
HAEMATOLOGY AND SERUM BIOCHEMICAL PARAMETERS OF *KALAWAD* WEANER GOATS FED DIETS CONTAINING *MORINGA OLEIFERA* LEAF MEAL

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ABSTRACT

This study was carried out to determine the haematology and serum biochemical parameters of KALAWAD weaner goats fed diets containing Moringa oleifera leaf meal (MLM). The research was carried out at the Institute of Food Security, Environmental Resources and Agricultural Research (IFSERAR), Federal University of Agriculture, Abeokuta (FUNAAB). A total of 12 weaner KALAWAD goats aged of 12-14 weeks old and comprised of 6 males and 6 females were used for the experiment. The goats were allotted to three experimental treatment groups which were: 0, 5.0, and 7.5% Moringa oleifera leaf meal inclusion levels. Data collected were subjected to One Way Analysis of Variance (ANOVA) in a Completely Randomized Design. The parameters measured were: Packed cell volume (PCV), Red blood cell (RBC), Haemoglobin (Hb) White blood cell (WBC), Mean Corpuscular volume (MCV), Mean Corpuscular haemoglobin (MCH) Mean Corpuscular Haemoglobin Concentration (MCHC). The Biochemical parameters were: Proteins, Albumin, Glucose, Cholesterol, Phosphorous, Calcium, Aspartate amino transferase (AST) Alanine amino transferase (ALT) Alkaline phosphatase (ALP), Gamma-Glutamyl Transferase (GGT). The results showed that 7.5% MLM inclusion level had demonstrated to be important sources of feed and health benefits that would go a long way in filling feed shortage gaps and fighting diseases without adverse effect on the animal. In this study, it was concluded that the inclusion of 7.5% MLM into the diets improved the well-being of the KALAWAD goats.

Keywords: haematology, KALAWAD goats, *Moringa oleifera*, blood, serum biochemistry

INTRODUCTION

Goats are multipurpose animals that produce meat, milk, skin, and hair. However, out of these products, meat is the major form in which goats are consumed in Nigeria (Alikwe *et al.*, 2011). Goat meat is widely accepted and consumed in Nigeria because there is no taboo against it to a greater extent. They are indispensable in marriage and religious rites and are insurance against crop failure in the mixed farming. Goats are very adaptable and versatile animals and they can thrive on diverse types of grasses and tree-shrub leaves. Moreover, conventional feed resources (grains, cereals, legumes, etc.) for animal production are sometimes scarce and highly expensive in many parts of the tropical regions. Utilization of fodder trees and shrubs could be a potential strategy for increasing the quantity and quality of feeds for ruminant production resource-limited livestock farmers during the dry season. The trees provide a good and cheaper source of protein and micronutrients (Moyo *et al.*, 2012). One of these potential tree forages is *Moringa oleifera*, which grows throughout the tropics and it is an indigenous native tree to India. Moringa leaf contains 17.9 to 26.8 % crude protein with about 47% of bypass protein and with adequate amino acid profile Biochemical determination of serum constituents and blood examination can provide valuable information relating to the nutrition, and other environmental factors that influence the performance and well-being of animals. The present studies investigated the blood profile of the *KALAWAD* weaner goats fed diets containing *Moringa oleifera* leaf meal.

MATERIALS AND METHODS

Experimental Site

This experiment was conducted at the Institute of Food Security, Environmental Resources and Agricultural Research (IFSERAR) Farm, Federal University of Agriculture, Abeokuta (FUNAAB) located within latitude 7°10' 30" and longitude 3° 25' 41" in the humid zone of southwest Nigeria. It received mean precipitation of 1,112.7mm with a seasonal distribution approximated at 110.9mm in the late dry season (January- March) 462.1mm in the early wet season (April-June), 376.6mm in the late wet season (July-September), and 163.1mm in the early dry season (October-December). Relative humidity averages 82 percent throughout the year (FUNAAB AGROMET, 2023).

