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Utilization of African Mistletoe (*Tapinanthus bangwensis*) Leaf Meal by Broiler Chickens

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Abstract: *Tapinanthus bangwensis* (African Mistletoe), leaf meal was used as a replacement for GNC at 0, 5, 10 and 15% levels of inclusion in broiler diets. One hundred and twenty day-old (Anak strain) broiler chicks were used for the study which lasted for six weeks. Feed intake and body weight gain were determined weekly. The feed/gain and gain/feed ratios were also determined. At the end of the study five birds per treatment were randomly selected, starved and bled for blood samples to be used for haematological and serum chemistry. There was no significant difference ($p>0.05$) in feed intake, but there was ($p<0.05$) in body weight gain. Statistical analysis showed significant difference ($p<0.05$) in haemoglobin, PCV and RBC; but no significant difference ($p>0.05$) in WBC. The serum parameters showed no significant difference ($p>0.05$) among treatment means except in globulin. Treatment IV showed the least feed cost/kg feed. No mortality was recorded throughout the feeding trial.

Key words: Performance, blood metabolites, economics of production

INTRODUCTION

It is a known fact that only a small proportion of protein in the diets of an average Nigerian is derived from livestock products. Animal protein, as important as it is to human food and animal feed is however, not produced sufficiently to meet the dietary requirements of the teaming population of Nigeria. According to Ani and Okafor (2004), the solution to the problem of animal protein shortage in Nigeria lies in the production of fast maturing animals with the utilization of cheap and locally available feedstuffs. One of such fast maturing animals is the poultry bird.

Poultry birds have shorter regeneration interval, good feed conversion and good efficiency of food utilization as advantages over ruminants and other livestock. Therefore, any attempt to improve animal protein source must be geared towards improving the production of poultry meat and eggs. Aduku (1992) emphasized that feed dictates the number of animals which can be reared and how fast they can mature for market. This feed, according to Olorede and Longe (1999) and Daghir (1995), accounts for more than 65% of the total cost of poultry production. The search for alternative feeding-stuffs for monogastric animals has challenged animal nutritionists in Nigeria since the past two decades. This search is necessitated by the high cost of the conventional feeding-stuffs, which are also in high demand by humans (Onyimonyi and Okeke, 2008).

Feed supply, according to Amaefule *et al.* (2004), has remained a major constraint in animal production due to the ever increasing cost of conventional feedstuffs occasioned by the competition between man and livestock for cereal grains. However, this competition is not limited to grain sources alone but also to protein sources; hence the need to search for alternative protein sources that are cheap, readily available and less competed for by man and the industry (Akinmutimi, 2004).

The need to harness the potentials of the numerous agro-industrial by-products and the so-called wastes as part replacement for the very expensive ones has been advocated (Umoh, 1984). African mistletoe (*Tapinanthus bangwensis*) is a promising plant because it is an evergreen, perennial and semi-parasitic shrub. Ruminants and local fowls in the study area do relish it without any reported digestive disorder. Hence, this study was carried out to investigate the haematological and performance responses as well as the economics of production of broiler chickens fed graded levels of mistletoe leaf meal.

MATERIALS AND METHODS

Mistletoe leaves were harvested from Neem trees within Sokoto metropolis. They were separated from the flowers and branches, air dried for five days and milled. Groundnut cake was replaced with Mistletoe Leaf Meal

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(MLM) in the diets of broiler chickens at 0, 5, 10 and 15% levels of inclusion as diets I, II III and IV respectively.

A total of one hundred and twenty (120) day-old broiler chicks (Anak strain) used for this study from a commercial outlet in Sokoto. They were weighed for their initial weights and randomly allotted into the four treatments. There were two replicates per treatment of fifteen (15) birds each. The birds were placed on conventional feeds for the first week and at the beginning of the second week, the experimental diets were introduced gradually to the birds. Feed and water were supplied *ad libitum*. During the brooding stage heat was provided using 100 watts electric bulbs. The birds were given necessary vaccines, same care and good management practices as outlined by Van Eekeren *et al*. (2004). A completely randomized design was used for the study. Body weight gain and feed intake were taken weekly from which feed/gain and gain/feed ratios were calculated.

