HAEMATOLOGICAL INDICES OF RED SOKOTO BUCKS FED DIETS SUPPLEMENTED WITH GRADED LEVELS OF SOYBEAN HULLS DURING EARLY RAINY SEASON GRAZING

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ABSTRACT
The experiment was conducted to investigate the haematological response of Red Sokoto bucks to graded levels of soybean hulls during early rainy season grazing. Four supplements were formulated to contain 12% CP. Twelve bucks (12) were used for the experiments in a completely randomized design, three animals each as a replicate was randomly allocated into four (4) treatment diets containing varied inclusion levels of soybean hulls. Supplement 1 served as control diet, while 2, 3, and 4 contained 15.00, 22.50 and 30%. respectively. Animals were offered their respective supplements at 400g per head per day (200g each in the morning and evening) and thereafter allowed to graze the available forages. The experiments lasted for 84 days. Results of the experiments revealed that all the parameters measured were similar (p>0.05). However, PCV (6.73%) and Hb (10.00g/dL) were higher than values recorded in T2 (6.10%), T3 (6.13%) and T4 (6.03%) and for Hb T2 (8.0g/dL), T3 (8.73g/dL and T4 (9.07g/dL), respectively. It is therefore concluded that all the supplements were within normal range as such did not have detrimental effects on blood parameters. It is recommended that supplement without soybean hulls can be fed to Red Sokoto bucks during early rainy season grazing.

Keywords: Haematological indices, Red Sokoto bucks, soybean hulls, supplements, supplementation

INTRODUCTION

Goat production is of particular significance in many parts of the world, including Nigeria. Goats are highly adaptable and can survive in harsh environments, making them an excellent choice for small-scale farmers in areas where other livestock species cannot thrive. Goats are known for their high fecundity, rapid growth, and excellent meat quality. They also have a wide range of uses, including meat, milk, and hides, and they are highly valued in many cultural and religious (Bamgbose and Adetunji, 2018)). Practices. Livestock production in Nigeria is faced with numerous challenges, including feed scarcity and high cost of conventional feeds, which have negative effects on the sector. According to Akinfala *et al*. (2021), feed scarcity is one of the biggest challenges facing livestock production in Nigeria. Furthermore, the high cost of conventional feeds is another major problem facing livestock production in Nigeria. According to Okpara *et al.* (2021), the high cost of feed ingredients such as maize, soybean, and wheat bran, which are commonly used in livestock feed production, is a major constraint to livestock farmers in Nigeria. This is due to several factors such as limited supply, high transportation costs, and import restrictions. As a result, farmers are forced to either reduce the quality and quantity of feed given to their animals or incur significant costs in procuring these feeds, which negatively affects their profitability. The problems of feed scarcity and high cost of conventional feeds have significant impacts on livestock production in Nigeria. According to Ojo *et al*. (2020), these challenges lead to low productivity, high mortality rates, and reduced profitability.

MATERIALS AND METHODS

Study Area

The experiments was conducted at Professor Lawal Abdu Saulawa Teaching and Research Farm, in the Small Ruminant Unit of the Federal University Dutsinma, Katsina State. The Departmental Livestock Teaching and Research Farm, according to field survey (2018) using GPS was reported as 6.46 hectares (64,616M^2), on Latitude: 12º25'39.3" N, Longitude: 7º27'63.6" E and Altitude: 505m.

Experimental Animals and their Management

Twelve Red Sokoto bucks with an average initial weight of 5 ± 2 kg were procured for the study/ Three (3) Red Sokoto bucks were randomly allocated to four (4) diets, in individual face – in cubicles of 2 by 2 metres, housed in the same pen with slanted concreted floors, under a common roof. The house was fully illuminated, well ventilated and was sanitized periodically. Prior to the arrival of the bucks, the cubicles were 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 (3) weeks during which their bodies were sprayed with acaricide, using Amitraz® 1mL/L against external parasites. They were dewormed with prophylactics against both internal and external parasites. Antibiotic, i.e Oxytetracycline L. A. (Kepro®) 20%, at 1mL per 10kg body weight was injected intramuscularly. Groundnut haulms and maize offal were offered to the bucks during the quarantine period and adaptation period of three (3) weeks before the commencement of the experiment.

