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BLOOD INDICES OF EGG-TYPE CHICKENS FED DIETS CONTAINING *ASPILIA AFRICANA*

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ABSTRACT

This study determines the effect of dietary replacement of soyabean meal with Aspilia africana leaf meal (ALM) on the haematological and serum biochemical indices of Isa brown strain of pullets. One hundred and ninety-two (192) pullets (14 weeks old) were assigned to four treatment groups; Control, 10, 20, and 30%ALM. Four replicates of twelve (12) birds each were distributed in a Completely Randomized Design. Data collected were analyzed using inferential statistics. Packed Cell Volume, Haemoglobin, Red Blood Cell and White Blood Cell increased ($p < 0.05$) with more inclusion of Aspilia while MCV and MCH reduced ($p < 0.05$) with increase in the Aspilia inclusion. Blood glucose, total protein, albumin and uric acid of the pullet birds increased ($p < 0.05$) with increase in dietary Aspilia. Both globulin and AST content of all treatments containing Aspilia (inclusion level notwithstanding) were higher than the control with no inclusion at all. The study showed that A. africana had a significant effect on both haematological and serum biochemical indices of Isa Brown pullets.

Keywords: Isa brown, haematological, biochemical, poultry production, feeding

INTRODUCTION

The two critical areas of note when considering cost reduction for optimal profit in poultry production include the cost of feeding and medication. One way of minimizing feeding cost includes the use of alternative, cheaper and non-competitive feed ingredients. The exploitation of locally available and cheap feed resources helps to forestall the threat that this situation poses to the future of poultry production (Obuzor and Nturi, 2011).

A number of locally sourced feed ingredients have been considered in the past. These include leaf meals of some tropical legumes and browse plants capable of supplying proteins, minerals, antibiotics (Oko and Agiang, 2011). *Aspilia africana* is one of such plants and has been found to be fortified with medicinal characteristics and capable of supplying proteins and minerals (Yusuf *et al.*, 2013). The study of blood indices is useful in health and physiological indicator of the birds, and it is majorly influenced by nutrition, pathology and the environmental factors the birds are subjected to (Petra *et al.*, 2014). Hence, this study is designed to determine the effect of dietary *A. africana* on the blood indices of pullet chickens.

MATERIALS AND METHODS

The experiment was carried out at the Institute of Food Security Environmental Resources and Agricultural Research (IFSERAR), Federal University of Agriculture, Abeokuta Ogun State, Nigeria. The farm lies within Latitude 7° 10' N longitude 3° 21' E (Google earth, 2018) and altitude 76mm located within derived savannah zone of south western Nigeria. It has a humid climate with mean annual rainfall of 1037mm and temperature of about 34° C.

Experimental procedure: Fresh *A. africana* leaves, collected around the University Campus area were air-dried for three days, milled and included in the chicken diets at various levels. One hundred and ninety-two 12 weeks old pullets were sourced and put on commercial feed during the first 2 weeks of acclimatization. Clean water was given *ad libitum* throughout the period of the experiment. Four



treatments, Control, 10, 20, and 30%ALM in which 0, 10, 20 and 30% of soybean component of the diet were replaced with *A. africana* respectively in a Completely Randomized Design. Each treatment was replicated four times comprising twelve pullets per replicate. At 15th and 16th weeks of age, the birds were vaccinated against Newcastle disease and Infectious bronchitis disease respectively. The experiment lasted for 6 weeks.

Table 1 Composition of experimental diet

Feed Ingredient	Control	10% ALM	20% ALM	30% ALM
Maize	42.00	42.00	42.00	42.00
Wheat bran	23.00	23.00	23.00	23.00
Soybean Meal	15.10	13.59	12.08	10.57
<i>Aspilia africana</i>	0.00	1.51	3.02	4.53
Bone meal	2.00	2.00	2.00	2.00
Limestone	2.00	2.00	2.00	2.00
Lysine	0.20	0.20	0.20	0.20
Methionine	0.20	0.20	0.20	0.20
*Premix	0.25	0.25	0.25	0.25
Palm kernel cake	15.00	15.00	15.00	15.00
Salt	0.32	0.32	0.32	0.32
Total	100.00	100.00	100.00	100.00
Determined analysis				
ME (kcal/100g)	331.48	344.51	329.60	344.51
Crude Protein	18.87	19.35	18.94	20.08

Data collection: Five (5mls) each of blood samples were collected from two birds per replicate at age twenty. The blood samples were collected via wing vein with sterile needle into ethylene-diamine-tetra acetic acid (EDTA) tubes for haematological analysis as described by Ayodele *et al.* (2021) and ordinary bottle for serum biochemical analysis.

