

Effect of Differently Processed Flamboyant (*Delonix regia*) seed meal on the blood parameters of rabbits

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ABSTRACT

This study was conducted to determine the effects of different processed forms of Delonix regia seed meal on the haematological and serum biochemical indices of mature rabbits. A total of 32, mixed bred rabbits of both sexes aged 6-7 months with an average weight of 1450- 1470g were used for the study. Four experimental diets were formulated comprising 0% (control), 15% (fermented), 15% (boiled) and 15% (toasted) levels of differently processed dietary Delonix regia seed meal as treatment T1, T2, T3 and T4, respectively. The animals were divided into 4 treatment groups. Each treatment had 8 replication on body weight equalization basis. Each group was there after assigned to the 4 experimental diets in a completely randomized design experiment. The feeding trials lasted 12 weeks. At the end of the feeding trial, blood samples were collected from 4 rabbits per treatment for haematology and serum biochemistry analysis. The results of the data analysis showed that only white blood cells, lymphocytes, red blood cells, haemoglobin, packed cell volume, mean corpuscular volume, mean corpuscular hemoglobin, neutrophils, eosinophils and basophils were significantly different ($P<0.05$) between treatment groups in the Haematological parameters while total protein, globulin, cholesterol and albumin were significantly different ($P<0.05$) from the other groups in the serum biochemical parameters. This study concluded that blood chemistry (Haematological and serum biochemical indices) of rabbits fed 15% dietary level of different processed forms of Delonix regia seed meal did not adversely affect the well being of the rabbits.

KEY WORDS: Delonix regia, blood parameters, rabbits, differently processed

Description of Problem

The blood profile of an animal might be influenced by factors, one of which is nutrition. Haematological studies are important tools for disease diagnosis and feed stress monitoring (1). The influence of diets on haematological indices is very significant (2). Since the blood is the main means of transportation of nutrients in the body, haematological profiling provides valuable information on the body reaction to toxic damages (3). Blood indices change in response to the physiological status of livestock (4). Blood analysis and any feeding trial provides an accurate and faster means of evaluating the clinical and physiological status of the animals, since the effect of different dietary components consumed can be determined in the blood (5). Full blood counts provide vital information on the

cellular constituents of blood, while biochemical examination shows the chemical parameters. Furthermore, examination of blood provides the opportunity to clinically investigate the presence of several metabolites and other constituents that play vital roles in the physiological, nutritional and pathological status of animals.

Delonix regia is available and found all year round as trees around residential environment, it is a leguminous plant also known as flamboyant or flame tree and it is a non-conventional feed stuff. *Delonix regia* seed meal has good protein potential as dietary protein sources for livestock. The proximate components of *Delonix regia* seed meal revealed 20.50% crude protein, 4.23% ether extract, 6.84% crude fibre (6).

Rabbit is a micro livestock with high reproductive potentials and rapid growth, can

easily convert any feedstuff into high nutritious meat (7). This study was therefore designed to investigate the effects of *Delonix regia* seed meal on the haematological and serum indices of rabbits.

Material and Method

The experiment was conducted at the Department of Animal Science teaching and research farm, Akwa Ibom State University, Obio Akpa Campus, Oruk Anam Local Government Area of Akwa Ibom State, Nigeria. Obio Akpa is located within the Southern zone of Nigeria at a latitude of 4° 50'N of the equator and longitude of 7° 45'E and 7° 55'E of the Greenwich Meridian. Matured pods of *Delonix regia* were collected from the flamboyant tree within Uyo metropolis. The seeds were removed manually from the pods, first washed with running tap water. The viable seeds were processed in different ways which will include boiling for 60minutes, toasting for

60minutes and soaking in water for 48 hours for fermentation to take place.

Experimental Diet and Design

Four experimental diets were formulated in which the diets have inclusion levels of *Delonix regia* seed meal of 0% for treatment 1 and 15% for treatment 2, 3 and 4 respectively. Diet 1, served as control without *Delonix regia* seed meal; diet 2 as fermented, diet 3 as boiled and diet 4 served as toasted *Delonix regia* seed meal. A total of 32 matured rabbits (16 female and 16male) of about 6- 7 months old with initial body weight of 1,450 – 1,700g were used in conducting this study. They were divided into four treatments groups and each group was replicated 8 times with 1 rabbit in a replicate.

Feed and water were provided *ad libitum* for all treatment groups accompanied by necessary prophylactic medication and vaccination. The rabbits were weighed at the beginning of the feeding trial.

