EFFECT OF MISTLETOE LEAF MEAL ON THE HAEMATOLOGICAL AND SERUM BIOCHEMICAL INDICES OF BROILER CHICKENS IN THE SEMI-ARID REGION OF NIGERIA

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ABSTRACT
Feeding trial was conducted to investigate the nutritional value of Mistletoe leaf meal (MLM) (*Tapinanthus bangwensis*) as feed resource using two hundred and twenty five (225) day old chicks. MLM was usedat graded levels of 0, 5, 10, 15 and 20% . The birds were randomly allotted to the five diets in groups of forty five (45) each and replicated thrice of fifteen (15) birds. Conventional management practices were strictly adhered to. A set of 2 ml blood samples were taken from 3 broilers per treatment into plastic tubes containing the anti-coagulant ethylene diamine tetraacetic acid (EDTA) and the other bottle without the anticoagulant for the determination of haematological and serum biochemical parameters respectively. The haematology includes PCV, Hb, RBC, WBC, MCV, MCH and MCHC while the serum biochemistry includes total protein, albumin, globulin glucose, cholesterol, urea, creatinine, electrolyte constituents, ALAT and ALAT. Data on haematological and serum biochemical indices were analysed using completely randomized design and significant means were separated using least significant difference. The results for the haematology revealed non-significant ($P>0.005$) differences among the dietary treatment groups for PCV, Hb concentration, RBC count, and WBC count. The parameters evaluated are all within the recommended haematological range values for broiler chickens. The result obtained in this study revealed that there were no significant ($P>0.05$) differences for the serum biochemical indices (total protein, albumin, globulin, glucose, cholesterol, creatinine, sodium, calcium and ALAT) among the treatment groups. However there were significant ($P<0.005$) differences for urea, potassium and ASAT among the treatment groups. The values however, did not follow any definite trend.It is concluded that inclusion of MLM in the diets of broiler chickens will support optimum performance and does not cause deleterious effect on the health status of broiler chickens.
Keywords: Broilers; Mistletoe; Proximate; Haematology; Serum.

INTRODUCTION
Poultry farming plays a major role in bridging the protein and other margin gap in developing countries where average daily consumption is far below recommended standards. A major constraint to poultry production in Nigeria is the very high cost of conventional feeding stuffs especially the primary energy and protein sources. Leaf meals have been incorporated in the diets of poultry as a means of reducing the high cost of conventional protein sources (Nworgu *et al*., 2013). There is evidence in the literature of the beneficial effects of using leaf meal from different sources in poultry production (Iheukwumere *et al*., 2008; Egbenwade *and* Olorede, 2003; Fasuyi *et al*., 2005). D'Mello *et al*. (1987) observed that leaf meals do not only serve as protein source but also provide some necessary vitamins, minerals and oxycaretenoids which cause yellow colour in the skin and shank of Abore Acre breed of broiler chicken.
Mistletoe leaf is not commonly used in the livestock industry and very few documented studies were found to have evaluated their effects on poultry production. Extracts from the plant contain different molecules that have intrinsic bioactivities affecting animal physiology and metabolism. Some of these compounds have been reported to improve animal performance due to their stimulating effect on salivation and pancreatic enzyme secretions or by having a direct bactericidal effect on gut micro-flora (Hardy, 2002). The present study was thus designed to investigate the haematological and serum biochemical indices of broiler chickens fed varying dietary levels of Mistletoe Leaf Meal (MLM).

MATERIALS AND METHODS

The study was carried out at the Poultry unit of the Animal Production Technology, Ramat Polytechnic, Maiduguri, Borno State. The feeding trial lasted for 45 days. Two hundred and twenty five broilers chickens of the 'Abore Acre' strain were purchased from a reputable hatchery. The birds were brooded together for two weeks in a deep litter pen measuring 2m x 3m2. Kerosene stoves and lanterns were used to provide the necessary heat used to maintain the optimum temperature range for the birds at this stage. Feeding was carried out twice daily between the hours of 07.00-08.00 am and 5.30-6.30 pm. Water was provided *ad libitum*. All the necessary vaccines and medication needed by the birds were strictly administered. At the end of the two weeks of brooding, forty five birds were randomly selected from the pool on the basis of vigour. The birds were randomly assigned to five treatments with forty five birds per treatment in a Completely Randomized Design. Each treatment was further replicated thrice with fifteen birds each. Fresh neem leaves were harvested from neem trees within Polytechnic campus, Maiduguri. The leaves were dried on bare floor in a well-ventilated room for 7 days and were later ground to fine particle size using a plate mill. The milled leaves were incorporated into the diets at levels of 0, 5, 10, 15 and 20% in treatments 1, 2, 3, 4 and 5, respectively. Treatment 1 had no MLM and served as the control. A 23% CP diet (Table 1) was fed to the birds during the finisher phase (29-49 day). All data collected were subjected to analysis of variance (ANOVA) according to the procedure of Steel and Torrie (1980). Significantly different means were separated according to Least Significant Difference.