At the end of the study, five birds per treatment were randomly selected, starved and bled for blood sampling. Samples meant for haematological indices were collected into EDTA-anticoagulant treated bottles and were analyzed as laid down by Kelly (1979). Blood samples meant for biochemical assays were allowed to clot before centrifuging to obtain serum used in the determination of some metabolites. Data obtained were subjected to Analysis of Variance (ANOVA) according to the procedures of Steel and Torrie (1980).

RESULTS

The nutrient composition of the experimental diets is shown in Table 1 while data on performance and economics of production of the birds on the various dietary inclusion levels of MLM are presented in Table 2. Feed intakes of the birds on diets containing MLM were significantly higher than those of the control diet (0%MLM). Body weight gain of birds on MLM did not compare favourably with birds on control diet. Birds on 0%MLM showed numerical increase in body weight gain. Weight gain, feed/gain and gain/feed ratios were significantly ($p<0.05$) different. Dietary inclusion of MLM reduced cost of producing one kilogram of feed and this was reflected in the economic efficiency. No mortality was recorded during the feeding trial.

Table 1: Composition of experimental diets

	Composition			
Ingredient	I	II	III	IV
Maize	45.00	45.00	45.00	45.00
Groundnut Cake (GNC)	26.00	21.00	16.00	11.00
Mistletoe Leaf Meal (MLM)	-	5.00	10.00	15.00
Wheat offal	19.10	19.10	19.10	19.10
Fish meal	3.00	3.00	3.00	3.00
Blood meal	3.00	3.00	3.00	3.00
Bone meal	2.50	2.50	2.50	2.50
Oyster shell	0.80	0.80	0.80	0.80
Vitamin premix	0.30	0.30	0.30	0.30
Salt	0.30	0.30	0.30	0.30
Total	100.00	100.00	100.00	100.00
Crude protein	23.34	23.14	21.44	20.74
Crude fibre	4.27	4.59	4.90	5.22
Ash	4.07	4.54	5.01	5.49
Ether extract	5.62	5.69	5.76	5.82
NFE	62.70	62.04	62.89	62.73

Premix used supplied :vitamin A, 12500000 iu; vitamin D, 2500000 iu; vitamin E, 40000 mg; vitamin K, 2000 mg; vitamin B, 3000 mg; vitamin B_2, 5500 mg; Niacin, 5500 mg; Calcium pantothenate, 11500 mg; vitamin B_6, 5000 mg; vitamin B_{12}, 25 mg; Folic acid, 1000 mg; biotin, 80 mg; choline chlorine, 500000 mg; manganese, 120000 mg; iron, 100000 mg; zinc, 80000 mg; copper, 8500 mg; iodine, 1500 mg; cobalt, 3000 mg; selenium, 120 mg and antioxidant, 120000 mg

Table 2: Performance characteristics and economics of production of birds fed MLM

	Treatment				
Parameter	I	II	III	IV	±SEM
Weight gain (g/day)	21.36^a	16.99^b	14.80^c	13.51^d	92.89
Feed intake (g/day)	45.52	47.34	47.10	46.81	190.69
Feed/gain ratio	2.13^a	2.79^b	3.18^c	3.46^d	0.015
Gain/feed ratio	0.47^a	0.36^b	0.31^c	0.30^c	0.001
Feed cost/kg feed Naira	32.65	30.65	28.65	26.65	-
Feed cost/ kg gain Naira	724.96	713.52	642.38	607.12	-
Economic efficiency	0.189	0.189	0.254	0.222	-
Mortality (%)	00.000	00.000	00.000	00.000	-

^{abcd} = Means with different superscripts in a row differ significantly ($p<0.05$). SEM = Standard Error Mean