Table 1: Gross Composition of Experimental Diets

%Ingredients	T1 (0%DRSM)	T2 (15%FDRSM)	T3 (15%BDRSM)	T4 (15%TDRSM)
Yellow Maize	44.10	34.10	34.10	34.10
Soybean meal	15.00	10.00	10.00	10.00
Cray fish meal	3.00	3.00	3.00	3.00
DRSM.	0.00	15.00	15.00	15.00
Rice husk.	17.00	17.00	17.00	17.00
PKC	3.00	3.00	3.00	3.00
Wheat offal.	14.00	14.00	14.00	14.00
Bone meal.	2.00	2.00	2.00	2.00
Premix	0.25	0.25	0.25	0.25
Methionine.	0.20	0.20	0.20	0.20
Lysine.	0.20	0.20	0.20	0.20
Salt.	0.25	0.25	0.25	0.25
Palm oil.	1.00	1.00	1.00	1.00
Total	100.00	100.00	100.00	100.00
Calculated Nutrient Composition				
Crude protein %	15.75.	15.68.	15.68.	15.68
Crude fibre %	8.20.	8.59.	8.59.	8.59
Metabolizable energy (kcal/kg)	2527.98.	2323.80.	2323.80.	2323.80

At the end of the feeding trials, two separate blood samples were collected per rabbit from the prominent ear veins with hypodermic needle and syringe from 4 rabbits in each treatment into

clean test tubes; one with anticoagulant (Ethylene Diamine Tetra Acetate, EDTA) for Haematological and serum biochemical analysis in the laboratory

Statistics Analysis

All data collected were subjected to one way analysis of variance (ANOVA) for a completely randomized design (CRD).

Result and Discussion

The results of the haematological parameters obtained in the study showed that there were significant differences ($P < 0.05$) across dietary

treatments in most haematological indices for white blood cells, lymphocytes, red, blood cells, haemoglobin, packed cell volume, mean corpuscular volume, mean corpuscular hemoglobin, neutrophils, eosinophils, and basophils. The results of this study corroborated the report of Evans *et al.*, (3) for rabbits fed cassava peel meal as replacement for maize in the tropics.

Table 2: Haematological characteristics of rabbits fed differently processed dietary *Delonix regia* seed meal.

Parameters	T ₁ (0%) Control	T ₂ (15%) FDRSM	T ₃ (15%) BDRSM	T ₄ (15%)TDRSM	SEM	Ref. ranges*
WBC($\times 10^3/\text{mm}^3$)	5.10 ^b	5.66 ^{ab}	6.40 ^a	6.36 ^a	0.21	5.00-12.00
RBC($\times 10^6/\text{mm}^3$)	4.86 ^b	4.56 ^c	5.20 ^a	4.86 ^b	0.07	4.00-8.00
HB(g/dl)	12.70 ^a	12.26 ^{ab}	11.50 ^b	12.86 ^a	0.20	10.00-15.00
PCV(%)	37.76 ^a	35.66 ^b	32.90 ^c	39.26 ^a	0.76	30.00-50.00
MCV(mm^3)	78.00 ^b	83.66 ^a	63.66 ^b	81.00 ^{ab}	2.42	60.00-69.00
MCH(pg/cell)	26.20 ^a	27.06 ^a	22.13 ^b	26.56 ^a	0.72	19.00-22.00
MCHC(g/dl)	33.36	44.46	33.60	33.46	2.77	30.00-35.00
LYM(%)	50.00 ^b	48.66 ^b	55.66 ^{ab}	60.00 ^a	1.65	30.00-35.00
PLT($\times 10^6$)	554.66	479.00	426.00	543.00	25.03	250-600
NEU(%)	35.00 ^a	33.66 ^a	31.66 ^{ab}	26.00 ^b	1.32	20.00-75.00
EOS(%)	15.00 ^{ab}	17.66 ^a	13.00 ^b	13.00 ^b	0.57	0.00-5.00
BAS(%)	0.00	0.00	0.00	0.00	0.00	0.00-0.84
MONO(%)	0.00 ^b	0.66 ^{ab}	0.66 ^{ab}	1.00 ^a	0.14	1.00-4.00

a, ab,b,c means on the same row with different superscript are significantly different ($P < 0.05$) *(8)

The values for white blood cells were 5.10 mm^3 , 5.66 mm^3 , 6.40 mm^3 and 6.36 mm^3 for treatment 1, 2, 3 and 4 respectively. There were significant differences ($P < 0.05$) between treatment groups, values for the white blood cells were within the normal range (5-13%) recommended by (8). Normal white blood cells indicates the ability of the rabbit to produce and release antibodies when infection occurred. The values for haemoglobin (Hb) were 12.70g/dl, 12.26g/dl, 11.50g/dl and 12.86g/dl for treatment 1, 2, 3 and 4 respectively. There were significant differences ($P < 0.05$) between treatment groups. The haemoglobin values of this study fell within the normal range reported for rabbits by 3. Normal ranges for haemoglobin indicated that the vital physiological relationship of haemoglobin with oxygen in the transport of gases (oxygen and carbon dioxide) to and from the tissues of the body has been maintained and was normal (9; 10). Packed cell volume values in the study were 37% .76%, 35.66%, 32.90% and 39.26% for

treatment 1, 2, 3 and 4 respectively which are within the acceptable range of 30-50% recommended by (8). Packed cell volume is involved in the transport of oxygen and absorbed nutrients.

