



HAEMATOLOGICAL AND BIOCHEMICAL PARAMETERS OF RABBITS FED GRADED LEVELS OF GARCINIA KOLA (GKSM) SEED MEAL

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Abstract

A 56-day study was carried out to evaluate the haematological and biochemical characteristics of weaner rabbits fed graded levels of garciniakolaseedmeal (GKSM). A total of 32 mixed mongrel rabbits of about 8 weeks old were used for the study. The rabbits were randomly selected and assigned to four treatments. Each treatment had 8 rabbits and was replicated 2 times with four (4) rabbits per replicate in a completely randomized design (CRD). Four grower rabbit diets were compounded, incorporating (GKSM) at 0%, 1.5%, 3.0% and 4.5% respectively. The diets were designated T₁, T₂, T₃ and T₄, respectively, with T₁ served as the control (with no GKSM). The rabbits were given feed and water ad-libitum and were subjected to similar sanitary and husbandry conditions throughout the experimental period. Data were collected for haematological and biochemical analysis. Haematological parameters include RBC, WBC, PCV, Hb, neutrophils, lymphocytes, monocytes, basophils and eosinophils, while biochemical parameters include total protein, bilirubin, creatinine, cholesterol, albumin, sodium, potassium, calcium and phosphorus. Result of haematological parameters showed that only RBC showed significant ($P < 0.05$) differences, while the rest showed non-significant ($P > 0.05$). Result of biochemical parameters showed that total protein, cholesterol, sodium and potassium showed significant ($P < 0.05$), while others showed non-significant ($P > 0.05$) differences. Cholesterol values reduced as the level of the meal increased. Generally, the meal has no deleterious effect on the health of the animal.

Keywords: Haematological, Biochemical, GKSM and Rabbits

Introduction

The cost of providing feed and drugs in livestock and poultry industry in Nigeria are steadily increasing. These production cost which accounts for more than 70-80% has adverse effect on the producers and consumers in return. Cost is a major determinant of profitability on the side of producers, while the market price will determine the quantity consumers will purchase. Traditional animal healthcare practices involving use of some materials and herbal preparations called ethno-veterinary medicine is fast gaining grounds in the livestock industry especially in African and Asian countries (Ebenebe *et al.*, 2010) as they provide readily available and low cost alternative to orthodox medicine. It has therefore become necessary to investigate such plants for possibilities of incorporating their leaves or seeds in livestock and poultry feeds to serve as feed ingredients and/or prophylactic agents. Plant derived medicines have many benefits such as; low toxicity status/ relative safety, accessibility and affordability. Plants parts have been a source of herbal medicine which has been shown to be effective to about 80% of population as primary health care (Akinyemi, *et al.*, 2000). The use of these plants as herbal drug, eg garlic (*Allium sativum*), ginger (*Zingiber officinale*), neem tree leaves (*Azadirachta indica*), bitter kola (*Garcinia kola*) etc have been reported in livestock health care management (Owen and Amakiri 2013 and Obun *et al.*, 2013). *Garcinia kola* is a dicotyledonous belonging to the family Guttiferae or Clusiaceae and is widely cultivated throughout West Africa (Adedeji *et al.*, 2006). In Nigeria, it is common in the South Western States and Edo State (Otor, *et al.*, 2001). According to Chilaka (2009), *G. kola* is used for social, therapeutic and nutritional purposes. Blood analyses have been used to predict the health status of animals. The importance of hematological and biochemical parameters as diagnostic tools and physiological indicators in birds has been documented (Harr, 2002; Hauptmanova *et al.*, 2006). However, these parameters



are greatly affected by sex, age and season (Fudge, 2000; Kececi and Col, 2011). The current study therefore investigated the haematological and biochemical characteristics of rabbits fed graded levels of *garcinia kola* seed meal (GKSM).

