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Haematology and Serum Biochemistry Characteristics of Broiler Chicks Fed Varying Dietary Levels of *Ipomoea asarifolia* Leaf Meal

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Abstract: A 49-day feeding trial involving 240 one-week old Anak broiler chicks was carried out to study the haematology and serum biochemistry of broilers fed varying dietary inclusion levels of *Ipomoea asarifolia* leaf meal. The birds were grouped into four dietary treatments of 0%, 5%, 10% and 15% levels of *Ipomoea asarifolia* leaf meal (IALM), which were further replicated 4 times in a completely randomized design. Feed and water supply were offered to birds *ad libitum* while standard management practices were meticulously adopted. At the 8th week of age, 16 birds were randomly selected (4 per treatment), bled 9.00am – 10.00am from punctured vein to aspirate 7mls of blood from each bird for haematology and serum assay. Results of the haematology parameters showed significant differences ($P<0.05$) between treatments, indicating that IALM influenced the values of the parameters. However, packed cell volume (PCV) and Eosinophil did not significantly differ ($P>0.05$) between their treatments. This shows that the IALM influenced the serum chemistry of Anak broilers as their values reduced with increasing levels of IALM.

Key words: Haematology, serum biochemistry, broiler chicks, *Ipomoea asarifolia* leaf meal

Introduction

The persistent decline in the poultry industry and its consequences on the sub-optimal animal protein consumption by Nigerians is a dangerous signal to imminent animal protein malnutrition. Esonu *et al.* (2001) had stated that more than 50% of the country's poultry farms have closed down and another 30% forced to reduce their production capacity because of shortage of feed. This feed shortage has been blamed on high cost of the conventional sources of ingredients which Opara 1996, Madubuike and Ekenyem 2001 have rated at 70-80% of total cost of poultry production. There is need to look for locally available and cheap sources of feed ingredients particularly those that do not attract competition between humans and livestock and for which Esonu *et al.*, 2002 suggested leaf meals of some tropical legumes and browse plants. There is therefore the need to investigate the effect of these unconventional feed resources on the physiological status of the animals especially the haematology and serum biochemistry.

Haematology and serum biochemistry assay of livestock suggests the physiological disposition of the animals to their nutrition. *Ipomoea asarifolia* leaf meal was used in this trial to evaluate the effect of its varying dietary inclusion levels in the haematology and serum profiles of the birds. Esonu *et al.* (2001) had stated that haematological constituents reflect the physiological responsiveness of the animal to its internal and external environments which include feed and feeding. Some scientists have found the effects of various feeds on the haematology and serum biochemistry of livestock and concluded that feed ingredients including unconventional sources affect animal physiology, which makes this study imperative. For example, up to 10% level of raw mucuna could be tolerated by broilers (Emenalom and Udedibie, 1998). Raw mucuna beans contain high level of anti-trypsin activity, phytate, cyanide, tannins (Esonu *et al* 2001) which limits its use in animal feeding.

Awosanya *et al.* (1999) have observed the dependence of blood protein and creatinine on the quality of dietary protein while Iyayi (2001) feeding swine with cassava leaf supplement found that SGOT and SGPT were significantly lowered while serum total protein was significantly increased.

There is therefore need to assess the effect of the various dietary levels of IALM on haematology and serum responses of broilers as a guide to optimum production of healthy and safe poultry products. The proximate composition of *Ipomoea asarifolia* is as shown in Table 1.

The results of the chemical analysis of *Ipomoea asarifolia* was a guide for the formulation of four broiler starter diets and four finisher diets each containing IALM at 0, 5, 10, and 15% levels. The diets were iso-energetic.

Materials and Methods

A total of 240 one-week old Anak broiler chicks were used in 49-day feeding trial in a completely randomized design to assess the haematology and serum biochemistry of broilers fed varying dietary inclusion levels of *Ipomoea asarifolia* leaf meal (IALM). The levels were 0%, 5%, 10% and 15% (Table 2). The four dietary treatments were further replicated 4 times with 15 birds per treatment. Feeding and water supply to the birds

Table 1: Proximate Composition of *Ipomoea asarifolia* Leaf meal

Nutrient	Value (%)
Crude fibre	16.90
Crude protein	32.00
Ash	7.10
Ether Extract	7.60
Moisture	15.00
NFE	20.79
Metabolisable Enegy (Kcal/kg)	2760.00
MINERAL COMPOSITION:	
Mineral calcium	0.50
Magnesium	0.63
Sodium	0.29
Potassium	0.50

were *ad libitum* while other standard management practices were adopted. At the 8th week of age, one bird was randomly selected from each replicate, making a total of 16 birds. The sampled birds were bled between 9am – 10.00am from punctured vein to aspirate 7mls of blood from each bird from which 2mls of each was collected into bijon bottle treated with ethylene diamine tetra acetic acid (EDTA) for haematological assay. The remaining of each blood sample was allowed to coagulate to produce sera for blood chemistry measurements according to the methods of Okeudo *et al*. (2003).

