SERUM AND HAEMATOLOGICAL INDICES OF BROILER CHICKEN FED *Amaranthus cruentus* LEAF MEAL AS A REPLACEMENT FOR PREMIX

O.O. OKUNLOLA[1]*, A.A. AKINOSUN[1] AND S.D. OGUNGBENRO[1]
[1]*Department of Animal Health and Production Technology*
Oyo State College of Agriculture and Technology, Igboora
**Correspondence:08064281822;olujuwonokunlola@yahoo.com*

ABSTRACT
Vegetable based feeds are rich sources of essential plant amino acids, vitamins, minerals and antioxidants. The fresh matured leaves were harvested and sundried. The sundried leaves were milled and analysed for their proximate composition. Crude protein 22.90%, crude fibre 8.99%, crude fat 2.77%, and ash 21.70%. One hundred and eight day-old marshall strain broiler chickens were used to evaluate the effects of feeding diets containing *amaranthus cruentus* leaf meal (ACLM) on serum and haematological indices of finishing broilers. The birds were randomly allotted into three experimental treatments groups with the treatments having 3 replicates. There were 12 birds per replicate which made up 36 birds per treatment in a completely randomized design (CRD). Diets were formulated to meet standard requirements. There were significantly ($p< 0.05$) difference in all serum metabolites measured. Birds on T_3 had the highest value of serum protein (g/dl), globulin (3.65g/dl), and creatinine (0.70g/dl) while the lowest value of serum protein was recorded for birds on T_1 and T_2 with birds on T_2 having the lowest globulin value (3.45g/dl) and birds on T_1 having creatinine value (0.60g/dl). All haematological parameters measured showed significant ($p<0.05$) difference. Birds on T_3 had the lowest values of PCV, Hb, RBC, WBC while birds on T_1 had the highest values of all the parameters PCV, Hb, RBC, and WBC with similarity existing in PCV and Hb value of birds on T_1 and T_2. It could be concluded that amaranthuscruentus can replace premix in broiler diets at both starter and finisher phases without any negative effect on the birds.

Keywords: *Amaranthus cruentus,* broilers, serum, haematology, premix.

INTRODUCTION
In most developing nations of the world, there are always been a short supply of animal feed for the population. This problem is further compounded by accelerated increase in human population which creates pressure on every form of food supply.The adoption of vegetable leaves meal is now gaining ground as the high production cost with the use of conditional vitamin premix reduces the profitability of poultry farmer. Amaranths have excellent nutritional value because of their high content of essential micronutrients such as b-carotene, iron, calcium, vitamin C and folic acid (Priya *et al.*, 2007). *Amaranthus hybridus* has higher content of minerals than *Vernonia amygdalina*, *Telfairia occidentalis* (Aletor *et al.*, 2002), The amounts of the nutrient constituents are the commonly used leaf vegetable species in Nigeria have been studied to some extent, the lesser known regional and local species known regional and local species remain virtually and neglected (Kola, 2004).Vegetable based feeds are rich sources of essential plant amino acids, vitamins, minerals and antioxidants (Omenka and Anyasor, 2010). Leaf meals do not only serve as protein sources but also provide some necessary vitamins especially tropical America, Africa and Asia (Candrika *et al.*, 2006). Hence this study focus on determining the serum metabolites and haematological indices of broiler fed *Amaranthus cruentus* leaf meal as a substitute for conventional premix in broilers diet.

MATERIALS AND METHOD
The study was carried out at the poultry unit of the teaching and research farm, Oyo State College of Agriculture and Technology, Igboora which is located at 7'15^{0}N and 3'30^{0}E. The leaves were harvested and sundried. The sundried leaves were milled with a blender and was analysed for proximate composition. Inclusion levels of broiler premix and ACLM was alternated in each of the diets i.e. diet 1,2,3 had 100%, 50%, 0% inclusion of broiler premix while the inclusion of ACLM replaced with broiler premix were at 0%, 50% and 100% respectively. The amounts of the other

ingredients were kept fixed. The ground ingredients were thoroughly mixed after milling and packed into clean bags weighed amount were fed to the birds on daily basis.

Experimental animals and design

One hundred and Eight (108) day-old Marshal strain of broiler chicks were used for the experiment. After weighing, the birds were randomly allotted into three experimental treatments groups with the treatments having 3 replicates. There were 12 birds per replicate which made up 36 birds per treatment. The birds were distributed in a completely Randomized Design (CRD). Birds were housed in deep litter pen with the floor littered with wood shavings prior to the commencement of the experiment. Feed and water were served *ad libitum.* Vaccination and medication of the birds were carried out adequately. Starter mash were offered from (0-4weeks) and finisher mash from (4-8 weeks). The experiment lasted for 8 weeks.

Data collection

At 8th week of the study, birds were randomly selected and 2.5ml of blood samples were collected through jugular vein into labelled sterile universal bottles containing (EDTA) as anticoagulants. These were used to determine haematological indices. Another 2.5ml of blood was collected into labelled sterile sample bottles without anticoagulants and used to determine the serum biochemical metabolites.

Statistical analysis

Data obtained in the study was analyzed according to the procedure of the statistical analysis system (SAS, 1997). Differences observed among the means was subjected to Duncan multiple range test (Duncan, 1995).