Materials and Methods

This experiment was carried out at the Rabbitry Unit of the Department of Animal Science Teaching and Research Farm, University of Nigeria Nsukka. The *garcinia kola* seeds were purchased from Ogige market Nsukka. They were processed and milled in a hammer mill with 2mm sieve to produce *Garcinia kola* seed meal (GKSM) that was used to compound the diet. A total of 32 weaner mixed mongrel rabbits of about 8 weeks old were used for the study. The rabbits were randomly selected and assigned to four treatments. Each treatment had 8 rabbits and was replicated 2 times with four (4) rabbits per replicate in a completely randomized design (CRD). Four grower rabbit diets were compounded, incorporating (GKSM) at 0%, 1.5%, 3.0% and 4.5% respectively. The diets were designated T₁, T₂, T₃ and T₄, respectively, with T₁ served as the control (with no GKSM). The trial lasted for 8 weeks (56 days) during which time the rabbits were given feed and water *ad libitum* and were subjected to similar sanitary and husbandry conditions.

Blood Collection for Haematological and Biochemical Analysis

At the end of the feeding trial, about 5mls of blood sample was collected for the analysis. The blood samples were taken from the wing vein of the bird using disposable needle and syringe. For haematological analysis, about 2mls of blood used for analysis was stored in a bottle containing anticoagulant, ethylene diamine tetra acetic acid (EDTA) to prevent clotting. The following parameters were analysed WBC, PCV, RBC, Hb, neutrophils, lymphocytes, monocytes, basophils and eosinophils. While for serum biochemistry analysis, about 3mls was used. It was store without anticoagulant, after coagulation it was separated and the harvested sera were used to determine the following parameters total protein, bilirubin, creatinine, cholesterol, albumin, sodium, potassium, calcium and phosphorus

Data Collection and Analysis

Data collected for haematological and biochemical parameters were analyzed using analysis of variance (ANOVA) appropriate for (CRD) and treatment means were separated using Duncan multiple range test

Table 1: Composition of Experimental Diet

Ingredients	T₁ (0%)	T₂ (1.5%)	T₃ (3.0%)	T₄ (4.5%)
Maize	45.0	44.0	43.0	42.5
Wheat offal	40.0	39.5	39.0	38.0
Bitter kola	0.00	1.50	3.00	4.50
Fish meal	2.00	2.00	2.00	2.00
Blood meal	7.00	7.00	7.00	7.00
Soya bean meal	4.00	4.00	4.00	4.00
Bone meal	0.25	0.25	0.25	0.25
Lysine	0.25	0.25	0.25	0.25
Methionine	0.25	0.25	0.25	0.25
Salt	0.25	0.25	0.25	0.25
Vit/min premix	1.00	1.00	1.00	1.00
Total	100	100	100	100

Results and Discussion



Table 2: Biochemical Characteristics of Rabbits fed *Garcinia Kola* Seed Meal

Parameters	T ₁ (0%)	T ₂ (1.5%)	T ₃ (3.0%)	T ₄ (4.5%)
Total protein (g/dl)	5.80±0.00 ^b	6.00±0.00 ^a	6.50±0.50 ^a	7.00±0.00 ^a
Cholesterol (mg/dl)	74.00± 6.00 ^a	67.00±1.00 ^{ab}	62.00±2.00 ^{ab}	60.00±1.00 ^b
Creatinine (mg/dl)	2.00±0.00	2.00±0.00	2.50±0.50	3.00±1.00
Albumin (g/dl)	4.50±0.50	4.00±0.00	4.00±0.00	4.00±0.00
Sodium (mg/dl)	10.00±0.00 ^b	11.50±0.50 ^a	12.00±0.00 ^a	12.00±0.00 ^a
Potassium (mg/dl)	5.00±0.00 ^b	7.00±1.00 ^{ab}	7.50±0.50 ^a	9.00±0.00 ^a
Calcium (mg/dl)	10.00±0.00	10.00±0.00	11.00±0.00	10.00±1.00
Phosphorus (mg/dl)	6.00±0.00	6.00±0.00	5.50±0.50	6.00±0.00

a,b,ab Means within a row with different superscripts differ significantly (p<0.05).