Blood samples were analyzed within 3 hours of their collection for total erythrocyte, haematocrit (PCV), haemoglobin (Hb), erythrocyte sedimentation rate (ESR) and differential leucocytes count according to the methods described by Dein (1984). Erythrocyte (RBC) count was done in a haemocytometer chamber with Natt and Herdrics dilluent to obtain a 1:200 blood dilution. The number of leucocyte was estimated as total WBC x 200. Packed cell volume (PCV) was measured as micro haematocrit with 75 x 16mm capillary tubes filled with blood and centrifuged at 3000 r.pm. for 5 minutes. The differential count of leucocytes was made from blood stained with Wrights dye and each type of cell countered with laboratory counter. Haemaglobin concentration (Hbc) was also calculated. Erythrocyte sedimentation rate was determined within six hours of sample collection according to the methods described by Orji *et al*. (1986). The clotting time was also measured using the glass slide method (Benjamin, 1961).

The coagulated blood was subjected to standard method of serum separation of the harvested total serum protein (TSP) and total serum electrolyte (TSE). The TSP was determined by the Golberge refractometer method to obtain concentrations (g/dl) per blood sample. The standard flame photometer (Gallencamp) was used to determine (Na^+) ion and potassium (k^+) ion. Data were subjected to one-way analysis of variance according to Snedecor and Cockran (1978) while significant mean differences were separated by Duncan's multiple range test, (Onuh and Igwemma 1998).

Results

Haematological parameters table 3 showed significant differences ($P<0.05$) between treatments indicating that IALM influenced the values of the parameters. However, PCV and Eosinophil showed no significant differences ($P>0.05$) between the treatment groups.

Packed cell volume = PCV, Red blood corpuscles = RBC, Haemoglobin Hb, Mean corpuscular volume = MCV, Mean corpuscular haemoglobin concentration = MCHC, White blood corpuscles = WBC, Erythrocyte sedimentation rate (ESR). The serum biochemistry results Table 4 showed significant differences ($P<0.05$) between the treatments. This shows that IALM influenced the serum chemistry of the experimental birds as their values reduced with increasing levels of IALM.

Discussion

The haematological values of the experimental Anak 2000 broiler (Table 3) indicate that PCV was within normal range (Merk Veterinary Manual, 1979) and did not differ significantly ($P>0.05$) between treatments. However, birds on 15% IALM had slightly lower PCV than the normal range. This implies that including IALM on diets of broilers had little or not effect on the relative quantity of blood cells as compared with the total volume of blood (Health and Olusanya, 1985). This report did not agree with Iheukwumere *et al*. (2002), which reported significant difference ($P<0.05$) in PCV arising from varying levels of feed restriction. However, the birds in the present research were not restricted from feeding, yet the feed intake varied between treatments. This suggests that what mattered was not just the type of feed but the extent of restriction. The values of RBC, HB, MCV, and ESR showed significant ($P<0.05$) treatment differences. This finding agrees with Iheukwumere *et al*. 2002 which reported significant differences ($P<0.05$) between treatments on haemoglobin (Hb) and Red blood corpuscles values. However, the RBC values for all treatments were higher than the normal range (Merck, 1979). The result show that the more IALM was included in the feed the lower the value of RBC. The results shows that blood quality was reduced in 15% level by high fibre level which made its ESR highest. The blood coagulation time was significantly longer in 10% and 15% levels, than 0% and 5% levels suggesting that IALM has substances that reduced blood coagulation time. The neutrophils were within normal range 20-40 (Health and Olusanya, 1985). Though significant difference ($P<0.05$) were observed between treatments, it was not attributable to diet effect. Because they were within normal range, are capable of performing their phagocytic

Table 2: Composition of the Broiler Diets (For 100kg feed)