RESULTS AND DISCUSSION

Serum metabolites of broilers fed *Amaranthus cruentus* leaf meal (ACLM) are presented in Table 1. All blood parameter considered in this study recorded significant (P< 0.05) difference across dietary treatments. Serum indices ranges from the following; Total Serum Protein (4.65-4.70g/dl), Serum albumin (1.10 - 1.20g/dl), Serum globulin (3.55-3.65g/dl), AST (179.50-180.00IU/U), ALT (26.00-27.50IU/U) and Creatinine (0.60-0.70g/dl). Total serum protein had similar values for treatment 1 and 2 while treatment 3 had the highest values. Similar results were recorded for serum albumin on treatments 1 and 3 while treatment 2 had the highest value. Serum globulin for birds on treatment 3 (3.65g/dl) were significantly (P< 0.05) higher than those on treatment 1 and 2 creatinine for birds on treatment 3 (0.70g/dl) had the highest values which has significantly (P< 0.05) different from values of birds on treatment 1 and 2. Table 2 revealed the effects of ACLM on haematological parameters. There were significant (P< 0.05) difference on most of parameters measured with similar results in packed cell volume and Haemoglobin. Red blood cell (RBC) counts for birds in the control diets (3.30 x 106U/L) were significantly (P< 0.05) higher than those fed the experimental diets with treatment 3 (1.96 x 106H/L) recorded the lowest mean value for RBC counts.Similar results were recorded for packed cell volume (PCV) on treatment 1 and treatment 3 while treatment 3 had the least count. White blood cell (WBC) counts for birds on treatment 2 (17.85 x 103 U/L) were significantly (P < 0.05) higher than those fed the control diets (17.40 x 103U/L) while treatment 3 (16.55 x 103 U/L) recorded the least meant value for WBC counts. Haemoglobin for birds on the control diets had the highest (9.40g/dL) which was statististically similar to those fed on treatment 2 (9.20g/dL) and significantly (P < 0.05) differ than those fed treatment 3 (8.00g /dL). The observed total protein values were within the range of 4.02-8.36g/dl reported by Metruka and Rawnsley, (1977) and 3.25-7.61g/dl by (Rajucker *et al.,* 2009) for broiler birds. The serum total protein was influenced (P< 0.05) by the dietary treatments and this is an indication that the quantity of protein is the diet was adequate as a result of the processing methods and the consumption by birds did not induce stress. Albumin recorded the highest value in treatment 2(1.20g/dl) with similar values in treatments 1 and 3. The consequences of increased globumin are observed in chronic infections, liver damage and kidney dysfunction (Seinchez – Monge *et al.,* 2004). Creatinine had the highest values in birds in treatment 3 (0.70g/dl) and lowest in the control diets (0.60g/dl). Creatinine values which is still within the normal physiological range for chicken is indicative of normal functioning of the kidneys of those chicken as Hammond and Belilies (1980) reported that with normal kidney function, the amount of creatinine in the blood

remains relatively constant and normal. The findings of this study on AST and ALT are in agreement with the range of 20-190IU/I and 25-65IU/I for AST and ALT respectively as reported by Metruka and Rawnsley (1977) for normal chicken and this is an indication of normal functioning of the liver of their animals. Haemotological characteristics of livestock have been observed as facts determining the response of livestock to the diet they are fed (Madubuike and Ekenyen, 2006). The numerical reductions in the haemoglobin, white blood cell and red blood cell of contents of the blood of broilers are indicators that the oxygen carrying capacity of the birds blood would be reduced. The low level of haemoglobin for broilers on treatment 3 implies that there are traces of anti-nutritional factors in the tested diets. This agree, with the observation of Akinmutimi (2004) that processing methods reduces but do not completely eliminate all traces of anti-nutritional factors in fed. The PCV and Hb values were within the reference range24.9 - 45.2% for healthy bird reportedly by (Metruka and Rawnsley 1977). The normal haematological values portray the nutritional status of the broiler chicken and thus indicating adequate nourishment of the birds (Church *et al*, 1984) several factors including physiological Alodan and Mashaly, 1999), environmental conditions (Vercereket *et al*, 2002, Graczyk *et al.*, 2003) and diets (Odunsi *et al.*, 2002) have been reported to be responsible for variation in haematological parameters.

CONCLUSION

It could be concluded that *Amaranthus cruentus* leaf meal can replace premix in broiler diets at both starter and finisher phases without any negative effect on the birds.

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Table 1: Serum Biochemistry of Broilers fed ACLM

Parameter	0%	50%	100%	SEM
Total serum protein(g/dl)	4.65^{ab}	4.65^{ab}	4.70^{a}	0.01
Serum albumin (g/dl)	1.10^{b}	1.20^{a}	1.10^{b}	0.03
Serum globumin(g/dl)	3.55^{b}	3.45^{c}	3.65^{a}	0.05
AST(IU/l)	180.00^{b}	181.50^{a}	179.50^{c}	0.49
ALT(IU/L)	27.50^{a}	27.50^{a}	26.00^{b}	0.41
Creatinine (g/dl)	0.60^{c}	0.65^{b}	0.70^{a}	0.02

Means within row with different superscript are significantly ($p< 0.05$) different.

AST- Aspartate aminotransferase. ALT-Alanine aminotransferase

Table 2: **Haematological parameters of broilers fed ACLM**

Parameters	0%	50%	100%	SEM
PCV (%)	28.50^{a}	28.00^{ab}	24.00^{c}	1.16
Haemoglobin(g/dL)	9.40^{a}	9.20^{ab}	8.00^{c}	0.36
RBC(10^3/UL)	3.30^{a}	2.94^{b}	1.96^{c}	0.33
WBC(10^3/UL)	17.40^{b}	17.85^{a}	1.55^{c}	0.31

means with different superscript are significantly ($p < 0.05$) different PCV = packed cell volume, RBC = Red blood cell, WBC = White blood cell.