THE EFFECTS OF ANTHONOTHA MACROPHYLLA (AFRICAN BEANS) LEAF MEAL ON THE BLOOD PROFILES OF FINISHING BROILER CHICKENS

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ABSTRACT

The effects of Anthonotha macrophylla (African bean) on haematological and serum biochemical characteristics of finishing broiler chickens were determined in a 35 day feeding trial. One hundred and sixty(160) unsexed broilers (Anak strain) were used for the experiment. The birds were brood together for three weeks and fed Anthonotha macrophylla leaf meal free diet for four weeks. Four diets were formulated containing 0, 5, 7.5, and 10% level of A.macrophylla leaf meal. At day 35, the birds were divided into four groups of 40 birds and each group was randomly assigned to one of the diet using completely randomized design (CRD). Each group was further replicated 4 times, with each replicate containing 10 birds housed in deep litter pen measuring 2m×2m. Wood shaving was used as litter material. Feed and water were provided *ad libitum*. At day 63, blood samples were collected from the birds through their wings vein and were analyzed for the following haematological and serum biochemical parameters, Red blood cell (RBC), White blood cell (WBC), Packed cell volume (PCV), Haemoglobin concentration (HB), total protein, urea, cholesterol, creatinine, alkaline phosphatase, albumin and globulin. All the haematological and serum biochemistry determined were not affected by the experimental diet. The result of the study showed that 10% inclusion of A. marcophylla leaf meal in the diet of broilers had no adverse effect on their haematological and serum biochemical indices.

Keywords: Broilers, Anthonotha macrophylla, blood profile.

INTRODUCTION

The trend for increasing price for animal feeds has compelled researchers from developing countries to direct their research effort at developing non- conventional, cheaper and readily available feedstuff with particular reference to protein substitute. The use of plant leaves as possible source of protein is one among many possibilities that have come out of this effort (Lopez 1986). Leaf meal made from fodder shrubs, leguminous crops and trees are currently helping small scale poultry farmers in many tropical countries to boost their yield (Nworgu and Fapohunda 2002).

Several plant species produces leaf that can be processed to produce high quality and low cost feed stuff for non-ruminant, especially poultry if information on their nutritive value are available(Emenalom et at 2009). Some of this plant leaves which 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 plant is Anthonotha macrophylla.

Anthonotha macrophylla seems to have great potentials as source of dietary protein for poultry in the country. Anthonotha macrophylla is a legume tree that yields heavily in seed and foliage. It is planted in Nigeria to restore soil fertility. Anthonotha macrophylla is

commonly found in rain forest belt, including secondary forest up to 1200m altitude. The leaves and barks have been reported to have some medicinal value (Breteter, 2010).
The use of blood examination to assess physiological, pathological, and nutritional and health status of animals have been well documented. The routine collection and processing of blood samples allows the evaluation of serum biochemical and hematological response to nutrition and disease (Jaime et al 2008). In considering the unconventional feedstuff it's very crucial and demanding to assay for the effects of these feeding materials on the health conditions of the birds. Also, haematological constituent reflect the physiological responsiveness of the animals (Esonu et al., 2001); and influence of diet on haematological parameter can be very strong Babatunde et al (1989).

Information on the feed values of Anthonotha macrophylla leaves as livestock feed is limited. Therefore the evaluation of the proximate composition and blood profile will provide valuable information for its assessment and use as feed ingredients in poultry diets. The present study was therefore designed to determine the proximate composition of Anthonotha macrophylla leaf meal, haematology as well as serum biochemistry of finishing broiler chickens fed graded levels of the leaf meal.

Materials and Methods

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 3500mm – 5000mm and average monthly temperature of 25^{0}C, and relative humidity between 60-90%. (Wikipedia, 2016).

Source and Processing Methods

Fresh green Anthonotha macrophylla leaves used in the study were harvested within the University community and air-dried, until they became crispy to touch. The dried leaves were ground into meal using a motorized electric grinding mill to produce Anthonotha macrophylla leaf meal (ALM). Samples of the fine leaf meal was stored in screw cap bottles at room temperature and used for analysis.

Proximate Analysis

Samples of the leaf meal were taken to the laboratory and analyzed as follows: The moisture content was determined by 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).The energy value of the meal was estimated in (KJ) according to Siddhuraju (1996) by multiplying the percentage of crude protein, crude fat and carbohydrate by the factor 16.7, 37.7 and 16.7 respectively.

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 soya beans in the diet. Other ingredients were added such that the diet met the nutrient requirements for finishing broiler birds. Ingredient and nutrient composition of the experimental diet is presented in Table 1.

Experimental Birds and Design

One hundred and sixty (160) day old broiler chickens of mixed sexes (Anak Strain) were used for the experiment. The birds were purchased from a local hatchery and brood together for three (3) weeks and fed ALM 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 diets using Completely Randomized Design (CRD). Each group was further replicated four times and each replicate housed in a pen measuring 2m x 2m. Wood shavings were used as litter material. Feed and water were provided *ad libitum*. All necessary prophylactic medications and vaccinations were also provided.