Ingredients	T_1	T_2	T_3	T_4
Maize grain	30.0	30.0	30.0	30.0
Soyabean meal	2.50	20.0	15.0	10.0
Groundnut cake	5.0	5.0	5.0	5.0
Leaf meal (IALM)	0	5.0	10.0	15.0
Palm kernel meal	10.0	10.0	10.0	10.0
Wheat offal	6.0	6.0	6.0	6.0
Oyster shell	3.2	3.2	3.2	3.2
Limestone	3.11	3.11	3.11	3.11
Nacl	0.3	0.3	0.3	0.3
L-lysine	0.08	0.08	0.08	0.08
DL Methionine	0.06	0.06	0.06	0.06
Premix	0.25	0.25	0.25	0.25
Calculated chemical composition:				
Dry matter	83.16	82.91	82.60	82.41
Crude protein	22.71	22.21	21.71	21.21
ME Kcal/kg	2577.22	2580.47	2583.87	2587.27
Ether Extract	4.62	4.83	5.03	5.24
Crude fibre	5.86	6.38	6.90	7.42

Table 3: Haematology of experimental broilers

Parameters	0%IALM	5%IALM	10%IALM	15%IALM	SEM
PCV (%)	35.40^{a}	32.65^{a}	32.25^{a}	29.60^{a}	1.665
RBC (x $10^{6}mm^{3}$)	4.43^{a}	3.60^{b}	3.55^{b}	3.10^{c}	0.064
HB (%)	10.70^{a}	9.90^{a}	9.80^{b}	8.60^{c}	0.211
MCV (mm^{3})	95.55^{c}	91.85^{b}	90.80^{b}	81.45^{a}	1.169
MCH (%)	27.7^{d}	27.6^{bc}	27.5^{ac}	24.7^{ab}	0.637
MCHC (%)	30.45^{b}	30.25^{b}	30.00^{b}	29.00^{b}	0.694
WBC x $103/mm^{3}$	27.75^{a}	27.25^{ab}	26.25^{b}	22.75^{c}	0.354
ESR mm/hr	6.5^{c}	11.0^{ab}	7.0^{bc}	14.0^{a}	1.25
Netrophils (%)	22.75^{b}	30.50^{a}	25.00^{b}	33.00^{a}	1.676
Lymphocytes (%)	70.5^{a}	$61.5b^{c}$	67.5^{ab}	59.0^{c}	2.087
Eosinophil (%)	2.5^{a}	2.5^{a}	2.5^{a}	2.5^{a}	0.289
Basophil (%)	4.0^{b}	5.5^{a}	5.0^{a}	5.5^{a}	0.354
Blood coagulation time (second)	75.25^{b}	73.75^{b}	83.75^{a}	86.25^{a}	2.077

abc: Means within same row with different superscripts are significantly different ($P<0.05$).

functions. Also, significant differences ($P<0.05$) existed between treatments in the lymphocytes but they were all within normal range.

The parameters in serum electrolytes showed significant differences between treatments with birds on 0% IALM showing superior values to other treatments. The consistent decline in value as higher level of IALM is included suggests that additional levels of IALM in feeds had a progressive reduction influence on the quantity of electrolytes in the blood system. All the values obtained from the minerals in this trial were generally lower than those reported by Iheukwumere *et al.* (2002) and also lower than values obtained by Iheukwumere and Herbert (2003). The implication is that breed/strain may affect the electrolyte values because even the control experiment had lower values than those of Iheukwumere *et al.* 2002 and Iheukwumere and Herbert (2003). The values of cholesterol declined with increasing levels of IALM in diets. This observation is very positive especially now that people are very conscious of reducing cholesterol content of animal protein, which has made some people reject red meat, the kidney function variables such as creatinine and urea significantly ($P<0.05$) varied between treatment and their values reduced with increasing levels of IALM. This trend also applied to urea, implying a reduction in efficiency of the kidney function. Total protein, inorganic phosphorus and alkaline phosphatase also followed same trend suggesting that the higher the inclusion level of IALM in diets, the lower the value of serum biochemistry variables.

Conclusion: *Ipomoea asarifolia* leaf has high potentials as a feed ingredient in poultry production and could be included up to 10% without deleterious effects. Further research should direct attention to the toxicological values of the leaf to determine its influence on health

status of the birds and even consumers.

Increasing the level of IALM depressed most haematology and serum parameters, an observation probably caused by stress factors generated by higher fibre levels of additional leaf meal. There is also the need to establish normal ranges of the haematological and serum parameters for Nigerian poultry strains.

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