The biochemical parameters of rabbits for this study are presented in Table 2. Total protein, cholesterol, sodium and potassium showed significant (P<0.05) differences. While creatinine, albumin, calcium and phosphorus showed non-significant (P>0.05) differences. The result of biochemical analysis of rabbits fed GKSM reveals that total protein concentration increases as the level of *garcinia kola* increases. T₂, T₃ and T₄ is similar and it differs (P<0.05) significantly from T₁. The result differs from the range as reported by Ahemen *et al* (2013) in their studies. Meanwhile, the result is within the normal range as reported by (Medirabbit 2007). Cholesterol concentration in T₁ differs (P<0.05) significantly from treatments T₂, T₃, and T₄. It follows a decreasing trend as the GKSM inclusion level increases. The result is in agreement with the report of Fuhrman *et al.* (2000) who reported that plant foods possess cholesterol-suppressive capacity. The meal contains some hypocholesterolemic compounds. More so, the reduction suggests a decline in lipid mobilization and that the meal is capable of reducing serum cholesterol, hence assisting in the reduction and deposition of cholesterol in the muscle. It falls within the range 10-80mg/dl as reported by University of Pennsylvania School of Veterinary Medicine (2002) and Medirabbit (2007).

Table 3: Haematological Characteristics of Rabbits fed *Garcinia Kola* Seed Meal

Parameters	T ₁ (0%)	T ₂ (1.5%)	T ₃ (3.0%)	T ₄ (4.5%)
PCV (%)	26.50±1.50	26.50±2.50	26.00±0.00	27.00±1.00
Hb(g/dl)	10.50±0.50	10.50±0.50	12.00±0.00	11.50±0.50
RBC (x10 ¹² /l)	9.00 ±0.00 ^b	10.50 ±0.50 ^a	10.00±0.00 ^{ab}	10.50±0.50 ^a
WBC (x 10 ³ /mm ³)	11.15±0.65	11.05±0.85	10.50±0.10	10.40±0.10
Neutrophils (%)	25.00±5.00	20.00±2.00	24.50±4.50	18.50±0.50
Lymphocyte (%)	74.00±6.00	78.00±2.00	73.50±3.50	81.00±1.00
Monocyte (%)	0.50±0.50	1.00±0.00	1.50±0.50	0.50±0.50
Basophils(%)	0.50±0.50	0.50±0.50	0.50±0.50	0.00±0.00
Eosinophils (%)	0.00±0.00	0.50±0.50	0.00±0.00	0.00±0.00



a,ab, Means within a row with different superscripts differ significantly ($p < 0.05$).
RBC=Red blood cell; WBC=White blood cell; PCV=Packed cell volume; Hb= Hemoglobin;

Table 3 showed the haematological characteristics of rabbits fed GKSM. All the parameters showed non-significant ($P > 0.05$) differences except RBC that showed significant ($P < 0.05$) differences. The PCV values (26.00-27.00 %) were within the normal physiological range (25.00-45.00 %) for growing rabbits as reported by (Mitruka and Rawnsley, 1977). Rabbits on T_4 recorded the highest PCV value of 27.00 % followed by T_1 and T_2 that had similar value 26.50 %, while the least value of 26.00 % was on T_3 . Also the result was lower than the range 33.62-39.67 % reported by (Ilo and Egu 2018). The disparity in the result may be connected to the differences in sex, age, physiological and nutritional status of the rabbits (Chineke *et al.*, 2006; Isaac *et al.*, 2013). Haemoglobin values were not significantly ($P > 0.05$) affected by the treatment. The value ranges from (10.50-12.00 $\times 10^{12}/l$) and it agreed with the normal haemoglobin levels of healthy rabbit as reported by (RAR 2009).

Conclusion

The results of this study have shown that GKSM can bring about an improvement in the blood profile of rabbit. Cholesterol values reduced with an increase of the meal. Also there were no detrimental effects on the health status of the animal, as all the parameters fall within the normal range for healthy rabbits.

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