

HAEMATOLOGICAL INDICES OF RED SOKOTO BUCKS FED PROCESSED FORMS OF *Piliostigma reticulatum* PODS MEAL

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ABSTRACT

An experiment was conducted to determine the haematological response of red Sokoto bucks fed different processed forms of *Piliostigma reticulatum* (Kalgo) pod meal (KPM). Completely randomized design was used with three treatments designated as: T1 (control), T2 and T3 each replicated four times. The goats were fed KPM for twelve weeks. Feed and water were offered *ad libitum*. Result indicated there were no significant ($P>0.05$) differences in the PCV (27.40 – 29.90 %), Hb (9.35 - 11.10 g/dL), WBC ($104.00 - 120.70 \times 10^9$), Lymphocyte (91.55 – 93.40%), Monocyte (0.00 – 0.10%), Basophil (0.25 - 0.50%), Eosinophils (0.45 – 0.65%), Platelet ($119.00 - 129.00$). However, other haematological indices: Red blood cells ($10.00 - 14.50 \times 10^{12}/L$), Mean corpuscular volume (35.11 – 38.32fl), Mean corpuscular haemoglobin (8.90 – 10.60pg) Mean corpuscular haemoglobin concentration (31.27 – 38.95pg), were significantly ($p<0.05$) different across the treatments. The values were all within normal range for healthy red Sokoto bucks. Thus, inclusion of *Piliostigma reticulatum* pod meal in the diets of red Sokoto bucks had no deleterious effect on haematological indices, therefore, the health status of red Sokoto bucks may not be impaired.

Keywords: Haematological indices, Red Sokoto bucks, *Piliostigma reticulatum* pod meal

INTRODUCTION

Livestock make a significant contribution to the world's supply of protein and energy (Pino, *et al.*, 2019). They occupy dry and cold areas where crop farming is not possible, as well as integrating with crops in warmer, wetter zones (Richard *et al.*, 2022). Ruminants have served and a valuable role in sustainable agricultural systems (Grandin, 2022). Goats are important domestic animals in many parts of the world. They provide substance in the form of food and clothing. The rising demand for goat meat, milk, and cheese offers commercial goat production opportunities (Ibrahim *et al.*, 2014).

Red Sokoto goat is most widely distributed throughout the various ecological zones, particularly Guinea and Sudano - Sahelian Savannah vegetation belts (Ibrahim *et al.*, 2014). The perennial acute shortage of feed stuffs during the long period of dry season, early part of the rains and the rapid decline in nutritional value with maturity in tropical grasses during the rainy season (2-6% of protein level) lead to losses in weight up to 15% of body weight of the animals subsisting on such grasses (Adegbola, 1990). To reduce such weight losses, requires research on the possibility of supplementing the grasses consumed by the animals with cheap and available protein sources, to ensure proper growth and production of small ruminants in Nigeria.

The decreased nutritional quality of natural forages during the dry season underscores the importance of supplementary feeding for animals raised under extensive system of management (Abdu *et al.*, 2013). Nutrition is essential for growth and reproduction which are the main concerns in all livestock species. *Piliostigma reticulatum* pods are good sources of protein, it is available throughout the year, readily available almost everywhere in Nigeria and they are not competed between humans and animals as food. Protein supplements such as soyabean meal, groundnut cake and cotton seed cake can no longer be used widely in ruminant diets by average Nigerian farmers (Abubakar, 2018). Information on blood parameters are valuable for determining the responses of the animal to physiological changes due to environmental variations. They also provide vital information on prognosis for pathological conditions (Ciesla, 2007). Aderemi (2004), highlighted that, study on haematological indices provides the opportunity to clinically examine the presence of several metabolites and other constituents in the body of animals and it plays a vital role in the physiological, nutritional and pathological status of an animal. Conventional feed stuff are inclined to create competition between humans and animals as such escalate their prices (Oladimeji *et al.*, 2020). The specific objective of the study was: to determine the haematological response of red Sokoto bucks fed with different processed forms of *Piliostigma reticulatum* pod meal.

MATERIALS AND METHODS

Experimental Site, Experimental Bucks and their Management

The experiment was carried out at Professor Lawal Abdu Saulawa Teaching and Research Farm; Small Ruminant Unit of the Federal University Dutsin-Ma, Katsina State, Nigeria. The Departmental Livestock Teaching and Research Farm, has an area of 6.46 hectares (64,616 m²), on Latitude: 12°25'39.3" N, longitude: 7°27'63.6" E and altitude: 505m (Muhammad *et al.*, 2018).

