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Heamatology and Serum Quality of Red Sokoto Goats Fed Baobab (Adansonia digitata L.) Fruit Meal Supplement

Okunlola D.O[1] Olorunnisomo O.A[2] Binuomote R.T[3] Amuda A.J[2] Agboola A.S[2] Omole O.G[3]
1.Department of Animal Nutrition and Biotechnology, Ladoke Akintola University of Technology, P.M.B. 4000, Ogbomoso, Oyo State, Nigeria
2. Department of Animal Science, University of Ibadan, Ibadan, Oyo State, Nigeria
3.Department of Animal Production and Health, Ladoke Akintola University of Technology, P.M.B. 4000, Ogbomoso, Oyo State, Nigeria

Abstract
The haematology and serum components of Red Sokoto goats fed baobab fruit meal was investigated. A total of 16 animals were randomly allotted to four dietary treatments with four animal per replicate in a completely randomized design. Treatment 1 was control with no baobab fruit meal supplement, Treatments 2 , 3 and 4 had 10%, 20% and 30% respectively. The heamatological and serum characteristics were significantly affected ($P<0.05$) across the treatments with Treatment 3 (20% inclusion) having the highest PCV (%), Hb (g/dl) and RBC (X $10^{9/l}$) respectively. The serum quality of T3 and T4 were not significantly different but albumin and iron levels were higher in T3 . However, the cholesterol level fluctuates along the treatment with control having the highest cholesterol level of 67.25 ± 2.0^{ab} while T3 had the least value of 60.95 ± 5.1^{b}. The study showed that all the dietary inclusion are satisfactory as feed for small ruminant without any deleterious effect on performance and blood profile. Inclusion level of 20% baobab appeared to have better overall performance when fed to red sokoto goat.
Keywords: baobab fruit meal, red sokoto goats, haematology, serum

INTRODUCTION

Health condition of an animal aside from nutrition is a function of its blood and serum constituent as these determines its ability to defend itself against foreign bodies. The effects of diets on blood and serum chemistry should be of paramount interest since blood transports gases, nutrients, hormones and excretory products within the body Aletor *et al.,*(1992). Animal protein still remain the major source for human protein requirement. Red sokoto goat among other breeds is known for excellence with reference to its skin quality which is used in production of morocco leather. Beyond its meat quality; it is also a good milker. Therefore, efforts should be intensified to improve its production and performance in order to exploit these potentials. Good and adequate feeding regime using non-conventional feedstuff such as baobab (*Adansonia digitata*) fruit is a pointer to accomplish this due to its beneficial health properties as antioxidant, analgesic, anti-inflammatory Ramadan *et al.,*(1994), and good source micronutrients and energy Locket *et al.,*(2000).

MATERIALS AND METHODS

The study was conducted at the Small Ruminant Unit of Ladoke Akintola University of Technology Teaching and Research Farm. Sixteen Red Sokoto goats (Does) were used for the study. Animals were vaccinated and acclimatized before the commencement of the study. The feeding trial lasted for 90days The animals were allotted to four treatment comprising of four (4) animal per treatment in a Completely Randomized Experimental Design.

Preparation of experimental diets

The baobab fruits were gathered from rural communities in Ogbomoso on longitude $4^{o}5'$ east of the Greenwich meridian and latitude $8^{o}7'$ North of the equator in the derived savannah zone of Nigeria.. The fruits were picked from the ground because matured fruits would fall naturally from the parent tree. The outer covering of the fruits were carefully scraped with hard brush. This is done to avoid contamination due to mixing during processing . The fruit pulp and seeds were removed and sun-dried for a week to reduce the anti nutrients. Dried baobab pulp and seeds was later milled and included at varying levels of 0%, 10%, 20% and 30% respectively with other feed component to prepare a concentrate tagged baobab fruit meal (BFM). Other components of the experimental feed include Wheat offals (63.00%, 53.00%, 43.00% and 33.00% for diets 1-4) respectively. Cassava peels, Palm kernel cake, Ruminant premix, Di-calcium Phosphate and Salt were all at a fixed proportion in all experimental diets.

Chemical evaluation

Proximate analysis

Proximate composition of the whole baobab fruit, pulp, seeds, pulp and seed mixture as well as experimental

diets were carried out according to the procedure of AOAC (1990). The crude protein was determined by the Kjeldahl method as described by AOAC (1990). Crude fiber determination was carried out using trichloroacetic acid (TCA) method. The ash and crude fat content were obtained by charring in furnace and extraction with ether

Data collection:

Haematological indices - At the end of 12 weeks of experiment, 5ml blood samples were collected from each animals and taken to laboratory for hematological serum analysis.

Statistical analysis

All data collected were subjected to statistical analysis of variance (ANOVA) procedure of SAS (2010) software package, where significant difference occurs among the means, Duncan's multiple range test of sample package was used to separate the means.

RESULTS AND DISCUSSION

The result of the haematological values obtained from 16 Red Sokoto Goats is shown on table 2. The was significant difference ($p<0.05$) among the treatments with treatment 3 having the highest value of PCV %, Hb g/dl, WBC (X 10^9/l), RBC (X 10^{12}/l) as 32.75 ± 2.4, 12.58 ± 2.2, 18.90 ± 1.8 and 2.83 ± 0.1 respectively. MCHC was not significantly different ($p>0.05$), but variation was observed in the values of MCH (pg) and MCV (fl).

