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Physiological Responses of Rabbit Bucks Fed Varying Levels of *Moringa oleifera* Leave Extracts

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Abstract

A 49 d experiment was conducted involving the use of the *Moringa* leaf extract (MOLE) to determine its effect on haematology of rabbits buck. Four diets were formulated to contain MOLE inclusion levels of 0% (control), 25%, 50% and 75% and tagged T₁, T₂, T₃ and T₄, respectively. Twenty eight grower bucks of mixed breeds were used for the experiment and were randomly divided into 4 groups of 7 animals per treatment with 1 animal per replicate in a Completely Randomized Design (CRD). Feed and water were provided *ad libitum*. Chemical analysis of the *Moringa* leaf extract (MOLE) indicated that the leaves contained 4.0% moisture, 30.75% CP, 6.70% EE, 12.80% CF, 10.70% ash, 35.05% NFE, 0.08% P and 1.07% Ca. All the blood parameters studied did not vary between treatments ($p>0.05$) except for PCV and Hb ($p<0.05$). The study revealed that the MOLE is rich in nutrients and could be used as a partial replacement for any vegetable protein source without any adverse effect on the blood indices of grower bucks.

Keywords: physiological responses, rabbit bucks, *Moringa oleifera*, leave extracts

Introduction

Most Nigerians consumes less than 10 grams of proteins per person per day out of which only 3.2 grams is animal protein (Abdullahi, 1990). This is because the growth in the population of livestock productions in Sub-Sahara African is not keeping pace with the growth in human population (Abdullahi, 1990). However, FAO (1985) recommended a minimum of about 56 grams of protein intake per person per day to be consistent with good living of which, about 50 percent (or 28 grams) should come from such animal protein sources as meat, milk, eggs and fish. The expected role of animal production is to fill the wide gap of about 25 grams of daily animal protein intake per person in Nigeria (Dafwang, 2006).

Leaf extracts have appetizing and digestion-stimulating properties and antimicrobial effects (Langout, 2000). The recommended policy is to identify and use locally available feed resources to formulate diets that are as balanced as possible (Guèye and Brancaert, 2002). *Moringa* leaves are believed to prevent over 300 diseases; now modern Science is proving that these tiny leaves are packed with incredible nutrients (protein, vitamins and iron) that can strengthen our bodies, provide immunity against HIV/AIDS and prevent diseases National Summit on *Moringa* Development (2010). Furthermore, there is the possibility of obtaining large amounts of high quality forage from *Moringa* without expensive inputs due to favourable soil and climatic conditions for its growth.

The aim of this research is therefore, to investigate the effect of varying levels of MOLE on the haematological parameters of rabbit bucks.

Materials and Methods

The experimental site is the Rabbit Unit of Research Farm of the Federal University of Agriculture Makurdi Livestock Teaching and Research Farm Makurdi, Benue State. Makurdi is geographically located on latitude 7.73 degrees North of the equator and longitude 8.53 degrees East of the prime meridian on the map of the world (<https://www.maps-streetview.com/Nigeria/Makurdi>).

A total of twenty Eight grower bucks (mixed breed) 10-11 weeks of age were used for the experiment. The rabbits were sourced for within Makurdi metropolis. An adjustment period was conducted. The Completely Randomized Design (CRD) was used to assign all twenty eight animals to the treatment. There were four treatments with seven replicates, with an animal serving as a replicate. There was a single basal diet for all the experimental animals irrespective of the treatment. Animals in T₁ were served as the control and were given cool drinking water without MOLE. Animals in T₂ were given 25ml: 100ml, T₃ were given 50: 100ml and T₄ were given 75:100ml. The gross and analyzed composition of the basal diet is presented in Table 1.

Table 1: Experimental diet fed to rabbit bucks at varying levels.

Ingredient	Quantity (kg)
Maize	44.1
Full Fat Soya bean	23.9
Rice offal	20.0
Premix	0.2
Palm kernel Cake	9.5
Salt	0.3
Bone ash	2.0
Total	100
Crude protein	17.50
Crude fibre	9.40
Ether extract	10.40
Ash	6.50
Nitrogen free extract	56.20
Dry matter	91.95

The experimental animals were housed individual in cages, measuring 60 cm L × 55 cm W × 140 cm H and 55 cm HAG (height above the ground), 60 cm L × 57 cm W × 120 cm H and 45cm HAG; 60cm L × 57cm W × 115 cm H and 49 cm HAG with a roof over to prevent the direct impact of sun rays and minimize ambient temperatures. Drinkers and feeders were provided in each cage and were well fitted to minimize feed and water wastages. The experimental animals upon arrival were given anti-stress (StresRoa®) at a dose 20ml per 12 liters of water for two days after which they were given dewormers (Mebenzole, Zodex®) at a dose of 100g per 5 liter of water. The Moringa leaves for this study were sourced from Wuse in Nasarawa State. Care was taken to obtain only fresh leaves. The leaves were washed free from sand and other contaminants and drained such that, the water from the washing was negligible. A clean mortar and pestle was used to pound the leaves. Only the leaves with twigs were pounded with no water added to it. After pounding, the extract was gotten by squeezing in muslin (cheese cloth). The extract was then served to the animals at different levels of inclusion with, 25:100 ml for T2, 50:100 ml for T3 and 75:100 ml for T4 of extract: water, respectively.

