 0, 5, 10 and 15% were included in diet groups T_o, T_1 T_2 and T_3 respectively T_o is the control diet while T_1, T_2 and T_3 are ADLM at 5, 10 and 15% levels inclusion respectively. Experimental diets were fed ad libitum to the different groups accordingly and water supplied throughout the period of eight weeks of experiment. Routine management practices were adhere to. The indices measured included initial weight, body weight gain, feed intake, feed conversion ratio and mortality when it occurred. A significant (P>0.05) effects were observed among treatments means for feed intake, body weight gain, feed conversion ratio and carcass characteristics. In conclusion, the result from this study indicated that 5% ADLM inclusion in the diets of broiler chicken were beneficial within the first three and half week.**

Keywords **– Broiler, *Adansonia Digitata,* Leaf Meal, Feed Intake.**

I. Introduction

Provision of qualitative and quantitative protein of animal origin for the teemingly populated Nigerians remains a great challenge to the livestock sector. Although it's been identified that poultry industry in Nigeria has been expanding, production capacity has not been keeping pace with rapidly increasing domestic consumption. The reason being that conventional feedstuff such as maize, groundnut and soyabeans used for poultry production are in high demand by human (Esonu *et al* 2011; Madubuike and Ekenyem, 2006, FAO, 2011b).

As more awareness is being created on alternative feedstuff for livestock particularly monogastric animals, researchers deem it fit to look out for non-conventonal, more affordable and easily available feedstuff in place of highly competitive conventional ones (Adeosun *et al 2015,* Adeosun *et al* 2016), Farran *et al* 2011a). Among identified alternative feedstuff are herbs. Research work carried out on herbal inclusion in the diets of animals have shown encouraging effects on feed intake, weight gain, feed efficiency and lowered mortality (Nworgu, *et al,* 2015, Iyayi 2001).

Some researchers have also indicated that feeding herbs to livestock has resulted in improved health, productive and reproductive capacities (Abdul-Rahman *et al* 2009, Sultan *et al* 2007, Sultan and Abdul-Rahman 2006). Furthermore, Nworgu *et al* (2015) indicated that waterleaf meal inclusion in broiler diets showed low cost effectiveness as replacement for groundnut cake and soya bean meal. Adansonia digitata popularly known as baobab is a well adapted deciduous tree crops found in most Africa (Maydi 2004). These plants are found in abundant supply in Katsna State, Nigeria. The leaves are edible.

The processed leaves ground into powered are referred to as Adansonia digitatat leaf meal (ADLM) the objectives of this stuff therefore were to evaluate the growth performance and carcass characteristics of broiler chickens fed dietary Adansonia digitata leaf meal.

II. Materials and Methods

Experimental Site:

The research was carried out at the research and teaching farm, Department of Animal Science, Federal University Dutsin-Ma, Katsina State Nigeria. The town is located at latitude 12° 27'56" N and longitude 07° 30' 04"E. The climate of the area is the tropical wet and dry season with an average annual rainfall of about 700mm. The main annual temperature ranges between 29°C – 31°C.

Collection and Processing of Adansonia Digitata Leaf

Fresh Adansonia digtata (L) (Baobab) leaves purchased from local farmers in Dutsinma environment were dried ooooooorietationunder shades, for about 7 days, to prevent nutrient loss the dried leaves were ground using a hammer mill of size 3.36m. This is then referred to as Adansona digitata leaf meal.

Ratio Formulation

The powered ADLM was used to formulate four dietary treatments at the rates of 0, 5, 10 and 15% levels for both starter and finisher broiler chickens (Tables 1 and 2). The 0 level stands for control and did not contain ADLM. The diets were formulated to meet the body nutrient requirement of broilers according to NRC (1994). The four dietary treatments were designated as T_o, T_1, T_2 and T_3 where T_o is the control diet while T_1, T_2 and T_3 are for inclusion of ADLM at 5, 10 and 15% respectively.

Experimental Animals, Feeding and Management

One hundred and eighty day old Oba Marshall broiler chicks purchased from a commercial supplier were used for this experiment. The birds were weighed on equal weight basis of 46.67g and shared into the four dietary treatment groups of 0, 5, 10 and 15% with each group replicated three times with 15 birds per replicate. The experiment lasted for a period of eight weeks continuously without break was laid out in a complete randomized design. Feeds and water were supplied to the birds *ad*

libitum, Management practices such as vaccination, drug administration and hygienic practices were adhered to.