Experimental Diets and Animal Feeding

Two experimental diets were used for the study: basal and supplemental diets.

The basal diets were free range grazing. The basal diets were fed to the bucks, *ad libitum* some of the spieces of grasses and legumes usually fund in the grazing area were: *Pennisetum purpureum, Panicum maximum, Andropogon gayanus, Ipomoea eriocapa, Centrosema pubscences,Chloris gayana Commelina benglensis, Chlorise gayana, Senna tora, Cassia occidentalis, Bauhinia thonningii, Triumfetta rhomboidea.* Four supplemental diets containing 12% crude protein with varying inclusion level of soybean hulls were formulated. The supplements designated as T1, T2, T3 and T4 contained cottonseed cake, *Piliostigma reticulatum* pod meal, maize offal, wheat offal, cowpea husk, rice offal, bonemeal and salt as presented in Table 1. Diet 1, is a control as such does not contain soybean hulls while 2, 3 and 4 contain varying levels of soybean hulls. Each buck was offered its respective supplementary diet at 400g per head per day (200g each in the morning and in the evening) at about 8:00 am; they were allowed to consume the feed for one hour (8:00 am to 9:00 am) and thereafter allowed to graze the available forages at the University Teaching and Research grazing area for about 7 – 8 hours (9:00 am to 4:00 pm) in order to obtain their basal diets. Feed left-overs were collected and weighed immediately after the bucks were released for grazing. On their returns from grazing, they were kept in their individual cubicles. Clean drinking water and saltlick were provided *ad-libitum* for the duration of the experiment. Water and salt lick were provided *ad libitum.* The experiment lasted for 6 weeks after two weeks of adjustment to the experimental diets.

Table: 1 Ingredients and Chemical Composition of the Experimental Diets

Ingredients %	Treatments			
	T1	T2	T3	T4
Soybean hulls	0.00	15.00	22.50	30.00
Maize offal	30.00	15.00	7.50	0.00
Wheat offal	22.00	18.00	15.00	14.00
Rice offal	10.00	17.00	20.25	22.00
Cottonseed cake	10.00	8.00	10.00	9.00
Cowpea husk	11.00	10.00	11.00	12.00
P. reticulatum	14.00	14.00	11.00	10.00
Bone meal	2.50	2.50	2.50	2.50
Common Salt	0.50	0.50	0.50	0.50
Dry Matter	89.47	90.53	89.73	90.30
Organic Matter	81.89	82.11	80.64	78.35
Crude Protein	18.94	21.75	19.63	21.06
Ash	7.58	8.42	9.09	11.95
NDF	65.24	67.55	66.90	63.61
ADF	35.65	38.50	42.65	39.75
Hemicellulose	29.59	29.05	24.25	23.86

NDF = Neutral Detergent Fibre and ADF = Acid Detergent Fibre

Haematological Parameters

Blood samples were collected via jugular vein of 3 bucks from each treatments at the end of the feeding trial, at zero time (before morning feeding) and 4 hours after feeding. Five (5) mL of blood samples were drawn via jugular veins of the experimental rams using sterilized 19-gauge needle and syringe as described by Frandson (1986) into cleaned and well labelled sample bottles that contain an ethylene diaminetetra acetic acid (EDTA) coated plastic tube for haematological study. mean corpuscular haemoglobin concentration (MCHC) content were calculated according to the procedures of Jain (1993). Packed cell volume and erythrocyte counts were determined as described in Egbunike and Nworgu (2006). Red blood cells (RBC) and differential total white blood cells (WBC) counts were carried out using Nuebauer haematocytometer after appropriate dilution according to Jelalu (2014).

Experimental Design

The experiment was conducted in a Completely Randomized Design (CRD) with four (4) treatments of three (3) animals each as a replicate.

Statistical Analysis

Data generated was analysed using SAS (2002) Difference among means were separated at ($p<0.05$) using Duncan Multiple Range Test (DMRT, 1955) of the same statistical package.