Table 3: Blood parameters of birds fed experimental diets

	Treatment				
Parameter	I	II	III	IV	±SEM
Haemoglobin (g/dl)	8.05[a]	6.95[b]	5.90[c]	4.90[d]	0.084
PCV (%)	23.25[a]	22.85[a]	18.20[b]	15.45[c]	0.992
Red blood cell (ml/mm^3)	2.08[d]	2.67[c]	3.11[a]	3.04[b]	75.375
White blood cell (x 10^9/l)	18.50	15.35	12.50	13.50	11.915
Total protein (g/l)	5.20	4.50	4.25	3.90	0.058
Albumin (g/l)	1.50	0.90	0.60	0.65	0.051
Globulin (g/l)	3.70[a]	3.60[ab]	3.65[b]	3.25[c]	0.004

[abcd] = Means with different superscripts in a row are significantly ($p<0.05$) different. SEM = Standard Error of Mean

Data obtained for all blood parameters measured are shown in Table 3. Haematological indices had significant ($p<0.05$) effect on haemoglobin, Packed Cell Volume (PCV) and Red Blood Cell (RBC), but no significant ($p>0.05$) difference in White Blood Cell (WBC). Serum parameters showed no significant ($p>0.05$) difference among the dietary treatments except albumin which showed significant ($p<0.05$) difference among the treatment means. It was generally observed that the least values were recorded for birds on diet IV (15%MLM) in virtually all the serum parameters investigated.

DISCUSSION

The trend in growth response observed in daily weight gain, feed/gain and gain/feed ratios (Table 2) suggested that higher inclusion of MLM did not enhanced these performance indices. Feed intake showed inconsistent trend which might equally be due to the fact that higher inclusion of MLM does not favour the feed intake of the birds. The increased feed intakes of the birds on diets containing MLM suggested an increased in fibre content of the diets and dilution of other nutrients. Thus, the birds consumed more so as to meet their energy requirements to sustain growth and development which is in line with the report of Esonu *et al*. (2005). Increasing levels of MLM in the diets significantly ($p<0.05$) depressed feed/gain ratio. The value observed for birds on the control diet was numerically better than other diets. In the gain/feed ratio, there was a declining trend with increasing level of MLM in the diets. The decrease in weight gain with increasing level of MLM in this study agreed with March and Hansen (1977), that restriction of nutrient intake through dietary dilution resulted in depression both in growth and even lipid accumulation.

Dietary inclusion of MLM at all levels reduced feed cost which also reflected in the economic efficiency. The lower feed cost/kg feed (Naira) recorded in MLM substituted diets suggested that the test material (MLM) is an economically viable non-conventional feed material.

The results obtained in this study showed that the PCV and haemoglobin values of birds fed MLM followed a definite trend. That is, they decreased with increasing levels of MLM and they were significantly ($p<0.05$) different. The values of RBC and WBC did not follow any definite trend but RBC showed significant ($p<0.05$) difference among the treatment means. The higher values recorded for PCV and haemoglobin in treatments I and II might have resulted from better nourishment of the diets. This supported the reports of Hackbarth *et al*. (1983), that dietary influence on haematological parameters is very strong. The above also supported the reports of Church *et al*. (1984), who reported that PCV and haemoglobin concentrations have been shown to indicate nutritional status of the subjects. The total protein values were higher in treatments I and II compared to III and IV (Table 3). These values decreased with the inclusion levels of MLM. Albumin and globulin values showed no definite trend. Statistical analysis showed no significant difference ($p>0.05$) in all the serum parameters except globulin which showed significant difference ($p<0.05$) among treatment means.

Conclusion: It can be concluded that the use of MLM to replace parts of GNC in broiler diets did not significantly improve weight gain but significantly increased feed intake and feed/gain ratio. Therefore, judging from values recorded on weight gain, feed intake, feed/gain ratio, feed cost and economic efficiency, replacement of GNC with up to 10%MLM in the diets of broilers posed no deleterious threat on the birds.

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