Data Collection and Analysis

Weekly data collection included initial weight, body weight gain, feed intake, feed conversion ratio and mortality when it occurred. At the end of the experiment, six birds from each treatment were randomly selected, slaughtered, eviscerated and dressed for carcass characteristics and the internal organs weights

The values obtained were expressed in grammes exception of percent dressing and intestinal length (cm). Data collected were summarized and subjected to analysis of variance. Where significant differences occurred, Duncan Multiple range test (Steel and Torrie, 1980) was used to separate the means.

III. Results

Feed Intake and Feed Conversion Ratio

The responses of broiler chicken fed dietary levels of Adansona digitata leaf meal (ADLM) in feed intake and feed conversion ratio are shown on Tables 3 and 4. A significant difference ($P<0.05$) in feed intake among treatment means was observed (Table 3). Birds on control diet had higher feed intake than those on treated diets within the first 2 weeks but at week 3, 4 and 5, birds on 5% ADLM dietary treatment had higher feed intake than control, treatments 10 and 15% ADLM. However, the feed conversion ratio on Table 4 indicated better performance ($P<0.05$) of 5% ADLM over the control 10 and 15% ADLM. At weeks 3 to 8, the birds on control diet had efficient feed conversion ratio than birds on treated diets.

Growth Rate

The growth rate of broiler chickens fed dietary levels of *Adansona dgitata* Leaf Meal is shown on Figure 1. Birds on 5% ADLM dietary level had comparable performance to those on control, diet within the first 3 ½ weeks. As from weeks 4 to 8, the birds on control diets showed better growth rate than birds on treated diets. It is noticed from this result that birds fed ADLM at 10 and 15% ADLM inclusion levels had decline growth rate from the commencement of the experiment.

Carcass Yields

The carcass yields and organs weights of broilers fed ADLM are presented on Table 5. Significant response ($P<0.05$) were noticed in live weight, carcass weight and percentage dressing. Birds on control diet performed better compared to those on dietary treatments. Significant ($P<0.05$) effects were also observed in the intestinal organs. Birds on control diet had higher organ weights on gizzard, hearts, lung and spleen but lower in abdominal fat, and shortest intestinal length. No significant ($P>0.05$) effects were noticed in liver, intestinal full and empty.

IV. Discussion

Feed intake (FI) of birds on control diet was higher than those on treatments within the first two weeks of the commencement of the experiment, but the feed conversion ratio (FCR) of birds on 5% ADLM was better than the control, 10% and 15% ADLM. At weeks 3, 4, and 5, birds on 5% ADLM F1 became higher than all other. The variation noticed in FI of birds on 5% ADLM at 2 weeks and 3-5 weeks could be attributed to unacceptability of the birds at the on-set of the experiment, but later (3-5 weeks) adapted to the feed. As the experiment continued from 5-8 weeks, birds on control diet had higher performance in F1 and FCR compared to birds on dietary treatments. This shows that the older the birds, the less acceptability and palatability the test material in respect to feed intake and FCR. The growth rate of birds on 5% ADLM was highly comparable to those on control diet- within the first three and half weeks. These results agrees with Nworgu (2015) who reported that water leaf meal inclusion in broiler diet show low cost effectiveness as replacement for groundnut cake and soya bean meal. Furthermore, the results are also similar to Iyayi (2001) who indicated that herb inclusion in the diet of swine had encouraging effects on feed intake, weight gain and feed efficiency. However, the results on carcass yields and internals organs indicated that inclusion of ADLM in finisher diet is not beneficial as shown by low live weight, carcass yields, dressing percentage and low internal organ weights of birds on treatment diets. Nevertheless, the low abdominal fat pad in this study can make birds on dietary treatment worthwhile for the sake of health benefit.

V. Conclusion

From the result obtained, it is concluded that inclusion of ADLM at 5% inclusion level within the starter phase had proved better performance of birds in feed intake, feed conversion ratio and comparable growth rate to that of control but the inclusion at finisher phase is not beneficial.