Table 1: Ingredient Composition of the Experimental Broiler Finisher Diet

	Levels of Mistletoe leaf Meals (%)				
Ingredients	**0**	**5**	**10**	**15**	**20**
Maize	58.12	56.45	54.00	53.00	47.00
Wheat Offal	12.00	12.00	12.00	12.00	12.00
Mistletoe leaf meal	0.00	5.00	5.00	5.00	5.00
Groundnut Cake	11.88	8.55	6.00	4.00	3.00
Soya bean meal	10.00	10.00	10.00	10.00	10.00
Fish Meal	4.00	4.00	4.00	4.00	4.00
Bone Meal	3.00	3.00	3.00	3.00	3.00
Salt (NaCl)	0.25	0.25	0.25	0.25	0.25
Premix	0.25	0.25	0.25	0.25	0.25
Methionine	0.25	0.25	0.25	0.25	0.25
Lysine	0.25	0.25	0.25	0.25	0.25
Total	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**
Calculated analysis					
ME (Kcal/kg	2905.23	2897.83	2833.48	2932.86	2836.24
Crude protein (%)	19.99	19.33	18.93	18.92	18.86

ME = Metabolizable energy calculated according to the formula of Pauzenga (1985):
ME = 37x% CP+81x%EE+35.5 x %NFE

RESULTS AND DISCUSSION

Haematological Indicesof Broiler Chickens

The results for haematological indices(Table 2) revealed non-significant (P>0.005) differences among the dietary treatment groups for Packed Cell Volume (PCV), Haemoglobin (Hb) concentration, Red Blood Cells (RBC) count, and White Blood Cells (WBC) count, respectively. RBC counts recorded in this study are 5.57, 3.57, 3.57, 3.77 and 3.47 $X10^6/mm^3$ for treatments 1, 2, 3, 4 and 5, respectively were within the normal range (2 – 4 $X10^6/mm^3$) for broiler chickens reported by Anon (1980). However, the mean RBC value of the control (0% MLM) is slightly higher (5.57 $X10^3mm^3$) than the reported value. The results obtained for WBC in this study were 3.00, 12.43, 13.73, 10.83 and 7.07 $X10^3mm^3$for treatments 1, 2, 3, 4 and 5, respectively were within the normal range for broiler chickens (9 – 13 $X10^3mm^3$) reported by

Aiello and Mays (1989) except for diet 5 which was slightly below the recommended value (7.07 $X10^3mm^3$).The results for haematological indices obtained in this study showed that the test ingredient did not impede oxygen carrying capacity of the blood in meeting the demand for broilers chickens (Egbewande *et al*., 2011). The results obtained for MCV, MCH and MCHC differed (P<0.05) significantly among the treatment groups. The differential counts of these cells indicated that Neutrophil and Eosinophil counts did not differ significantly (P>0.05) among the dietary treatment groups. However, Lymphocytes, Basophils and Monocytes counts differed (P<0.05) significantly. Bhatti *et al*. (2008) observed neutrophils microphages (monocytes) are components of WBC that are involved both in oxygen-independent and oxygen-dependent mechanism for combating viral infection and killing and engulfing bacteria. The Neutrophils appeared to have similar variations between the treatment groups. The mean values obtained are in line with the findings of Ologhobo *et al*. (1992). The Lymphocytes recorded (28.33 – 35.00%) were lower than the 40 – 48% reported by Bhatti *et al*. (2002). This implied that, all the treatment groups may have adequate immune status.

