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Blood Indices of Post-Gestation Rabbit Does Fed Graded Levels of Neem (*Azadirachta indica*) Leaf Meal

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Abstract

A total of twenty-four (24) rabbit does of mixed breeds, with initial average live weight of 1975g were randomly allocated into four (4) experimental dietary treatments; each of which was replicated three (3) times with two (2) rabbits per replicate. The rabbits were fed diets containing 0%, 2.5%, 5.0%, and 7.5% Neem (*Azadirachta indica*) leaf meal. Parameters measured included packed cell volume (PCV), haemoglobin, red blood cells (RBC), white blood cells (WBC) and its differentials for haematology while total protein, globulin, albumin, cholesterol, alkaline phosphate (ALP), alanine aminotransferase (ALT) and aspartate aminotransferase (AST) were measured for biochemical indices. All data generated were subjected to one-way analysis of variance in a completely randomized design. The result showed no significant ($p>0.05$) difference in all the parameters measured except neutrophils. Neutrophils were significantly ($p<0.05$) reduced in rabbits on the control diet (26.67%) while rabbits on NLM diets recorded similar values. From the serum component, cholesterol was significantly ($p<0.05$) highest in rabbits fed 5.0% NLM (62.33 mg/dl) and lowest in those fed 2.5% NLM (49.67 mg/dl). It was, therefore, concluded that inclusion of NLM in rabbit does' diet up to 7.5% had no adverse effect on the health status of the animals as the values obtained for neutrophils and cholesterol were still within the normal range of rabbit blood profile.

Keywords: Rabbit does, Neem leaf meal, haematology, serum biochemical indices

Introduction

In recent time, the interest of Nigerian animal producers has been centred mostly on the search for cheaper feed ingredients that are always available and have no competition with man's dietary demands (Esmail, 2002). Some agro-industrial by-products and plants have been used with varied levels of success. Neem tree is one of the tropical plants that have attracted attention of animal nutritionists (Esonu *et al.*, 2005). Neem leaves contain approximately 20.68% crude protein, 16.60% crude fibre and 4.13% fat after processing into leaf meal via drying and milling (Oforjindu, 2006). Rabbit as micro-livestock is socially acceptable on the combined basis of space requirement and absence of religious taboos as well as peculiar digestive physiology which permits the use of forages and agro-industrial by products, thus making it non-competitive specie with man for cereals and legume grains (Ahemen *et al.*, 2013). Most emphasis by animal nutritionist is usually on nutrient digestibility, utilization and performance of the farm animals, but the future health status of the animal used in feeding trials either with conventional or non-conventional feedstuffs should also be considered.

Blood contains a myriad of metabolites and other constituents, which provide a valuable medium for clinical investigation and assessment of nutritional status of human beings and animals. Dietary components have measurable effects on blood components; hence, blood constituents are widely used in nutritional evaluation and survey of animals (Olorode *et al.*, 1995). Hence, Aderemi (2004) reported that blood examination gives the opportunity to investigate the presence of several metabolites and other constituents and helps detect conditions of stress, which can be nutritional, environmental or physical.

This study, therefore, investigated the blood indices of post-gestation rabbit does fed diets containing graded levels of Neem leaf meal.

Materials and Methods

Experimental site: The experiment was carried out at the Rabbitary Unit of the Directorate of University Farms (DUFARMS) of the Federal University of Agriculture, Abeokuta in Odeda Local Government Area of Ogun State, Nigeria.

Experimental animals and management: The experiment was carried out using 24 rabbit does weighing between 1950 and 2000g. These were divided into 4 dietary treatments having 6 rabbits per treatment and were housed individually. The rabbits were fed experimental diet supplemented with forage after a week of adaptation. Fresh water was provided for them in the morning and late in the evening. They were mated after six weeks of

feeding the experimental diets. All other routine management such as disinfection of the hutches and stable, cleaning of feeders and drinkers, etc. were observed and medication was administered when needed. Kindling boxes were also placed inside the hutches on the 28th day of gestation. The experiment was carried out for a period of 14 weeks.

Experimental diets: Neem leaves were harvested by hand-plucking from the trees within Abeokuta metropolis. The leaves were air-dried and milled to form Neemleaf meal (NLM) while other feed ingredients were sourced from a reputable feed mill. After this, experimental diets were formulated such that NLM were included at 0% (control), 2.5%, 5% and 7.5% levels for diets T1, T2, T3 and T4 respectively as shown on Table 1.

Table 1: Percentage Composition of Experimental Diets

Ingredients	T1	T2	T3	T4
	Level of Inclusion of NLM (%)			
	0	2.5	5.0	7.5
Maize	40.00	40.00	40.00	40.00
Rice husk	30.00	27.50	25.00	22.50
NLM	0.00	2.50	5.00	7.50
Soya bean meal	24.00	24.00	24.00	24.00
Fish meal	1.00	1.00	1.00	1.00
Bone meal	3.00	3.00	3.00	3.00
Oyster shell	1.50	1.50	1.50	1.50
Salt	0.25	0.25	0.25	0.25
Vit. Prix	0.25	0.25	0.25	0.25
Total	100.00	100.00	100.00	100.00
Calculated Analysis				
ME (MJ/kg)	9.89	10.03	10.80	10.31
Crude protein (%)	15.93	16.02	16.11	16.20
Fibre (%)	12.71	12.19	11.67	11.15

NLM:Neem leaf meal

Blood Analyses: At the 11th week of the experiment (a week after kindling), 2.5ml of blood sample each was collected from 3 rabbits per treatment into EDTA (ethylenediamine tetra acetic acid) bottle for haematological parameters while for serum biochemical parameters, plain bottle was used for the blood sample collection to determine serum metabolites which include: total serum protein, glucose cholesterol, alkaline phosphatase (ALP), aspartate transferase (AST), Albumin and Globulin.