Mean corpuscular volume values were 78.00 mm^3 , 83.66 mm^3 , 63.66 mm^3 and 81.00 mm^3 for treatments 1, 2, 3 and 4 respectively which treatment 3 is within the acceptable range of 60-69% recommended by (8) while treatment 1,2 and 4 values are slightly higher than the normal. Mmereole (11) reported that red blood cells agglutination can produce a false increase in MVC. In haematology. Mean corpuscular hemoglobin concentration values were 33.36g/dl, 44.46g/dl, 33.60g/dl and 33.46g/dl for treatment 1, 2, 3 and 4 respectively which are within the acceptable range of 30-35% recommended by (8) except treatment 2 which the value is slightly higher than the normal. This is caused by an increased concentration of haemoglobin inside of the red blood cells (12).

The values for total protein obtained in the study were 7.92g/dl, 7.32g/dl, 7.12g/dl and 6.43g/dl for treatment 1, 2, 3 and 4 respectively. There were significant differences ($P<0.05$) between groups. The value in treatment 1 was higher than the normal range which was fed with the control diet without *Delonix regia* seed meal. The values for globulin obtained were 2.73g/dl, 2.53g/dl, 2.46g/dl and 1.73g/dl for treatment 1, 2, 3 and 4 respectively, which is within the normal range of 1.50g/dl to 3.30g/dl reported by Medirabbit (8) for healthy rabbits. There were significantly different ($P<0.05$) between treatment groups. Glucose levels were 4.38, 4.18, 4.18 and 4.68 for treatment 1, 2, 3 and 4 respectively, which is within the normal range of 4.20mmol/L to 8.90mmol/L reported by Medirabbit (8) for healthy rabbits.

Cholesterol levels were 3.28mmol/L, 3.18mmol/L, 2.93mmol/L and 2.60mmol/L for treatment 1, 2, 3 and 4 respectively which is within the normal range of 0.10-2.00 which slightly higher than the normal range recommended by Medirabbit (8). The values obtained for albumin were 5.20g/dl, 4.80g/dl, 4.66g/dl and 4.70g/dl for treatment 1, 2, 3 and 4 respectively. Observation showed significant difference ($P<0.05$). AST activity was not significantly ($P>0.05$) influenced by the dietary treatment. The results obtained were 11.66u/l, 13.00u/l, 11.66u/l and 11.66u/l for rabbits fed diet 1, 2 3 and 4, respectively. ALT activity was not significantly ($P>0.05$) influenced by the dietary treatment. The results showed were 8.00u/l, 6.00u/l, 10.00u/l and 8.00u/l for rabbits fed diet 1, 2 3 and 4, respectively.

Table 3: Serum biochemical indices of rabbits fed differently processed dietary *Delonix regia* seed meal

Parameters	T ₁ (0%) Control	T ₂ (15%) FDRSM	T ₃ (15%) BDRSM	T ₄ (15%) TDRSM	SEM	Ref. ranges*
Total Protein(g/dl)	7.92 ^a	7.32 ^b	7.12 ^b	6.43 ^c	0.17	5.00-7.50
Globulin(g/dl)	2.72 ^a	2.53 ^b	2.46 ^b	1.73 ^c	0.12	1.50-3.30
Glucose(mmol/L)	4.38 ^b	4.18 ^b	4.18 ^b	4.68 ^a	0.07	4.20-8.90
Cholesterol(mmol/L)	3.28 ^a	3.18 ^{ab}	2.93 ^b	2.60 ^c	0.08	0.10-2.00
Albumin (g/dl)	5.20 ^a	4.80 ^b	4.66 ^b	4.70 ^b	0.07	2.5-4.00
AST(μ /l)	11.66	13.00	11.66	11.66	02	10.00-98.00
ALT(μ/l)	8.00	6.00	10.00	8.00	0.73	12.00-67.00

a, b, c means on the same row with different superscript are significantly different ($P< 0.05$)
(AST= Aspartate amino transferase; ALT= Alanine amino transferase) *(8)

Conclusion and Application

The study concluded that blood chemistry (Haematological and serum biochemical indices) of rabbits fed 15% dietary level of different processed forms of *Delonix regia* seed meal did not adversely affect the wellbeing of the rabbits. Farmers are advised to use up to 15% dietary levels of the different processed forms of *Delonix regia*.

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