Haematology and Serum Chemistry Evaluation

At day-63, two birds were randomly selected from each replicate, making a total of 8 birds per treatment. Blood samples were collected from their wing veins with sterile needles. Blood sample collected were separately preserved in labeled sterilized bottles containing ethylene Diamine tetra acetic acid (EDTA) and another labeled bottles without EDTA for haematological and serum biochemistry evaluation respectively. The haematological parameters analyzed included; Haemoglobin concentration (Hb), packed cell volume (PCV), Red blood cell(RBC) and white blood cell (WBC), and they were determined according to the method of Davie and Lewis (1975).

The serum biochemistry parameters analyzed were total protein, urea, creatinine, cholesterol, Alkaline phosphatase and Albumin using the method of Coles (1986).

Data Analysis

Data generated from this study were subjected to analysis of variance (ANOVA) in a statistical analysis system package (SAS 2000). Where ANOVA detected treatment effects, means were compared using Duncan New Multiple Range test (DNMRT) as outlined by Obi (1990).

RESULTS AND DISCUSSION

The data on haematological and serum biochemistry of finishing broilers fed A. macrophylla leaf meal is shown in table 3. All the haematological parameters evaluated in the study were not significantly ($p > 0.05$) affected by the diet, but there were slight increase across the treatment. The values of the white blood cell (WBC) of birds in T_2 and T_3 were relatively higher than the control and T_4. The red blood cell (RBC), haemoglobin concentration (Hb) and packed cell volume (PCV) of the experimental broiler birds were not affected by the diet. The white blood cell (WBC) plays a major role in defending the body against disease-producing organisms e.g. Fungi, bacteria and viruses. The slight increase in the value of the white blood cell (WBC) recorded in T_2 and T_3 is suggestive of a well-adapted immune system. The value for white blood cells (WBC) obtained in the study was within the ranged recommended by Mitruka and Rawnsley (1977) for poultry. The evidence from the result showed that A. macrophylla leaf meal did not alter the normal value for the white blood cells (WBC) of the broilers birds, this implied that the broilers were better equipped immunologically.

The value obtained for haemoglobin concentration (Hb) in the study showed that haemoglobin concentration (Hb) did not reduce below normal, thus indicating the absence of anti-nutritional substances in the experimental diets. The values of Red blood cells (RBC)

and packed cell volume (PCV) obtained in the study were similar to the reference value documented by Mitruka and Raunsley (1977) for healthy chickens.

Data on the serum biochemical indices of finishing broilers chickens fed A. macrophylla leaf meal is presented in table 3.

The serum biochemical parameters determined in the study were not significantly ($p>0.05$) affected by the diet. Normal values for total protein, urea, creatinine, cholesterol, alkaline phosphatase, albumin and globulin were obtained in study.

CONCLUSION

The result of this study showed that 10% inclusion level of A. macrophylla leaf meal in finishing broiler diet had no adverse effect on the haematological and serum biochemistry of the birds. It is therefore recommended that more research should be carried out using higher levels of the leaf meal so as to determine the optimum inclusion level in broilers diet.

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Table1: Ingredient and Nutritional Composition of the experimental finishing Broilers Diets

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

*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.

Table 2: Proximate Composition of Anthonotha macrophylla Leaf meal

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 3: Haematological and serumbiochemical indices of finishing Broiler birds fed Anthonotha macrophylla Leaf meal

Parameter	T_1 control	T_2 5% ALM	T_3 7.5% ALM	T_4 10% ALM	SEM
Haematology					
RBC($\times 10^6$/ul)	2.41 $X10^{10}$	2.56 $X10^6$	2.51 $X10^6$	2.41 $X10^6$	1.02 $X10^6$
WBC($\times 10^5$/ul)	7.21 $X10^5$	7.67 $X10^{15}$	7.53 X 10^5	7.33 $X10^5$	3.81 $X10^5$
PVC(%)	31.30	33.40	33.10	31.50	0.13
Hb(g/dl)	9.20	9.180	9.310	9.23	0.33
Serum Biochemistry					
Total protein(g/dl)	4.52	4.76	4.73	4.57	0.14
Urea (mg/dl)	1.22	1.35	1.14	1.13	0.08
Creatinine(g/dl)	0.64	0.56	0.73	0.91	0.04
Albumin(g/dl)	1.35	1.31	1.34	1.51	0.03
Globulin(g/dl)	3.17	3.45	3.39	3.06	0.12
Cholesterol(mg/dl)	3.54	3.21	3.43	3.01	0.04
Alkaline phosphatase (µ/l)	241.71	237.41	241.03	243.06	2.32