Source of experimental ingredients

The *Moringa oleifera* leaves were sourced from the Directorate of University Farms (DUFARMS), Federal University of Agriculture, Abeokuta. The harvested *Moringa* leaves were air-dried until crispy to touch, milled and kept in a sack until needed. Other feed ingredients which include maize, wheat offal, PKC, bone meal, NaCl, and premix were purchased and milled at a reputable feed mill.

Experimental Animals and Management

A total number of twelve (12) weaner *KALAWAD* goats between 12-14 weeks of age which were sourced from a reputable source. The management system was intensive system as feed and water were supplied to the goat in their pens. *Moringa* leaf meal was fed to the animals at 4% of their body weight. The goats were randomly allotted into three (3) treatments with four (4) goats per treatment.

Experimental Diets

Treatment 1 (Control): 0% inclusion level of *Moringa* leaf meal

Treatment 2: 5% inclusion level of *Moringa* leaf meal

Treatment 3: 7.5% inclusion level of *Moringa* leaf meal

Blood Collection

Five (5) mL of blood samples were collected from each goat via jugular vein puncture using a vacutainer needle. Blood samples were collected into a vacutainer tube containing ethylene diamine-tetraacetate (EDTA) as anti-coagulant for haematological studies. The haematological parameters determined include: haemoglobin concentration (Hb); red blood cell (RBC) count, mean corpuscular haemoglobin concentration (MCHC), mean corpuscular volume (MCV); mean corpuscular haemoglobin (MCH), white blood cell (WBC) count and haematocrit. The serum biochemical parameters determined include: Serum minerals: Calcium (Ca, mmol/L), Phosphorus (P, mmol/L), Sodium (Na, mmol/L), and Potassium (K, mmol/L), Serum protein: Total protein (TP, g/dL) using biuret method Marsh, Albumin (ALB, g/dL), and Globulin (GLOB, g/dL), Serum lipid: Triglyceride (mg/dL), Cholesterol (mg/dL). Serum sugar: Glucose (mg/dL) and Globulin.

RESULTS AND DISCUSSION

Table 1: Effects of different levels of *Moringa oleifera* on haematological parameters of *KALAWAD* weaner goats

Parameters	0%MLM	5.0% MLM	7.5%MLM	SEM
RBC (x10 ⁶ /μL)	12.47 ^b	13.48 ^a	12.63 ^b	0.90
Hb (g/dL)	6.43 ^b	7.18 ^b	7.62 ^a	0.40
PCV (%)	28.17 ^b	29.25 ^a	30.57 ^a	2.05
MCV (fl)	23.66 ^b	22.50 ^b	25.37 ^a	2.74
MCH (pg)	5.17 ^b	5.37 ^a	6.20 ^a	0.30
MCHC (g/dL)	23.56 ^b	25.58 ^a	25.66 ^a	2.72
WBC(x10 ³ /μL)	9.08 ^{ab}	9.77 ^a	7.14 ^a	0.80
Neutrophils (%)	37.00 ^a	37.83 ^a	35.33 ^b	1.65
Eosinophils (%)	1.32 ^b	1.75 ^a	1.23 ^b	0.30
Basophils (%)	0.54 ^b	0.52 ^b	0.90 ^a	0.14
Monocytes (%)	1.15 ^b	1.20 ^a	1.32 ^a	0.15
Lymphocytes (%)	60.00 ^a	58.70 ^b	62.14 ^a	1.81

^{ab}Means with different superscripts along same row are significantly different (p<0.05)SEM=Standard Error of Mean PCV=Packed cell volume, RBC=Red blood cell, Hb=Haemoglobin, WBC=White blood cell, MCV=Mean Corpuscular volume, MCH=Mean Corpuscular haemoglobin, MCHC=Mean Corpuscular Haemoglobin Concentration.

