

BLOOD CHEMISTRY AND HAEMATOLOGICAL INDICES OF RABBITS FED SUPPLEMENTARY WILD SUNFLOWER (*Tithonia diversifolia* Helms. A.Gray) LEAF MEAL

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ABSTRACT

This study was carried out to determine the haematological profile and serum biochemical indices of rabbits fed graded level of wild sunflower (*Tithonia diversifolia* Helms. A.Gray). The study involved Twenty-four (24) growing rabbits (7 – 8 weeks of age with average weight 181.25 ± 0.02 g) of mixed sexes. The rabbits were allotted into four dietary treatments comprising six (6) rabbits per treatment. The dietary treatments were 0%, 10%, 20% and 30% sunflower leaf meal (SFLM) inclusion levels. The experimental diet contained 17% crude protein and 2488.68 Kcal/Kg metabolizable energy. The feeding trial lasted eight weeks, during which period feed and water were provided *ad libitum*. Two blood samples each were collected per rabbit; one set of the blood samples were collected into plastic bottles containing Ethylene Diamine Tetra acetic acid (EDTA) for haematological studies while the other sample was collected into plain sterile bottles for the serum biochemical indices determination. Data generated were subjected to analysis of variance. Results obtained from this study revealed that PCV showed significant ($p < 0.05$) difference with 20% SFLM having the highest mean value of 39%, while 0%SFLM had the least mean of 30.60%. The same trend was observed for Hb and RBC. WBC was significantly influenced with the inclusion of SFLM with 10%SFLM having $5.33 \times 10^9/L$, 20%SFLM (5.18×10^9) while 0%SFLM had the least mean of $4.68 \times 10^9/L$. ALT was also influenced significantly ($p < 0.05$), 20%SFLM had similar mean value (66.50) with 0%SFLM (72.00). The study concludes that inclusion of sunflower leaf meal up to 20% had haematinic potential on weaner rabbits.

Keywords: Hematology, Mean corpuscular haemoglobin, Mean corpuscular volume, Serum biochemistry, Weaner rabbits

INTRODUCTION

The examination of blood provides the opportunity to clinically investigate the presence of several metabolites and other constituents in the body and it plays a vital role in the physiological, nutritional and pathological status of the animal (Doyle, 2006). It also helps to distinguish normal state from state of stress which can be nutritional. Haematological constituents reflect the physiological responsiveness of the animal to its internal and external environments which include feed and feeding (Esonu *et al.*, 2001). Dietary content affect the blood profile of healthy animals (Odunsi *et al.*, 1999; Kortuglu *et al.*, 2005). Isaac *et al.* (2013) stated that haematological components, which consists of red blood cells, white blood cells or leucocytes, Mean Corpuscular Haemoglobin and Mean Corpuscular Haemoglobin Concentration are valuable in monitoring feed toxicity, especially, with feed constituents that affect the blood as well as the health status of farm animals. Many feed products are fed to rabbits usually without recourse to their health and physiological implications on the animals. The commonest parameter for measuring these implications is through the haematology of the animals (Aro *et al.*, 2013). Rabbit is a favoured animal because of its high fecundity, low cost of investment, short generation interval, as well as ability to utilize diverse forages (Taiwo, *et al.*, 2004). Despite these obvious advantages, improved feed formulation and strategies for enhancing the production potentials of rabbit especially in the tropical and sub tropical regions of the world have not been fully exploited. According to M'cenes *et al* (1999) such nutritional strategies would involve feeding of rabbits with agro-industrial by-products together with the use of inexpensive locally available feed ingredients that will drastically bring down the production cost. Among the non-conventional feedstuff, that has gained acceptance in animal nutrition is wild sun flower (Odunsi, *et al.*, 1996; Farinu, 1999). The wild sunflower (*Tithonia diversifolia* Helms. A.Gray) is of the family Asteracea. In Nigeria it grows on road sides and fallow lands in the forest savannah zone (Akinola, *et al.*,

1999). It grows as annual, biennial or perennial plant depending on the habitat. It has been fed to sheep, goat and cattle (Thomas, *et al.*, 1982).

MATERIALS AND METHODS

The study was carried out at the rabbitary unit of the Oke-Ogun Polytechnic, Saki, Oyo State, Nigeria. Sunflower leaves were collected from within the premises of The Oke Ogun Polytechnic Saki, Oyo State, Nigeria. The leaves were air-dried and pulverized into powder and sealed in an air-tight container till the period of usage.

Experimental Animals and Management

A total of Twenty-four (24) growing rabbits (7 – 8 weeks of age with average weight 181.25 ± 0.02 g) of mixed sexes were obtained from a reputable farm in Oyo State, Nigeria for the purpose this study. The animals were housed in thoroughly washed and disinfected wooden cages raised from the ground level. Feed and water troughs were provided in each cage, while feed and water were provided *ad libitum*. The rabbits were caged individually in clearly marked cells. The feeding trial lasted eight weeks.