Statistical analysis: Statistical analysis was performed using one-way analysis of variance (ANOVA). The means were separated using Duncan's Multiple Range Test in SAS (2012) software package.

RESULTS

Table 2 showed that the egg type chickens fed with the experimental diet 30%ALM have the highest ($p < 0.05$) value of Packed Cell Volume (PCV). This value however is similar to the values obtained for those on control and 20%ALM diets. The Haemoglobin (Hb), Red Blood Cell (RBC) and White Blood Cell (WBC) values follow similar trend as 20%ALM and 30%ALM with higher inclusion of *Aspilia* recorded significantly ($p < 0.05$) higher values than the birds in 0 and 10% ALM groups.

The birds fed 20%ALM had the higher ($p < 0.05$) heterophil value and lower ($p < 0.05$) lymphocytes value. The heterophil-lymphocyte ratio is higher ($p < 0.05$) also in 0%ALM birds. The Mean Corpuscular Volume (MCV) and Mean Corpuscular Haemoglobin (MCH) values follow same trend with 0%ALM and 10%ALM groups recording similar but higher ($p < 0.05$) value than 20%ALM and 30%ALM groups.

Table 2: Effect of *A. africana* inclusion in the diets of egg type chicken on haematological characteristics

Parameters	Control	10% ALM	20% ALM	30% ALM	SEM
Packed Cell Volume (%)	28.87 ^{ab}	27.87 ^c	31.75 ^{ab}	32.75 ^a	0.68
Haemoglobin (g/dl)	9.56 ^{ab}	9.25 ^b	10.61 ^a	10.81 ^a	0.23
Red Blood Count ($\times 10^2/L$)	4.02 ^b	3.88 ^b	4.83 ^a	4.83 ^a	0.12
White Blood Count (g/100 ml)	13.55 ^b	12.50 ^b	18.90 ^a	19.10 ^a	0.77
Heterophil (%)	14.75 ^b	18.25 ^b	25.50 ^a	18.12 ^b	1.23
Lymphocyte (%)	81.50 ^a	78.37 ^a	71.37 ^b	78.75 ^a	1.20
H/L	0.18 ^b	0.24 ^b	0.36 ^a	0.24 ^b	0.02
Monocytes (%)	1.75	1.62	1.37	2.37	0.29



Basophil (%)	0.37	0.50	0.37	0.12	0.10
Eosinophil (%)	1.62	1.25	1.37	0.62	0.22
Mean Corpuscular Volume (fl)	71.98 ^a	72.00 ^a	65.83 ^b	66.88 ^b	0.63
Mean Corpuscular Haemoglobin Conc. (%)	33.25	32.96	33.33	33.63	0.14
Mean Corpuscular Haemoglobin (pg)	23.85 ^a	23.82 ^a	22.02 ^b	22.35 ^b	0.19

Means with different superscript along the row are significantly ($p < 0.05$) different. H/L -Heterophyl lymphocyte ratio; ALM – *Aspilila africana* leafmeal, SEM – Standard error of mean

In Table 3, the birds fed 30% ALM had the highest ($p < 0.05$) value of blood glucose (187.35mg/dl), similar to the value (172.20 mg/dl) recorded for birds on 20%ALM. Birds on control diet recorded the lowest ($p < 0.05$) value. The blood protein value of the birds fed 30%ALM have the highest ($p < 0.05$) value of 71.4875g/dl while birds on the control diet and 10%ALM recorded least ($p < 0.05$) values. The birds on 30%ALM also recorded higher ($p < 0.05$) albumin value than other three groups which have similar and lower values. The Globulin and aspartate aminotransferase (AST) values follow similar trend with birds on the control diet recording lower ($p < 0.05$) values while all groups with *A. africana* recorded higher ($p < 0.05$) values. The Uric value was highest ($p < 0.05$) with 30%ALM chickens while birds on control and 10%ALM recorded the least.

Table 3: Effect of *A. africana* inclusion in diet of egg type chicken on Serological indices.