Statistical Analyses: Data generated were subjected to one-way analysis of variance in a completely randomized design using the statistical package (SAS, 2007) while the significant means among treatments were separated using Duncan Multiple Range Test of the statistical package at 5% significant level.

Results and Discussion

The effect of Neem leaf meal (NLM) on the haematological parameters of post-gestational rabbit does is presented in Table 2. Haematological indices are an index and a reflection of the effects of dietary treatments on animals in terms of the quality of feed ingested and nutrients available to an animal to meet its physiological requirements. The values recorded for haematological parameters in this study were not significantly ($p > 0.05$) affected by the different levels of inclusion of NLM except neutrophil and were within the normal ranges reported for healthy rabbit. This non-significant difference could be an indication of the wellness of the animals throughout the gestation period as normal haematological parameters of an animal are direct indications of absence of disease (Olafadehan *et al.*, 2010). The neutrophil values of the does on NLM diets were significantly ($p < 0.05$) higher than the mean value of those on the control (0% NLM) diet but were within the ranges 20-75% (Merck Manual, 2012) and 35 - 43.2% (Hewitt *et al.*, 1989; Kronfield and Mediway, 1975; Mitruka and Rawnsley, 1977), respectively, recommended for clinically healthy rabbits. The neutrophils are concerned with day to day immunological defence against pathogens. This implies that the ingestion of NLM did not trigger the production of this blood component.

Table 2: Haematological Parameters of Rabbit does Fed NeemLeaf Meal Diets

Parameter	0%	2.5%	5.0%	7.5%	SEM
Pack Cell Volume (%)	36.00	31.67	32.00	29.33	1.44
Haemoglobin (g/dl)	10.30	9.03	8.63	8.43	0.42
Red Blood Cell (x10 ¹² /L)	6.00	5.33	5.77	5.33	0.21
MCH (pg)	17.23	16.90	14.93	15.87	0.50
MCHC(g/dl)	28.53	28.53	26.90	28.97	0.41
MCV (fl)	60.17	59.17	55.57	54.90	1.27
White Blood Cell (x10 ³ /l)	7.57	7.60	8.30	7.60	0.30
Neutrophil (%)	26.67 ^b	32.67 ^a	31.33 ^a	31.67 ^a	0.89
Lymphocyte (%)	69.67	65.67	66.33	66.33	0.73
Eosinophil (%)	1.00	0.33	0.33	0.33	0.15
Monocytes (%)	2.00	1.00	1.00	0.33	0.29
Basophil (%)	0.67	0.33	1.00	1.33	0.21

^{a,b}: Means with different superscripts along the same row are significantly ($p < 0.05$) different. MCH- Mean corpuscular haemoglobin, MCHC-Mean corpuscular haemoglobin concentration, MCV- Mean corpuscular volume

The result obtained on the effect of NLM on the serum biochemical components is shown on Table 3. Serum biochemical analysis is used to determine the level of liver damage and to evaluate protein quality and amino acid requirements in animals (Harper *et al.*, 1999). Significant effect of diet was not observed in all the parameters studied except serum cholesterol. The serum cholesterol value of the rabbits fed 2.5% NLM was significantly ($p < 0.05$) lower than the mean value of those fed 5.0% NLM diet, while does on control and 7.5% NLM diets recorded similar mean values. This might be an indication that NLM could reduce and not increase serum cholesterol beyond therecommended range for clinically healthy rabbits. This is in agreement with the earlier findings of Oforjindu (2006) that NLM in the diets of broiler birds resulted to a decrease in the cholesterol and liver lipid levels.

Table 3: Serum Biochemical Indices of Rabbit bucks Fed NeemLeaf Meal Diets

Level of MOLM	0%	2.5%	5.0%	7.5%	SEM
Parameter					
Total Protein (g/dl)	5.43	5.60	5.53	5.23	0.17
Albumin (g/dl)	3.13	3.17	3.10	3.00	0.11
Globulin (g/dl)	2.30	2.43	2.43	2.23	0.07
Alakaline phosphate (U/L)	45.67	53.00	55.33	59.33	3.06
Alkaline aminotransefrase (U/L)	22.00	22.67	28.00	29.67	1.41
Aspartate aminotransferase (U/L)	46.67	51.67	49.67	48.00	1.67
Cholesterol (mg/dl)	53.33 ^{ab}	49.67 ^b	62.33 ^a	58.33 ^{ab}	1.97
Glucose (mg/dl)	83.33	90.33	93.00	99.00	4.07

^{a,b}: Means with different superscripts along the same row are significantly ($p < 0.05$) different.

Conclusion

Inclusion of NLM in rabbit does' diet up to 7.5% had no adverse effect on the health status of the animals as the discrepancy observed in the values of neutrophils and cholesterol were still within the normal range of rabbit blood profile.

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