Experimental Diet

Four experimental diets were formulated with the inclusion of 0%, 10%, 20% and 30% Sunflower Leaf Meal (SFLM)

Table 1: Composition of the Experimental Diets

Parameters	0% (SFLM)	10% (SFLM)	20% (SFLM)	30% (SFLM)
Maize	32.00	32.00	32.00	32.00
SFLM	0.00	2.40	4.80	7.20
Wheat offal	40.00	40.00	40.00	40.00
Soybean meal	24.00	24.00	24.00	24.00
Fish meal	0.50	0.50	0.50	0.50
Limestone	1.00	1.00	1.00	1.00
Bone meal	2.00	2.00	2.00	2.00
Salt	0.25	0.25	0.25	0.25
Premix	0.25	0.25	0.25	0.25
Total (Kg)	100	100	100	100

Blood collection:

Blood collection was done at the end of the 8th week of feeding trial from four rabbits per treatment. Blood samples were obtained from the prominent ear vein with the aid of a hypodermic needle and syringe. Two blood samples each were collected per rabbit; one set of the blood samples were collected into plastic bottles containing Ethylene Diamine Tetra acetic acid (EDTA) for haematological studies while the other sample was collected into plain sterile bottles for the serum biochemical indices determination. All haematological parameters were determined by conventional laboratory methods of Bitto and Gemade (2001), while serum biochemical indices were determined by methods described by Ochei and Kolhatkar (2007).

Statistical Analysis

All data collected were subjected to analysis of variance (ANOVA) technique using statistical analysis software.

RESULTS AND DISCUSSION

Table 2 shows the result of haematological indices of rabbit fed sunflower leaf meal (SFLM). SFLM had significant ($P < 0.05$) influence on Packed Cell Volume (PCV) of the animals across the treatment. PCV values ranged between 30.60 and 39.00, these mean value falls within the referenced range for rabbit's PCV (33.00-050.00) except the value from the control (30.60) which was statistically similar to 37.75 in 10% SFLM and 30% SFLM. 20% SFLM had the highest value of 39.00. The investigation shows that

feeding SFLM to rabbit's enhanced feed utilization which resulted in effective blood formation in rabbits fed 20% SFLM. Significant effect ($P < 0.05$) was observed in the haemoglobin (Hb) and RBC of the experimental animals. The value ranged between 9.75 and 12.65g/dl which falls within the referenced range for rabbit 9.40 -17.70 (Medi Rabbit, 2007). The result shows that inclusion of SFLM up 20% had haematinic effect on rabbits placed on SFLM to enhance effective oxygen transport to the animals' tissues for oxidation of ingested feed to release energy for other body function as well as the transport of CO_2 outside the body. RBC showed similar trend as Hb and the values $(5.86 - 7.33) \times 10^6/\text{mm}^3$ were within the reference range 3.80 -7.90 (MediRabbit, 2007). The result implies that inclusion of SFLM in rabbit feed pose no threat to RBC synthesis. Sunflower leaf meal in rabbits' diet showed significant influence ($P < 0.05$) on WBC. Values of WBC across the treatments (4.08 -5.33) falls within the reference range of 5.00 -13.00 except 4.68 observed in the control. This suggests normal production of defensive mechanism to combat infection. MCH, MCV and MCHC showed no significant ($P > 0.05$) effect across the treatments. MCH, MCV and MCHC values of 0%SFLM manifested anaemic condition. This might result from less efficient feed utilization. All biochemical parameters evaluated showed no significant difference ($P > 0.05$) except ALT. All the Parameters were within the normal referenced range. Total protein and albumin values suggest normal protein metabolism occurred in the experimental animals, since protein synthesis is related to the amount of protein available in the diet (Iyayi, and Tewe, 1998). This research showed that inclusion of SFLM in rabbit diet had no deleterious effect on their biochemical response.

Table 2: Haematological indices of rabbit fed Sunflower leaf meal.

Parameters	0%SFLM	10% SFLM	20% SFLM	30% SFLM	SEM	Reference range
PCV (%)	30.60 ^b	37.75 ^{ab}	39.00 ^a	33.75 ^{ab}	2.40	33.00 – 50.00
Haemoglobin(g/dl)	9.75 ^b	11.53 ^{ab}	12.65 ^a	11.15 ^{ab}	0.86	9.40 – 17.40
RBC($\times 10^{12}/\text{l}$)	5.86 ^b	6.81 ^{ab}	7.33 ^a	6.48 ^{ab}	0.41	3.80 – 7.90
WBC($\times 10^9/\text{l}$)	4.68 ^b	5.33 ^a	5.18 ^a	5.05 ^{ab}	0.37	5.00 – 13.00
MCH	16.64	16.93	17.26	17.21	1.17	18.00 – 24.00
MCV	52.22	52.50	53.21	52.08	0.42	58.50 – 66.50
MCHC	3.19	3.23	3.24	3.30	0.44	27.00 -34.00

KEY: Packed cell volume (PCV), White blood cell (WBC), Red blood cell (RBC), Mean Corpuscular Haemoglobin (MCH), Mean Corpuscular Volume (MCV), Mean Corpuscular Haemoglobin Concentration (MCHC)

Table 3: Biochemical indices of rabbit fed Sunflower leaf meal.

Parameters	0%SFLM	10% SFLM	20% SFLM	30% SFLM	SEM	Reference range
ALP (IU/L)	10.25	10.25	10.75	10.50	0.22	10.00 – 96.00
AST (IU/L)	67.25	71.25	67.75	63.50	2.58	10.00 – 98.00
ALT (IU/L)	72.00 ^a	59.50 ^b	66.50 ^{ab}	59.25 ^b	2.94	10.00 – 96.00
Total protein (g/l)	6.13	5.88	6.40	5.87	0.40	50.00 – 75.00
Albumin (g/l)	3.05	2.88	3.28	2.90	0.40	25.00 – 40.00
Globulin (g/l)	3.08	3.00	3.12	2.98	0.26	25.00 – 40.00

Key: Aspartate aminotransferase (AST), Alanine aminotransferase (ALT), Alkaline Phosphatase (ALP),

CONCLUSION AND RECOMMENDATION

Results obtained in this study have shown that SFLM can had haematinic potential on weaner rabbits fed 20%SFLM without adverse effects on their haematological profile and serum biochemical indices.

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