Parameters	Control	10% ALM	20% ALM	30% ALM	SEM
Glucose (mg/dl)	142.47 ^c	165.61 ^b	172.20 ^{ab}	187.35 ^a	4.26
Total protein(g/dl)	61.06 ^c	64.31 ^c	66.80 ^b	71.48 ^a	0.91
Albumin (g/dl)	35.96 ^b	36.37 ^b	38.07 ^b	42.11 ^a	0.63
Globulin (g/dl)	25.10 ^b	27.93 ^a	28.65 ^a	29.30 ^a	0.50
AST (iu/l)	115.42 ^b	136.42 ^a	142.66 ^a	143.10 ^a	2.87
ALT (iu/l)	72.56	61.71	75.15	62.17	3.03
ALP (iu/l)	195.13	195.37	201.73	219.51	4.70
Cholesterol (mg/dl)	217.92	201.48	224.52	175.87	9.97
Bilirubin	0.65	0.60	0.60	0.68	0.02
Calcium	10.31	10.14	10.03	10.71	0.15
Phosphorus (mg/dl)	6.42	7.77	7.74	6.89	0.26
Uric (mg/dl)	9.23 ^c	11.01 ^{cb}	13.63 ^{ab}	15.38 ^a	0.65

a,b Means with different superscript along the row are significantly ($P < 0.05$) different

ALM – *Aspilila africana* leafmeal, SEM – Standard error of mean

DISCUSSION

The PCV values reported in this study for the egg type chickens were within the normal range of 22 –35% reported by Benerjee (2009) for healthy chickens. Increase in PCV was observed as there was progressive increase in the level of *A. africana*. PCV are generally affected by inadequate intake of energy and protein with lower values which indicates anaemia (Muhammad and Oloyede, 2009). The values obtained for haemoglobin were within the standard range of 7-13g/dl (Mitruka *et al.* 1981). The Red blood cells (RBC) values reported in this study was observed to be higher than the range (2.5-3.5 x10¹⁰/l) reported by Benerjee (2009) for normal/healthy chickens. This implies that addition of *A. africana* shoot meal in feeds might have the tendency to improve RBC synthesis. The values obtained for White Blood Count (WBC) of the layer birds were within the reference range of 9-31x10³/mm³ for healthy birds (Reitman and Frankel, 1957). This agrees with the work of Linus and Lawrence (2015) that used varying levels of *Azadirachta indica* included in diets of layer birds. The highest value of WBC recorded for birds fed with more (30%) *A. africana*. WBC are known to fight against diseases, the result of this study indicates that birds fed on 30% *A. africana* have an immunity status which is more superior (Soetan *et al.*, 2013). The heterophil is the cellular component of the non-specific immune system. The heterophil is the most common granulocyte found in birds. The normal range of heterophils is between 40- 75% (Mitruka and Rawsley, 1977). It was observed to be highest in 20% (25.50%). The Heterophil/ Lymphocyte Ratio are a

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good indicator of stress in chickens (Latimer and Bienzle, 2000). Birds fed *A. africana* were significantly stressed compared to birds fed with the control diet.

The Mean corpuscular haemoglobin (MCH) values reported in this study for the layer birds were lower than the normal range (33.0 – 47.0 pg) reported by Benerjee (2009) for normal or healthy chickens. The birds fed with *A. africana* were statistically similar and significantly lower than the control. Since MCH is an indicator of the blood carrying ability of the RBC, this could suggest that the birds on the control group may be less efficient in performing respiratory function as observed by (Soetan, *et al*, 2013). The concentration of glucose and uric showed an increase from the control diet to 30% as increase in level of *A. africana*. The glucose values in the present study were lower than the normal range reported by Coles (1977). In this regard *A. africana* leaf meal may be said to have lowered blood glucose level.

Total protein was observed to be elevated in birds with *A. africana* included in their diets than control. Serum protein actually depends on availability of dietary protein. This means that the proteins of the leaf meal diets were more available to the birds. The results are in line with findings of Samarth *et al*. (2003), who reported that the *Amaranthus paniculatus* leaf meal inclusion increased the serum proteins as compared to control. Albumin level was observed to increase significantly with increase in the quantity of *A. africana*. Using the same diet with graded level of *A. africana* inclusion, the significant increase in values may suggest a higher protein intake by the birds. The AST content of all treatments containing *Aspilia* were higher than the control suggesting liver tissue damage in egg-type chickens.

CONCLUSION AND RECOMMENDATION

The study showed increased haematological and serum indices with increased *A. africana* leaf meal inclusion. *A. africana* can replaced soybean in the diet of egg-type chickens up to fifteen percent..

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