Table 2: Effects of different levels of *Moringaoleifera* on Serum Biochemical parameters of KALAWAD weaner goats

Parameters	0%MLM	5.0% MLM	7.5%MLM	SEM
Proteins (g/L)	62.36 ^b	63.4 ^b	70.03 ^a	1.62
Albumin(g/L)	37.03 ^{ab}	36.67 ^b	40.60 ^a	1.15
Glucose (g/L)	58.90 ^b	82.90 ^a	51.3 ^c	55.10
Cholesterol(g/L)	72.60 ^b	88.20 ^a	90.83 ^a	3.70
Phosphorous(g/L)	5.34 ^b	6.31 ^{ab}	6.55 ^a	0.30
Calcium(g/L)	9.35 ^b	9.85 ^a	9.96 ^a	0.10
GGT (g/L)	30.03 ^a	23.80 ^c	27.67 ^{ab}	2.52
AST (g/L)	95.03 ^a	71.20 ^b	86.77 ^b	13.00
ALT (g/L)	29.63 ^a	18.33 ^b	13.67 ^c	5.53
ALP (g/L)	112.73 ^c	143.70 ^a	143.33 ^a	21.36

^{ab}means with different superscripts along same row are significantly different ($p < 0.05$). SEM=Standard Error of Mean, AST= Aspartate amino transferase, ALT= Alanine amino transferase, ALP= Alkaline phosphatase. GGT=Gamma-Glutamyl Transferase. Concentration.

The well-being of an animal is directly related to the quality of the blood profile of the animal in question. In the same vein, the life of an animal is in the blood. This is not possible without the quality of the plain of nutrition being fed to the animals. The highest Hb recorded in 7.5%MLM inclusion level corresponded with the highest values of PCV concentration observed in 7.5%MLM, suggesting their superiority in terms of their capability of supporting high oxygen carrying capacity of the blood. The RBC, Hb and PCV values in this study were similar to values obtained by Okoruwa *et al.* (2013) in West African dwarf bucks fed *Pennisetum purpureum* and unripe plantain peels. However, the obtained Hb values of 6.43, 7.18 and 7.62 g dL⁻¹ for 0, 5.0 and 7.5% MLM inclusion levels, respectively, fell within the normal range values (7.00 to 15.00 g dL⁻¹) as reported by Tambuwal *et al.* (2002) for WAD goats and Sudanese goats by (Babeker and Elmansoury, 2013). The PCV was significantly ($P < 0.05$) high in 7.5%MLM inclusion level (30.57) and (28.17), (29.25) in 0% AND 5.0%MLM inclusion levels respectively. The observed PCV (%) values fell within the range of 21.0-36.9% reported for clinically-healthy WAD goats (Daramola *et al.*, 2003). The total white blood cells (TWBCs) were significantly ($P < 0.05$) high in 5.0%MLM (9.77) when compared with 7.5%MLM (7.14) 1 (9.08), respectively. These results mean that goats on 7.5%MLM diets remained healthy, because the number of WBC counts on the normal range. Konlan *et al.*, (2012) reported that WBC offer explanation for defense mechanism of animal. Also the WBC values obtained were within earlier reported ranges for WAD goats (Daramola *et al.*, 2003) and Sudanese goats by (Babeker and Elmansoury, 2013). White blood cell, monocyte, eosinophils and basophils were also significant across all MLM inclusion levels, while values of Neutrophils and Lymphocytes were significantly high on 7.5%MLM and 5.0%MLM inclusion levels, respectively.

In this study, the serum hormones such as Aspartate amino transferase, Alanine amino transferase, Alkaline phosphatase and Gamma Glutamyl Transferase obtained in the present study are consistent with the report of Fafiolu *et al.* (2006). The consistency on the normal range of the serum hormones ensure that the animals' liver were in good condition and were not exposed to any liver diseases occurrence.

CONCLUSION

Based on the result of the study, it was concluded that the inclusion of *Moringa oleifera* Leaf Meal (MLM) helped to improve the wellbeing of the KALAWAD goats thereby improved the nutritional status of the animals. The highest improvement on the blood profile of the animals was obtained at 7.5% level of inclusion of MLM.

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