RESULTS AND DISCUSSION

Results of haematological indices of Red Sokoto bucks supplemented with diets containing graded levels of soybean hulls during early rainy season razing is shown in Table 2. All the values revealed no significant ($p>0.05$) difference. The white blood cells (WBC) range of 5.56 to 13.25×10^9/L recorded in this study fell within 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 the range of values of 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 with *Spondias mombin* leaf meal. The values of WBC obtained in this study were within normal range of values (4.0 – 13.0×10^9/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 haemoglobin concentration range of 7.35 to 10.00 g/dL in this study was in accordance with the range of 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 blood haemoglobin values recorded in this study are within the normal range (8.0 – 12.0g/dL) reported by Millam *et al.* (2020) for Red Sokoto bucks. The increase in the Hb values after feeding the experimental diets may be due to improved nutrition.

The packed cell volume range of 3.90 to 6.73% recorded in this study was in conflict with the range of values 18.0 to 26.0, 25.33 to 33.33 and 30.00 to 33.00% reported by Millam *et al.* (2020), Odeyinka *et al.* (2020) and Kolo *et al.*(2021) for Red Sokoto bucks and West African Dwarf goats respectively. The lower PCV values obtained in this study compared two previous studies could be as a result of some illnesses observed during the experiment.

The values of basophils (2.53 to 3.67%), lymphocytes (68.62 to 84.83%) and MCHC (140.19 to 213.66g/dl) were higher than 1.25 to 1.30%, 45.55 to 51.05% and 35.00 to 37.90g/dl reported by Kolo (2021) for Red Sokoto kids. However, values of lymphocytes reported in this study fell within normal range (50-70%) reported by Kolo (2021) for Red Sokoto kids. The values for neutrophils (9.66 to 26.20%) and eosinophils (0.46 to 0.83%) recorded in the present study were lower than 40.95 – 45. 95% and 6.00 – 7.00% reported by Kolo *et al.* (2021) for Red Sokoto kids. However, the value for eosinophils is almost in the normal range of 1 – 8% reported by Kolo (2021) for Red Sokoto goats. The use of graded levels of soybean hulls supplements did not negatively affect blood parameters in this study indicating the adequacy of this diet for small ruminant nutrition.

Table 2: Haematological parameters of Red Sokoto bucks fed with the experimental diets

Parameters	Diets				SEM	LS
	T1	T2	T3	T4		
WBC ($\times 10^9$/L) Before Feeding	5.56	6.13	5.73	6.17	0.71	NS
4 Hours After Feeding	14.50	17.23	17.00	13.25	26.81	NS
LYMP (%) Before Feeding	71.30	68.63	71.17	73.15	3.08	NS
4 Hours After Feeding	84.83	77.83	77.93	77.43	5.74	NS
NEUT (%) Before Feeding	9.66	14.53	14.50	15.07	3.01	NS
4 Hours After Feeding	22.96	26.20	24.00	21.40	4.51	NS
EOSIN (%) Before Feeding	0.53	0.46	0.53	0.55	0.07	NS
4 Hours After Feeding	0.83	1.20	1.10	1.13	0.28	NS
BASO (%) Before Feeding	3.30	3.43	3.16	3.15	0.24	NS
4 Hours After Feeding	2.83	2.53	3.67	3.06	0.33	NS
Hb (g/dL) Before Feeding	7.56	7.46	7.53	7.35	0.34	NS
4 Hours After Feeding	10.00	8.50	8.73	9.07	0.79	NS
PCV (%) Before Feeding	4.80	5.36	4.76	3.90	0.56	NS
4 Hours After Feeding	6.73	6.10	6.13	6.03	0.80	NS
MCHC (g/dL) Before Feeding	148.68	140.19	142.76	151.16	6.25	NS
4 Hours After Feeding	170.12	139.13	168.84	213.66	29.73	NS

SEM = Standard Error of Means; Difference, NS = Not Significant; = ($P<0.05$); HAEM = Haemoglobin; PCV = Packed Cell Volume; MCH =Mean Corpuscular Haemoglobin; MCHC = Mean Corpuscular Haemoglobin Concentration; WBC = White Blood Cells; RBC = Red Blood Cells; ESR = Erythrocyte Sedimentation Rate; MONO = Monocytes; LYMPHO = Lymhoccytes; NEUT = Neutrophils.

CONCLUSION AND RECOMMENDATION

It is therefore concluded that supplemental diet containing 30% inclusion level of soybean hulls had highest total weight gain, lower total cost of feed and least cost of feed per naira per kilogram weight gain, as such it is recommended for supplementation on bucks during early rainy season grazing.

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