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BLOOD PHYSIOLOGY OF HERITAGE TURKEY HENS ADMINISTERED *MORINGA OLEIFERA* LEAF AND SEED EXTRACTS

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ABSTRACT

The study examined the serum as well as the heamatological effect of Moringa oleifera leaf and seed extracts on the heritage turkey hens. A total of 36 female turkeys were used for the study, which were randomly assigned into four treatment groups. Replicated three times with three turkey hens, each treatment were administered 0 gram of Moringa (T_1), 1 gram of Moringa seed alone (T_2) combination of 0.5g of Moringa seed and 0.5gram of Moringa leaf (T_3) lastly, 1 gram of Moringa leaf alone (T_4) . Blood samples collection was done at 36 weeks of age. The results showed that there were no significant differences (P>0.05) in the red blood cell (RBC), Mean Corpuscular Volume (MCV), White Blood Cell (WBC) and the Packed Cell Volume (PCV). The Mean Corpuscular Heamoglobin (MCHC), Mean Corpuscular Heamoglobin (MCV), Heamoglobin (Hb) differed significantly (P<0.05) among the treatment groups. While the serum biochemical report shows that, there are significant difference (P<0.05) on the glucose, total protein, albumen, bilirubin, urea, creatinine, AST and calcium. The cholesterol, sodium and potassium level did not differ significantly. It is therefore safe to conclude based on the study that Moringa improved the blood quality of the local female turkeys.

Keywords: Turkey, heamatology leaf and seed extracts.

INTRODUCTION

Blood acts as a pathological reflector of the status of exposed animals to toxicant and other conditions (Olafedehan *et al*., 2010). As the examination of blood gives the opportunity to investigate the presence of several metabolites and other constituents in the body of animals and it plays a vital role in the physiological, nutritional and pathological status of an organism (Doyle, 2006). Hence the need to examine the blood status of turkey hens administered *Moringa* leaf and seed extracts as a way to improve productivity of heritage turkeys.

MATERIAL AND METHODS

Collection and Preparation of experimental material

The seeds and the foliage were ground separately into power and stored in separate clean dry containers. Treatment one (T_1) was the control group with no *Moringa* administered. One gram of the seed powder was diluted in 1000ml of clean water, sieved with cheese cloth and served as drinking water for treatment two (T_2). Treatment three (T_3) had 0.5g of leaf powder and 0.5g seed powder diluted with 1000ml of clean water sieved with cheese cloth and served as drinking water. One gram of the leaf powder was diluted in 1000ml of clean water, sieved with cheese cloth and served as drinking water for treatment four (T_4) between 7am and 10am in the morning. The 36 female turkeys were randomly assigned into treatments. There were four (4) treatments in all with nine (9) turkeys per treatment. Each treatment group was replicated three times to contain three (3) turkeys per replicate.

Data collection

Bloods for heamatological and biochemical analysis was collected via wing vein using sterile needles and syringes and were analyzed within 2 hours of collection. Blood samples for haematological analysis were discharged into Ethylene Diamine Tetra-acetic Acid (EDTA) containers. Three (3) milliliter of blood samples were drawn from three turkeys in each treatment. This was done on the last day of the trial (36th week). Heamoglobin (Hb) levels was determined using spectrophotometer (Environmental Scientific

Instrument Co. Panchkula, Haryana, India) by diluting whole blood (1 mL in 20 L) in a modified Drabkin's solution, (Diagnostic Reagent Ltd Thame, Oxon UK) which contained potassium cyanide. This was converted by the cyanide to a stable HCN, which was absorbed at 540 nm, using the cyanmethemoglobin method. The Packed Cell Volume (PCV) was determined using microhematocrit (Jouan S. A. Cedex, France) method as described by Saleh *et al.,* 2010. The white blood cells (WBC) were estimated using the haemocytometer (Paul Marienfeld, Lauda-Konigshofen, Germany) as described by Saleh *et al.* (2010). The mean corpuscular volume, (MCV) = (PCV÷RBC×10), mean corpuscular hemoglobin concentration MCHC = (Hb÷PCV) ×100) were calculated from the Hb, PCV and RBC. While serum biochemistry which includes, total protein (TP) albumin, globulin, cholesterol, creatinine, urea, aspartate transaminase (AST), alanine transaminase (ALT) and alkaline phosphatase were determined following standard procedures (Evans, 1996). Blood glucose level was determined using ACCU-CHEK glucometer (Roche Diagnostics GmbH, Germany).

Statistical analysis

Data analysis was performed using one way ANOVA (SAS, 2015) with dietary treatments (T_1, T_2, T_3, T_4) as independent variables, while all data obtained on serum glucose and total protein levels were regarded as dependent variables. Duncan HSD test was used for testing difference of means. The treatment effect was considered significant if P- values were less than 0.05.

Results and discussions

Table 1: Mean values of the haematological parameters of female turkeys administered aqueous extract of *Moringa* leaves and seeds

Parameters	**T_1 (0g)**	**T_2 (1g seed)**	**T_3 (.5 leaf:0.5 seed)**	**T_4 (1g leaf)**
PVC (%)	39.333±1.202	44.667±2.333	47.000±5.000	44.000±0.577
Hb (g/100ml)	14.973±4.468^{a}	18.229±4.871^{b}	21.742±12.873^{a}	17.949±8.534^{b}
RBC (x10^{6}mm^{3})	6.227±0.204	7.147±0.373	7.180±0.639	7.040±0.092
WBC (x10^{3}mm^{3})	23.067±0.570	27.200±2.444	23.600±2.444	26.893±7.450
MCV (fl)	63.180±0.341	62.500±0.000	65.247±1.662	62.500±0.000
MCH(pg)	24.052±0.774^{b}	25.577±7.048^{ab}	30.270±2.359^{a}	25.473±8.790^{ab}
MCHC (g/l)	38.070±1.420^{b}	40.924±11.276^{ab}	47.071±3.114^{a}	40.757±4.065^{ab}

Means with different superscripts $^{a, b, c}$ or ^{d} on the same row are significantly different (P<0.05).