Table 2: Haematological Indices of Broiler Chickens Fed Graded Levels of Mistletoe LeafMeal

	Level of Mistletoe leaf Meal (%)					
Constituents	**0**	**5**	**10**	**15**	**20**	**SEM**
Packed Cell Volume (%)	23.00	25.67	24.00	21.33	24.00	3.38^{NS}
Haemoglobin (g/dl)	7.17	8.53	7.97	7.10	7.00	1.12^{NS}
Red Blood Cell (x 10^6ml)	5.57	3.57	3.57	3.77	3.47	1.11^{NS}
White Blood Cell (x 10^3ml)	13.00	12.43	13.73	10.83	7.07	3.58^{NS}
Mean Corpuscular Volume (fl)	41.29^{e}	71.90^{a}	67.22^{c}	56.58^{d}	69.16^{b}	14.20*
MCH (pg)	12.87^{e}	23.89^{a}	21.82^{b}	18.83^{d}	20.17^{c}	8.11*
MCHC (%)	31.17^{c}	33.23^{a}	32.46^{b}	33.28^{a}	29.17^{d}	27.74*
Differential counts (%)						
Neutrophils	50.33	52.00	52.00	46.33	51.00	2.65^{NS}
Lymphocyte	35.00^{a}	33.67^{ab}	30.00^{bc}	28.33^{c}	31.67^{abc}	2.03*
Eosinophils	3.00	2.33	3.00	3.00	3.00	0.43^{NS}
Basophils	0.00^{b}	0.67^{a}	0.00^{b}	0.00^{b}	0.67^{a}	0.30*
Monocytes	3.00^{c}	3.33^{bc}	3.67^{abc}	4.67^{a}	4.33^{ab}	0.56*

MCH = Mean Corpuscular Haemoglobin, MCHC = Mean Corpuscular Haemoglobin Concentration.

Serum Biochemical Indicesof Broiler Chickens

The results for serum biochemical indices (Table 3) revealed that there were no significant (P>0.05) differences for the serum biochemical indices (total protein, albumin, globulin, glucose, cholesterol, creatinine, sodium, calcium and ALAT) among the treatment groups. However there were significant (P<0.005) differences for urea, potassium and ASAT among the dietary treatment groups. The values however, did not follow any definite trend. The levels of total blood protein and creatinine contents usually depend on the quantity and quality of dietary protein fed (Awosanya *et al*., 1999; Esonu *et al*., 2001).The albumin values obtained in this study are within the normal recommended range (1.30 to 2.80 g/dl) for broiler chickens as reported by Aiello and Mays (1998). The slightly higher value recorded for treatment 5 (20% MLM) may suggest a higher protein intake by the chickens, in order to meet the demand for physiological body function. The results of the electrolyte constituents obtained were not significantly (P>0.05) affected except potassium which showed significant (P<0.05) differences among the various treatment groups. This indicates that MLM can be included up to 20% in the diets of broiler chickens without any adverse effect on the electrolyte constituents of broiler chickens.

Table 3: Serum Biochemical Indices of Broiler Chickens Fed Graded Levels of Mistletoe Leaf Meal

	Level of Mistletoe leaf Meal in the Diets (%)					
Parameter	0	5	10	15	20	SEM
Total Protein (g/dl)	4.60	5.41	4.48	5.73	4.65	1.63^{NS}
Albumin (g/dl)	2.64	2.52	2.73	2.21	3.23	1.98^{NS}
Globulin (g/dl)	1.96^{c}	2.89^{b}	1.75^{d}	3.52^{a}	1.42^{e}	0.08*
Glucose (g/dl)	68.80	67.07	68.23	65.90	66.10	34.72^{NS}
Cholesterol (mg/dl)	43.73	43.73	40.10	38.14	21.55	14.40^{NS}
Creatinine (mmol/l)	92.33^{a}	84.33^{ab}	89.67^{ab}	88.00^{ab}	86.41^{ab}	8.41*
Urea (mmol/l)	4.17^{a}	2.50^{b}	5.82^{a}	3.02^{b}	3.77^{ab}	1.13*
Sodium (mmol/l)	141.34	140.53	144.32	141.73	143.52	24.17^{NS}
Potassium (mmol/l)	2.63^{c}	4.60^{ab}	5.80^{ab}	7.40^{a}	4.00^{bc}	1.38*
Chloride (mmol/l)	84.57	87.77	76.80	85.83	88.27	12.92^{NS}
Calcium (mmol/l)	3.93	3.87	3.70	13.40	2.67	6.92^{NS}
ALAT (IU/L)	9.39	10.35	10.37	9.87	10.03	2.23^{NS}
ASAT (IU/L)	16.00^{a}	17.33^{c}	17.00	18.68	19.33	5.29^{NS}

ALAT= Alanine amino transferase, ASAT = Aspartate amino transferase.

CONCLUSION AND RECOMMENDATION

Based on the findings, it can be concluded that the test ingredient did not impede oxygen carrying capacity of the blood in meeting the demand for broilers chickens. It is recommended that MLM can be included up to 20% in the diets of broiler chickens without any adverse effect on the health status of broiler chickens.

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