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Table 1: Composition of Experimental Diet with graded levels of *Adansona digital* (L) leaf meal for broiler starter

Ingredient	**T1**	**T2**	**T3**	**T4**
Maize	54.31	51.34	48.36	45.26
Groundnut cake	26.31	23.91	21.52	19.21
Soya bean cake	10.00	10.00	10.00	10.00
Fish meal	3.50	3.50	3.50	3.50
Limestone	0.15	0.15	0.15	0.15
Salt	0.35	0.35	0.35	0.35
Bone meal	3.50	3.50	3.50	3.50
Vitamin Pre	0.25	0.25	0.25	0.25
Lysine	0.25	0.25	0.25	0.25
Methionine	0.18	0.18	0.18	0.18
Oil	1.20	1.57	1.94	2.35
ADLM	0.00	5.00	10.00	15.00
Total	**100.00**	**100.00**	**100.00**	**100.00**

Calculated Chemical Analysis

ME (kcal/kg)	2970.66	2970.39	2970.42	2970.14
Crude protein (%)	23.00	23.00	23.00	23.00
Crude fiber (%)	3.17	3.41	3.66	3.89
Ether extract (%)	5.20	4.90	4.60	4.19
Lysine (%)	1.27	1.21	1.17	1.12
Methionne (%)	0.93	0.87	0.84	0.80
Avail. Phos. (%)	0.77	0.70	0.70	0.69
Calcium (%)	1.42	1.44	1.43	1.39

Table 2. Composition of Experimental Diets of graded levels of Adansonia digitata (L) Leaf Meal for broiler Finishers (21% cp)

Ingredient	**T1**	**T2**	**T3**	**T4**
Maize	60.32	57.42	54.48	51.61
Groundnut cake	21.30	18.89	16.49	14.11
Soya bean cake	10.00	10.00	10.00	10.00
Fish meal	3.00	3.00	3.00	3.00
Limestone	0.15	0.15	0.15	0.15
Salt	0.35	0.35	0.35	0.35
Bone meal	3.00	3.00	3.00	3.00
Vitamin Pre	0.25	0.25	0.25	0.25
Lysine	0.25	0.25	0.25	0.25
Methionine	0.18	0.18	0.18	0.18
Oil	1.20	1.51	1.85	2.16
ADLM	0.00	5.00	10.00	15.00
Total	**100.00**	**100.00**	**100.00**	**100.00**

Calculated Chemical Analysis

ME (Kcal/Kg)	3045.33	3045.03	3045.91	3045.34
Crude protein (%)	21.00	21.00	21.00	21.00
Crude Fiber (%)	3.13	3.37	3.62	3.86
Ether extract (%)	4.94	4.85	4.35	4.05
Lysine (%)	1.18	1.35	1.52	1.87
Methionine (%)	0.90	0.84	0.80	0.75
Av. Phos. (%)	0.62	0.62	0.61	0.65
Calcium (%)	1.32	1.32	1.31	1.30

Table 3. Feed Intake of broiler chicken fed graded levels of Adansonia digitata (L) Leaf meal (g/birds/day)

	Dietary Treatment Levels				
Week	**0**	**5**	**10**	**15**	**SEM**
1	37.99^{a}	21.95^{b}	21.96^{b}	21.73^{b}	0.02
2	57.00^{a}	44.81^{b}	43.28^{b}	43.05^{b}	0.5
3	70.34^{c}	73.36^{a}	71.53^{b}	70.34^{c}	0.14
4	74.61^{d}	87.76^{a}	83.60^{b}	81.91^{c}	0.28
5	87.38^{b}	88.96^{a}	86.03^{c}	85.60^{c}	0.32
6	93.09^{a}	88.81^{b}	85.22^{a}	83.97^{d}	0.16
7	96.06^{a}	94.05^{b}	89.68^{c}	84.76^{d}	0.44
8	102.62^{a}	93.86^{b}	88.20^{c}	85.99^{d}	0.84

Means with different superscript on the same row are significantly different (P>0.05)
SEM – Standard Error of Means

Table 4. Feed Conversion Ratio of Broiler Chicken Fed graded levels of *Adansonia digitata* (L) Leaf Meal

	Dietary Treatment Levels				
Week	**0**	**5**	**10**	**15**	**SEM**
1	2.44^{b}	1.33^{a}	1.60^{b}	1.62^{b}	0.04
2	2.39^{b}	1.99^{a}	2.36^{b}	2.57^{b}	0.10
3	2.36^{a}	2.44^{b}	3.25^{c}	3.84^{d}	0.02
4	2.05^{a}	2.83^{b}	3.45^{c}	4.21^{d}	0.02
5	2.33^{a}	2.72^{b}	2.79^{b}	3.88^{c}	0.04
6	2.20^{a}	2.59^{b}	2.65^{b}	3.65^{c}	0.08
7	1.97^{a}	2.68^{b}	2.82^{c}	3.35^{d}	0.02
8	2.09^{a}	2.50^{b}	2.79^{c}	3.51^{d}	0.03

Means with different superscript on the same row are significantly different (P>0.05)
SEM – Standard Error of Means