Twelve Red Sokoto bucks with an average initial weight of 9 ± 2 kg were procured for the study from Dutsin-Ma market, Katsina State, Nigeria. Four bucks were each randomly allocated to the three diets, in individual cubicles in the same pen with slanted concreted floors, under a common roof. The house had enough light for visibility of feed and water, well ventilated and has been sanitized periodically. Prior to the arrival of the bucks, the pen was cleaned and disinfected with Diskol-ES (Tiscol) at the rate of 10mls/4litres of water. Also 10% formalin was used as a fumigant.

On their arrival, the bucks were quarantined and adapted for three weeks during which their bodies underwent prophylactic treatments to rid them of both internal and external parasites. Their bodies were sprayed with amitraz® 1ml/litre, albendazole at 12.5mg/kg¹ body weight. Antibiotic, i.e oxytetracycline LA (Kepto®) 20%, at 1ml per 10kg body were injected intramuscularly. Groundnut haulms and maize offal were offered to the bucks during the quarantine and adaptation periods of three weeks before the commencement of the experiment.

Experimental Design, and Experimental Diets Preparations

Twelve Red Sokoto bucks were allotted to dietary treatments 1, 2 and 3 which contained four bucks each, in a completely randomized design.

Piliostigma reticulatum pod meal was prepared from harvested sample, it was air-dried and pulverized with pestle and mortar. Anti-nutritional factors in the pods were chelated by heating using frying pan. **1. Soaking:** The pods were poured inside buckets, water was added and allowed to stay for 24 hours, the water was not changed immediately but thereafter, drained off by means of baskets with perforations. The pods were then air-dried and crushed to particle size ranging 1 - 2 cm (Abdu, 2011). The sub-samples were pooled together, mixed thoroughly and packed into empty polythene bags of which a little quantity was taken to laboratory for chemical analysis.

2. Roasting: The pods were placed inside half drum containing sand, the sand was sieved to remove organic matter prior to placing the pods in it (roasting). The half-drum was placed under fire wood, at temperatures that fluctuated between 105 and 110°C. The mixture was turned for three minutes at short interval of two minutes. Temperature was checked at intervals of five minutes. After roasting, the sand was sifted using a sieve (Abdu, 2011). The sub-samples were pooled together, mixed thoroughly and packed into empty polythene bags out of which a little quantity was taken to laboratory for chemical analysis. The gross composition of the experimental diet is shown in Table 1 below

Table 1: Gross Ingredients Composition of Diets fed to bucks

Ingredients of (% DM)	Raw pods (Control)	Water soaked pods	Roasted pods
	T1	T2	T3
<i>P. reticulatum</i>	30.00	30.00	30.00
Groundnut cake	2.00	2.00	2.00
Maize offal	25.00	25.00	25.00
Rice offal	40.00	40.00	40.00
Bonemeal	2.50	2.50	2.50
Common salt	0.50	0.50	0.50
Total	100.00	100.00	100.00

Haematological Indices

Blood sample of 5ml was collected from three bucks in each group through jugular venipuncture into sample bottles containing Ethylene Diamine Tetraacetic Acid (EDTA). Packed Cell Volume (PCV), Haemoglobin (Hb), Red Blood Cell, (RBC), White Blood Cell (WBC), Mean Corpuscular Volume (MCV), Mean Corpuscular Hemoglobin (MCH) were assessed.

Data analysis

Data were subjected to analysis of variance using General Linear Model of SAS (2002) version 9.13 in a Completely Randomized Design (CRD). Means were compared using Least Significant Difference (LSD) of the same statistical package at $P < 0.05$.

RESULTS AND DISCUSSIONS

The haematological indices of red Sokoto bucks fed *Piliostigma reticulatum* pod meal are presented in Table 2. The result showed that there were no significant ($P > 0.05$) differences in PCV. The range recorded in this

study (27.40 – 29.90 %) were in agreement with 18.0 to 26.0 and 25.33 to 33.33 reported by Millam *et al.* (2020) and Odeyinka *et al.* (2021) for Red Sokoto bucks and West African Dwarf goats, respectively. The Hb (9.35 - 11.10 g/dL) accorded with 10.20 to 11.00 g/dL reported by Kolo *et al.* (2021), Millam *et al.* (2021) reported 6.7 to 8.6 g/dL which were lower than the values in this study. The haemoglobin values in this study were within the normal range (8.0 – 12.0g/dl) reported by Millam *et al.* (2021) for Red Sokoto bucks. The values of WBC ($10.40 - 12.70 \times 10^9$) in this study were in agreement with the range of values 5.56 to 13.25×10^9 /L recorded by Yusuf (2023) for red Sokoto bucks supplemented with diets containing *Piliostigma reticulatum* pods soaked in water, the range of values 5.88 to 13.77×10^9 /L obtained by Odeyinka *et al.* (2021) for West African Dwarf goats fed *Moringa oleifera* leaves ensiled with cassava peels. The values were lower than 9.00 to 17.75×10^9 /L recorded by Kolo *et al.* (2021) on wattled Red Sokoto does and their offsprings.

