

EFFECT OF DIFFERENTLY PROCESSED DIETARY *Delonix regia* SEED MEAL ON THE BLOOD PARAMETERS OF RABBITS

*Evans, E. I.¹, Essien A.I, Ozung, P. O.,² Sam, I. M.,¹ Usoro, O. O.,¹ Ukpanma, U. A.¹

¹ Department of Animal Science, Akwa Ibom State University

² Department of Animal Science, University of Calabar

*Corresponding Author: E-mail: ememevans2015@gmail.com

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 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 replications 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 haemoglobin, 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.

Keywords: Delonix Regia, Blood Parameters, Rabbit

INTRODUCTION

Nutrition has the highest consideration in livestock enterprise due to its importance in the building of animal protein for human consumption. The continuous increase in the cost of conventional feed ingredients is a major constraint in livestock enterprise arising from stiff competition between humans and animals for grains. Alabe *et al.*, (2018). Population growth also has a major impact on food availability as it results in both increased competition for available resources and demand for food (FAO 2012). It has been estimated that 10.3% of the world population is undernourished. This has necessitated researchers and producers to shift focus on the production and development of micro livestock like grasscutters, snails, rabbits etc to meet this rising demand in consumption of meat. Rabbits have the potential of alleviating the challenges of low meat consumption in developing countries (Oyadeyi *et al.*, 2011).

Many livestock enterprise have stop production due to high cost of conventional feed stuff, leading to general decrease in production and availability of animal protein for human dietary needs. It is therefore necessary to search for alternative sources which could be referred to as non-conventional feed resources and incorporate them into the production of animal feed (Adeola and Oluko 2008). Availability and accessibility is the key to using any unconventionally feed stuff. *Delonix regia* seed fits into these bench marks.

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 it, produces large quantities of seed pods and)

Haematological studies are important tools for disease diagnosis and feed stress monitoring .This study was therefore designed to investigate the effects of *Delonix regia* seed meal on the haematological and serum indices of rabbits.

MATERIAL AND METHODS

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, Matured pods of *Delonix regia* were collected from the flamboyant tree within Uyo metropolis. Four experimental diets were formulated in which the diets had inclusion levels of *Delonix regia* seed meal of 0% for treatment 1 and 15% for treatment 2, 3 and 4 respectively.

A total of 32 matured rabbits (16 female and 16male) of about 6- 7 months old was 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.

Table 1: Gross Composition of Experimental Diets

%Ingredients	Dietary levels of processed <i>Delonix regia</i> seed meal			
	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
Crayfish 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
Palm kernel cake	3.00	3.00	3.00	14.00
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.
Crude fibre %		8.20.	8.59.	8.59.
Metabolizable energy (kcal/kg)		2527.98.	2323.80.	2323.80.

.DRSM- *Delonix regia* seed meal FDRSM- fermented *Delonix regia* seed meal. BDRSM- Boiled *Delonix regia* seed meal; TDRSM- Toasted *Delonix regia* seed meal

Blood Collection and Analysis

At the end of the feeding trials, about 5mL of blood was collected in two separate bottles respectively. 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 analysis and the other were taken to the laboratory for analysis.

Serum Biochemical Indices of Rabbits

Serum total protein (STP) was determined by the Biuret method. The remaining 2.5mL blood samples were collected in sterile bottles without EDTA and left to coagulate for serum biochemical indices determination.

Statistical Analysis

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

RESULTS 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 Haemoglobin, neutrophils, eosinophils, and basophils. The results of this study corroborated the report of Evans *et al.* (2020) for rabbits fed cassava peel meal as replacement for maize in the tropics.

The white blood cell showed significant differences ($P<0.05$) between treatment groups, however, the results of the white blood cells were within the normal range (5-13%) recommended by (Medirabbit 2011) Implying that *Delonix regia* seed meal had no adverse effects on the rabbit, since normal white blood cells indicates the ability of the rabbit to produce and release antibodies when infection occurs. There was significant difference ($P<0.05$) between treatment groups. Normal ranges for haemoglobin indicate 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 was maintained (Njidda and Hambagola 2006).

Packed cell volume values in the study were within the acceptable range of 30-50% recommended by (Medirabbit 2011). Packed cell volume is involved in the transport of oxygen and absorbed nutrients

Mean corpuscular volume values and mean corpuscular haemoglobin concentration were within the acceptable ranges for healthy rabbits' haemolysis)

The results for serum biochemistry of rabbits fed differently processed dietary *Delonix regia* seed meal are presented on the table 3. The serum biochemical indices determined were, total protein, globulin, glucose, cholesterol, albumin, Aspartate amino transferase and Alanine amino transferase,

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)

Ref. ranges* obtained from <http://wildpro.twycrosszoo.org/00Ref/Haematology/Haem>

Ref. ranges** obtained from http://www.medirabbit.com/http://www.medirabbit.com/EN/Haematology/blood_chemistry.htm), (WBC=White blood cells; LYM= Lymphocytes; RBC= Red blood cells; HB= Haemoglobin; PCV= Packed cell volume; MCV= Mean corpuscular volume; MCH= Mean corpuscular Haemoglobin; MCHC= Mean corpuscular Haemoglobin concentration; PLT=Platelet; NEU= Neutrophils; EOS= Eosinophils; BAS= Basophils; MON= Monophils); FDRSM- fermented *Delonix regia* seed meal; BDRSM- Boiled *Delonix regia* seed meal; TDRSM- Toasted *Delonix regia* seed

The results of Total protein, Globulin, Cholesterol, Albumin and Aspartate Amino Transferase were within the normal ranges reported by Evans *et al.* (2021) for healthy rabbits. Normal Cholesterol and Glucose is an indication that there was no symptoms of abnormal glucose and cholesterol in the blood which include diabetes, mal-absorption of fat, anorexia and liver dysfunction. (Bawala *et al.*, 2007). Globulin level generally shows the immune responses and is mostly a reliable source for the production of antibodies. Total Protein, albumin and globulin are generally responsible for protein uptake (Njidda and Hambagola 2006).

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	0.52	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)

CONCLUSION AND APPLICATION

Serum biochemical indices of rabbits fed 15% dietary level of different processed (fermentation, boiling and toasting) forms of *Delonix regia* seed meal did not adversely affect the wellbeing of the rabbits.

RECOMMENDATION

It is therefore recommended that further studies should be conducted higher levels of inclusion of different processed forms of *Delonix regia* seed meal to see the effects.

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