Table 5. Carcass Characteristics of broiler chicken fed gradded levels of Adansonia digitata Leaf Meal

Parameter	**O**	**5**	**10**	**15**	**SEM**
Live weight (g)	2003^{a}	1700.37^{b}	1405.11^{c}	1115.37^{d}	
Carcass weight (g)	1559.37^{a}	1290.90^{b}	989.18^{c}	766.34^{d}	
% dressing	77.86^{a}	76.89^{b}	70.40^{c}	68.71^{d}	
Organs:					
Gizzard (g)	57.07^{a}	46.83^{b}	41.00^{b}	40.67^{b}	
Abdominal pad(g)	50.47^{b}	31.43^{ab}	17.57^{ab}	10.37^{a}	
Heart weight (g)	9.67^{a}	9.07^{a}	8.47^{ab}	5.90^{b}	
Liver weight (g)	49.27	50.10	41.27	37.10	
Lung weight (g)	11.93^{a}	8.43^{ab}	7.23^{b}	6.33^{b}	
Spleen (g)	3.80^{a}	3.53^{ab}	2.83^{ab}	2.07^{b}	
Intestinal full (g)	110.0	112.67	112.37	167.93	
Intestine empty	83.07	87.88	95.13	84.20	
Intestinal length (cm)	170.67^{b}	182.67^{ab}	194.33^{ab}	215.31^{ab}	

Means with different superscript on the same row are significantly different (P>0.05)
SEM – Standard Error of Means

Growth rate

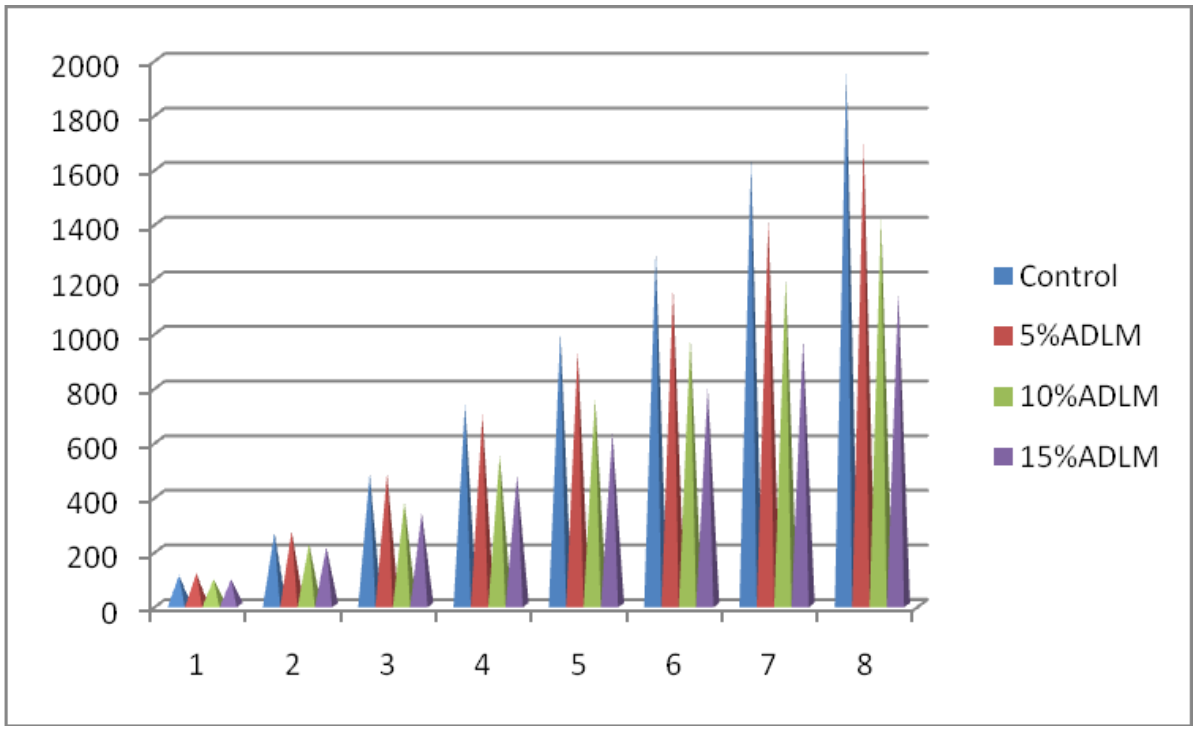

Fig. 1. Growth rate of broiler chicken fed dietary levels of Adansonia digitata leaf meal