Mean values of the haematological parameters of female turkeys administered aqueous extracts of *Moringa* leaves and seeds are shown in Table 1.

The PCV level are usually associated with presence of toxic substance in the body, observed PCV levels in this study were in line with Mituika and Rawnsley (1977) 25 – 45% in bird and Priya and Gomathy (2008) reported 37.67±0.44 to 56.77±0.45 in male and female turkeys. The haemoglobin (Hb) g/100ml which is a measure of iron containing oxygen blood cells– transport metallo protein in the red blood cells of birds which according to Priya and Gomathy, (2008) increases with advancement in age differed significantly in the study but did not take any pattern that will be attributed to effect of the *Moringa* extracts in the study. The MCH and MCHC all differed significantly (P<0.05) among the treatments. The T_3 (30.61pg) had a higher MCH level than other treatments, including the control. Usually MCH and MCHC are used to evaluate poor quality protein in the test ingredients (Awoniyi *et al*., 2000). Feed quality may not be attributed to the treatments since the control group (T1) recorded values that were

within the range of 37.12±62pg (MCH) and 32.81±84.g/dl in turkeys (Pandian *et al*., 2012). This cannot therefore be attributed to anemia or the effect of *Moringa* extracts.

Table 2: Mean values of the Serum biochemical parameters of female turkeys administered aqueous extract of *Moringa* leaves and seeds

Parameter	T_1 (0g)	T_2 (1g seed)	T_3 (.5 leaf:0.5 seed)	T_4 (1g leaf)
Glucose (mg/dl)	138.00±0.58^{a}	128.33±0.88^{b}	140.00±0.58^{a}	131.67±2.33^{b}
Total Protein (g/dl)	5.72±0.29^{a}	5.07±0.058^{b}	4.67±0.04^{b}	4.74±0.04^{b}
Albumen (g/dl)	3.03±0.16^{a}	2.48±0.12^{b}	2.31±0.11^{b}	2.61±0.17^{ab}
Cholesterol (mg/dl)	146.56±7.77	130.78±5.56	103.23±6.75	167.18±5.04
Bilirubin (mg/dl)	0.49±0.01^{b}	0.62±0.01^{a}	0.54±0.01^{b}	0.56±0.04^{ab}
Urea (mg/dl)	14.49±1.42^{c}	17.38±0.57^{b}	19.37±0.57^{ab}	20.43±0.46^{a}
Creatinine (mg/dl)	0.61±0.02^{b}	0.713±0.02^{b}	0.76±0.02^{a}	0.74±0.01^{a}
ALT(u/L)	15.00±0.58	12.33±1.45	13.00±0.58	13.00±0.58
AST (u/L)	24.33±0.33^{a}	23.00±0.58^{a}	19.00±0.58^{b}	18.00±0.00^{b}
Sodium (µEg/l))	119.87±0.61	121.13±0.42	121.46±1.67	119.30±1.71
Potassium (µEg/l)	3.43±0.15	3.27±0.04	3.67±0.22	3.26±0.06
Calcium (mg/dl)	8.40±0.16^{a}	8.86±0.88^{a}	7.78±0.23^{b}	7.89±0.03^{b}

Means with different superscripts $^{a, b, c}$ or ^{d} on the same row are significantly different.

The glucose level differed significantly (P<0.05) could mean that the single effect of these extracts on the female turkeys brought down their glucose levels. This finding goes a long way to confirm the earlier reports of Sahoo *et al.*, (2014) on anti-diabetic properties of *Moringa*. The total protein (g/dl) which is usually affected by the presence of severe damage or prolonged protein deficiencies, differed significantly among the female turkeys administered *Moringa oleifera* leaf and seed extracts. This could mean that the *Moringa* extracts provided enough cushioning effect from its composition to boost the total protein levels thus saving the turkeys from severe protein shortages that would have led to high level of total protein in the blood. The level of total protein among the *Moringa* treated group were in line with the reports of Bounous *et al.*, (2000) (2.6 – 5.5gldl) in turkeys. High level of albumen is an indication of dehydration among the control groups. This indicates that the slight sour bitter taste of the *Moringa* extract did not deprive the female turkeys from having adequate water so as to increase their albumen level as in the control group. *Moringa* extracts treatment groups had significantly higher bilirubin levels than the control. This may be that the chemical properties of the leaves and seeds of the *Moringa* plant may possesses an anti nutrient which might affect the liver of the female turkeys. The calcium levels were significantly higher (P<0.05) in the control (T_1) and seed extract treatments (T_2). lower levels of blood calcium in females on leaves extract treatment groups could be attributed to chelating effect of the *Moringa* leaf extract. This result seems to confirm the reports of Abdulkarim *et al*. (2015); Abakpa *et al*. (2017); and Alagbe (2017) on healthy values of *Moringa* on animals.

CONCLUSION

In conclusion, the *Moringa* leaf and seed extract did not have detrimental effect on the blood quality of the turkeys but rather improved the blood quality on healthy values of *Moringa* on animals.

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