At the end of the 49 days of feeding trial, blood samples were collected from one animal per replicate for haematological analysis at the end of the feeding trial. Firstly, blood was collected from each animal about 10mls into labeled test tubes containing anticoagulant, ethylene-diamine-tetraacetic acid (EDTA) for the determination of haematological components and determined according to the methods outlined by Bitto *et al.* (2010). The parameters included hemoglobin (Hb), mean cell volume (MCV), red blood cells count (RBCs), white blood cells count (WBCs), mean cell hemoglobin concentration (MCHC), platelets (PLT), lymphocytes (LYM) and packed cell volume (PCV). MCV and MCHC values were calculated from RBCs count, Hb and PCV.

Data obtained from this study were subjected to the Analysis of Variance (ANOVA) for Completely Randomized Designed (CRD) and where significant differences occur, the means were separated using the Duncan Multiple Range Test (DMRT).

Results and Discussion

The proximate and mineral composition of the *Moringa oleifera* leaf and that of the extract are presented in Table 2. The high crude protein content (30.75%) and that of the ether extract suggest that the material may be a good source of protein and energy for most monogastric animals and it is comparable with other conventional vegetable sources. Calcium and phosphorus are present in appreciable quantities suggesting that the material can support growth of animals. The values recorded in the present study are slightly higher than the 18.92 and 2.74% for crude protein and ether extract earlier reported by Nweze and Nwafor (2014).

The results of the effect of varying levels of MOLE on the haematological indices of rabbit bucks are presented in Table 3. The results show that PCV and Hb significantly increased ($p < 0.05$) as the level of MOLE increased in the diets. However, MOLE inclusion did not affect ($p > 0.05$) RBC, WBC, leucocytes and leucocyte

differentials. However, mean values of each parameter were within the normal range as reported by (David *et al.*, 2002) except for WBC which is lower than the normal range. High WBC count is usually associated with microbial infection or the presence of foreign body or antigen in the circulating system (Madubuike and Ekenyem, 2006). The non-significant difference ($p>0.05$) observed for these parameters is an indication of better utilization of MOLE by the rabbit bucks.

Table 2: Chemical composition of MOLE and leaf residue

Sample	Leaf extract (Dried) %	Leaf residue%
Crude protein	30.75	9.60
Ether extract	6.70	1.81
Crude fibre	12.80	18.55
Ash	10.70	2.10
Calcium	1.07	0.57
NFE	35.05	0.04
Phosphorus	0.08	0.03
Moisture	4.0	67.90

Table 4: Haematological indices of rabbit bucks on different levels of inclusion of MOLE

Parameters(ml)	T1(0)	T2(25)	T3 (50)	T4(75)	SEM
PVC	37.75±1.03 ^{ab}	34.75±1.55 ^b	39.25±1.49 ^a	37.00±0.71 ^{ab}	*
Hb (g/dl)	12.60±0.33 ^{ab}	11.60±0.51 ^b	13.08±0.49 ^a	11.93±0.037 ^{ab}	*
RBC ($\times 10^{12}/l$)	4.700±0.53	4.35±0.43	4.68±0.55	4.18±0.09	NS
WBC ($\times 10^9/l$)	4.52±0.26	4.06±0.30	4.75±0.33	5.30±0.15	NS
MCV (fl)	82.00±6.44	82.25±8.67	87.25±21.34	88.50±1.26	NS
MCH (pg)	27.25±2.14	26.50±3.07	29.25±3.50	28.50±0.50	NS
MCHC (g/dl)	333.57±0.25	333.50±0.29	333.25±0.25	333.25±0.48	NS
NEU (%)	28.00±5.55	24.75±5.94	21.00±6.15	26.50±1.94	NS
MONO (%)	1.25±0.95	1.50±0.65	0.50±0.29	0.50±0.29	NS
BASO (%)	0.00±0.00	0.00±0.00	0.00±0.00	0.00±0.00	NS
LYMP (%)	68.25±4.44	69.75±6.68	74.25±7.51	72.00±2.12	NS
EOSI (%)	2.50±1.55 ^{ab}	4.00±1.08 ^a	4.25±2.36 ^{ab}	1.00±1.00 ^b	*

LOS= Level of significance, a,b,c = means on the same row bearing different superscripts differ significantly
 *=Significant at 5% ($p<0.05$), NS= Not significant at 5% ($p>0.05$), PVC= Packed Cell Volume, Hb= Haemoglobin, RBC= Red Blood Cell Count, WBC= White Blood Cell Count, MCV= Mean Corpuscular Volume, NEU= Neutrophils, MCH= Mean Corpuscular, Haemoglobin, MONO= Monocytes, BAS= Basophils, EOSI= Eosinophils, MCHC= Mean Corpuscular Haemoglobin Concentration, LYM= Lymphocytes.

Conclusion and Recommendation

In conclusion, the data derived from nutrient composition of Moringa are clear indications that the plant leaves are rich in nutrients and have the potential to be used as a feed additive with multiple purposes which include serving as a protein, fatty acid, mineral and vitamin resource for animals at 75% level of inclusion.

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