The packed cell volume (PCV) in this study was higher than 25.7±3.1 obtained for red sokoto goats Tambuwal *et al.,*(2002) and 28.4 ± 0.9 obtained for West African Dwarf (WAD) goats Opara *et al.,*(2010). The variation in the report of this study therefore could be attributed to the quality of the experimental diets and environmental condition(s).

Haemoglobin (Hb) concentration of Red Sokoto goats fed baobab fruit meal increased significantly with T3 having the highest value of 12.58 ± 2.2 and this is an advantage in terms of the oxygen carrying capacity of the blood.

The white blood count in the study is significantly different ($p<0.05$). T3 recorded the highest value of 18.90 ± 1.8. The result shows a good level of immunity for defence against any infectious agent and as such enhance adaptation of this species to this eco-zone which is characterized with high prevalence of diseases.

The result of the Serum Characteristics of Red Sokoto goats fed baobab fruit meal shows no significance differences ($p>0.05$) in creatine level. The cholesterol levels were significantly different ($P<0.05$) with highest value (73.25 ± 4.6) recorded in T4 (30% baobab fruit meal inclusion) while T3 recorded the least value of (60.95 ± 5.1). The level of Iron was also high in T3 with a value of 68 µg/dl which made the treatment the most preferred diet to the experimental animals.

CONCLUSION

The results of the study had shown that inclusion of baobab at 20 % in the diet of Red Sokoto goats gave the optimum digestibility value. The availability of such multipurpose fruit during dry season would thereby improve the quality of the declining nutritive value of available grass species, and hence reduce the characteristic weight loss during this period.

In addition, baobab fruit plays a significant role in the diet of man meeting their daily vitamin C, Iron, Calcium and protein requirement. Its antioxidant capacity among other numerous potentials makes it a suitable feed supplement in ruminant as its inclusion in no doubt will bring about the production of healthy animals for human consumption.

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Table 1
Chemical composition of Baobab fruit *(Adansonia digitata)*

Parameters (%)	Whole fruit	Pulp only	Pulp and seed	Seed
Dry matter	90.39	90.39	89.88	89.92
Crude protein	7.53	3.50	13.38	17.33
Crude fiber	23.00	8.00	13.00	16.00
Ether extract	15.00	11.00	18.00	22.00
Ash	6.00	6.00	7.00	7.80
NFE	48.47	71.50	48.62	36.87
NDF	71.00	48.00	60.60	65.75
ADF	41.00	16.50	26.00	30.50
ADL	26.59	10.50	15.00	18.50

NDF- Neutral Detergent Fiber, ADF- Acid Detergent Fiber, ADL- Acid Detergent Lignin

Table 2 : Chemical composition of experimental diets

Parameters (%)	Bb – 0	Bb – 10	Bb – 20	Bb – 30
Dry matter	82.57	83.07	83.98	81.92
Crude protein	14.50	14.10	13.70	13.30
Crude fiber	11.68	12.08	12.48	12.83
Ether extract	15.50	16.00	16.40	16.83
Ash	9.56	8.65	7.97	7.29
NFE	48.76	49.17	49.45	49.74
NDF	40.50	46.02	52.50	56.85
ADF	32.00	35.75	40.80	45.05
ADL	10.75	12.00	12.65	12.80
M.E (kcal/kg)	2013.70	2172.20	2220.70	2320.20

NFE- Nitrogen free extract, NDF- Neutral Detergent Fiber, ADF- Acid Detergent Fiber, ADL- Acid Detergent Lignin, Bb- 0% - Baobab fruit, Bb- 10% - Baobab fruit, Bb- 20% - Baobab fruit, Bb- 30% - Baobab fruit

Table 3 : Haematological parameters of Red Sokoto goat fed Baobab fruit meal as supplement to Guinea grass.

Parameters	Control T1	T2	T3	T4
PCV %	27.25 ± 1.5^{a}	29.50 ± 2.1^{b}	32.75 ± 2.4^{ab}	30.50 ± 2.0^{b}
Hb g/dl	8.55 ± 0.6^{a}	10.50 ± 1.5^{b}	12.58 ± 2.2^{ab}	11.48 ± 3.0^{b}
WBC (X 10^{9}/l)	11.98 ± 2.0^{a}	13.95 ± 1.0^{a}	18.90 ± 1.8^{b}	16.83 ± 1.5^{b}
RBC (X 10^{12}/l)	1.80 ± 0.9^{a}	1.90 ± 0.7^{a}	2.83 ± 0.1^{ab}	2.10 ± 1.2^{b}
MCV (fl)	15.05	14.28	14.93	16.28
MCHC(g/l)	33.55	33.30	33.30	33.30
MCH (pg)	51.00	47.65	43.38	40.95

^{ab} *Means within each row without superscript in common are different at P<0.05*

Table 4: Serum quality of Red Sokoto goats fed baobab fruit meal as supplement to guinea grass

Parameters	Control T1	T2	T3	T4
Creatine(mg/dl)	0.93 ± 0.1^{a}	0.85 ± 0.5^{a}	0.79 ± 0.7^{a}	0.80 ± 0.3^{a}
Cholesterol (mg/dl)	67.25 ± 2.0^{ab}	65.25 ± 2.5^{a}	60.95 ± 5.1^{b}	73.25 ± 4.6^{ab}
Iron (µg/dl)	57.50	62.75	68.00	67.25
Albumin (g/dl)	3.43 ± 0.2^{a}	3.90 ± 0.9^{a}	4.08 ± 0.5^{b}	3.98 ± 1.0^{b}

^{ab} *Means within each row without superscript in common are different at P<0.05*

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