However, the values were higher than the values 5.26 to 6.57×10^9 /L reported by Bishir *et al.* (2021) for Red Sokoto bucks fed *Spondias mombin* leaf meal. The values of WBC obtained in this study were within normal range of values ($4.0 - 13.0 \times 10^9$ /L) reported by Daramola *et al.* (2005) for Red Sokoto goats. The normal values of WBC obtained in this study suggested well developed immune system of the goats in different dietary groups (Jiwuba *et al.*, 2016). The range of values for lymphocyte (91.55 – 93.40%) reported in this study were higher than lymphocytes 68.62 to 84.83% reported by Yusuf (2023) for red Sokoto bucks fed diets containing soybean hulls and *Piliostigma reticulatum* pods as supplements during dry season grazing. This could be attributed to diets and the season upon which the two researches were carried out.

Monocyte (0.00 – 0.10%) were within normal range $0.2 - 1.2 \times 10^9$ /L for red Sokoto bucks. Basophil (0.25 - 0.50%) were lower than 2.53 to 3.67% reported by Yusuf (2023) for red Sokoto bucks fed diets containing soybean hulls and soaked *Piliostigma reticulatum* pods as supplements during early rainy season grazing. The difference could be as a result of season and diets used in different studies. Eosinophil (0.45 – 0.65%) obtained in the current study were lower than 1 – 8% reported by Kolo (2021) for Red Sokoto goats. However, the range was within normal values for red Sokoto bucks.

The use of different processed forms of *Piliostigma reticulatum* pods did not negatively affect blood parameters indicating adequacy of this diet for small ruminant nutrition. Platelet counts (119.00 – 129.00). However, there were significant ($P < 0.05$) differences in red blood cells ($10.00 - 14.50 \times 10^{12}$ /L) the values obtained in this study disagreed with 3.34 – 4.30, 4.90 to 5.25×10^{12} /L and a range of 4.00 to 8.00×10^{12} /L reported by Yusuf (2024) for weaner rabbits fed raw and soaked *Piliostigma reticulatum* - supplement, Williams *et al.* (2022) for weaner rabbits. The values were also than the values 5.29 to 6.29×10^{12} /L reported by Adedeye *et al.* (2022) for haematological parameters of weaner rabbits fed graded levels of processed kolanut pod meals. The difference could be as a result of species differences.

Mean corpuscular volume (35.11 – 38.32fl). Mean corpuscular haemoglobin (8.90 – 10.60pg) and mean corpuscular haemoglobin concentration (31.27 – 38.95 g/dL) were within the normal ranges of 32-36 g/dL reported (Bounous and Stedman 2000; Compbell *et al.*, 2003) for red Sokoto bucks. By implication inclusion of *Kalgo* pod meal in broiler chickens' diet had no deleterious effect on their health

Table 2: Haematological indices of red Sokoto bucks fed *Piliostigma reticulatum* pod meal

Parametres	Treatments			SEM	LS
	T1 (0% Control)	T2 (Soaked)	T3 (Roasted)		
PCV (%)	27.40	29.90	28.95	2.1033703	NS
Hb (g/dL)	9.500	9.350	11.10	1.3319785	NS
RBC ($\times 10^{12}$)	10.00	14.50	12.50	0.0000000	*
WBC ($\times 10^9$)	104.00	112.75	120.70	3.729723	NS
MCV (fl)	38.32	35.11	36.30	0.0000000	*
MCH (pg)	9.05	8.90	10.60	0.0000000	*
MCHC	34.17	31.27	38.95	0.0000000	*
LYMPHOCYTE	92.750	93.400	91.550	0.9192388	NS
MONOCYTE	0.10000	0.00000	0.00000	0.05773503	NS
BASOPHIL	0.3500	0.2500	0.5000	0.23452079	NS
EOSINOPHIL	0.6000	0.6500	0.4500	0.20412415	NS
PLATELETS	129.00	119.00	124.50	8.411302	NS

PCV = Packed cell volume; Hb = Haemoglobin; RBC = Red blood cells; WBC = White blood cells; MCV = Mean corpuscular volume; MCH = Mean corpuscular haemoglobin; MCHC = Mean corpuscular haemoglobin concentration;

CONCLUSION

Findings showed that inclusion of differently processed *Piliostigma reticulatum* pod meals have negative impact on Haematological indices of red Sokoto bucks. Therefore, it is recommended that, either soaked or roasted pods can be used in their diets without any deleterious effects on their blood indices.

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