



Research Article

Effects of Yam Peel-cassava Leaf Meal based Diets on the Blood Profile and Growth Performance of Grazing Red Sokoto Bucks

Ukanwoko* AI, Ekine OA, Onwuameze GI and Okoro KN

Department of Animal Science, University of Port Harcourt, Rivers State, Nigeria.

*Corresponding author: ndutonia@yahoo.com

Article History: Received: December 12, 2019 Revised: January 22, 2020 Accepted: February 14, 2020

ABSTRACT

This study examined the effect of yam peel-cassava leaf meal diets on the blood profile and growth performance of Red Sokoto bucks. The experiment was carried out in the Faculty of Agriculture Research and Demonstration farm, University of Port Harcourt, Rivers state. 9 Red Sokoto bucks were gotten from the school farm, weighed and apportioned to three treatments; T₁, T₂ and T₃ in a completely randomized design (CRD). The experimental diets contained varying levels of yam peels and cassava leaf meal. T₁ had 0% yam peel and 0% cassava leaf meal, T₂ had 5% yam peel and 5% cassava leaf meal while T₃ had 10% yam peel and 10% cassava leaf meal. The yam peels used during this experiment were gotten from household, food stands ('bole' stand) and the cassava leaves were harvested from bushes within the University of Port Harcourt premises. They were air dried on a concrete floor until they became crispy dry, milled and bagged while the other ingredients (wheat offal, palm kernel cake, brewers' dried grain, soyabean meal, bone meal and common salt) were purchased from the market and used for diet formulation. The animals were taken out for grazing in the morning and fed the experimental diets afterwards till the following morning. Feed intake was calculated as feed served minus feed refusal. At the end of the experiment, blood samples were taken from the animals and taken to the laboratory for haematological and biochemical analyses. Results show that body weight gain and feed conversion ratio (FCR) were significantly (P<0.05) affected by the treatments. They were 1.71kg, 0.32; 1.21kg, 0.53 and 2.13kg, 0.26 for T₁, T₂ and T₃, respectively. There were significant differences (P<0.05) in the platelet, total protein and albumin values of the bucks. T₃ proved superior in terms of platelet (232.37x10³/ul), total protein (69.33g/l) and albumin (42.33g/l) and it is therefore recommended for goat production.

Key words: Albumin, Body weight gain, Feed conversion ratio, Platelet and Total protein

INTRODUCTION

In Nigerian agricultural economy, ruminants play a crucial role as part of the livestock subsector. This they do by boosting the low protein intake of the teeming population (Fajemisin *et al.*, 2010). Added to this advantage is the ability of small ruminants to produce hides and skin, milk and meat (Konlan *et al.*, 2012; Makun *et al.*, 2013 and Okoruwa *et al.*, 2013).

Goats are by far the most productive small ruminants (Web and Mamabolo, 2004). They serve as sources of income (Peacock *et al.*, 2005) and are used during festivities like traditional wedding ceremonies. The main constraint to the production of goats is the cost of their feed (Okoruwa *et al.*, 2013).

High cost of feed and feed scarcity (Sodeinde *et al.*, 2007) especially during the dry season have caused a search for alternative feed resources by ruminant farmers

(Adanlawo and Ajibade 2006). In Nigeria, crop residues and agro – industrial by – products are available and includes yam peels and cassava leaves.

Cassava (*Manihot esculenta*) leaves have high crude protein (16.7% - 39.9%) (Yousuf *et al.*, 2007). Yam (*Discorea rotundata*) peels can serve as alternative feedstuff without any adverse effect.

Blood profile is an indication of the pathological state of an animal (Ogunbosoye *et al.*, 2018) and is affected by age, nutrition, sex, genetics and environmental factors (Daramola *et al.*, 2005).

MATERIALS AND METHODS

Experimental site

The experiment was carried out in the Faculty of Agriculture Research and Demonstration farm, University of Port Harcourt, Obio/Akpor local government, Abuja,

Cite This Article as: Ukanwoko AI, OA Ekine, GI Onwuameze and KN Okoro, 2020. Effects of yam peel-cassava leaf meal based diets on the blood profile and growth performance of grazing red sokoto bucks. Int J Agri Biosci, 9(1): 26-29. www.ijagbio.com (©2020 IJAB. All rights reserved)

Rivers state. Rivers state is located on longitude 4° 45'N, latitude 6° 50'E (4.750° N, 6.833°E), having an annual average temperature of 26°C (78.8°F) and 2708mm average rainfall (Ijeomah *et al.*, 2013).

Experimental animals

Nine (9) Red Sokoto bucks were gotten from the school farm in the Faculty of Agriculture Research and Demonstration Farm and were used for this experiment. The animals were apportioned to 3 treatments; T₁, T₂ and T₃ in a Completely Randomized Design (CRD).

Experimental diet

The yam (*Dioscorea rotundata*) peels used for this experiment were gotten from food stands ('bole' stand), sun – dried on a concrete floor for 3 – 5 days, crushed and bagged. The cassava leaves were harvested from bushes within the University of Port Harcourt premises. They were sun - dried on a concrete floor until crispy dry. The other ingredients were bought from the market and used for feed formulation as shown on Table 1.

Data collection and analysis

The weights of the animals were recorded at the beginning of the experiment and weekly using a weighing scale. Feed intake was calculated as the difference between feed served and feed refusal. Samples of each treatments, forages grazed by the animals were taken and used for proximate analysis. Crude protein, CHO (carbohydrates), Ether extract, moisture, ash and crude fibre were determined from this analysis. Blood samples were collected at the end of the experiment and were taken to the laboratory for haematological and serum biochemical analyses according to the procedures of Joshi *et al* (2002) and Ogunsami *et al* (2002) respectively.

Statistical analysis

All data collected were subjected to a one way analysis of variance (ANOVA) using SPSS package. Significant treatments means were compared using Duncan's new multiple range test of the same package.

RESULTS AND DISCUSSION

The proximate composition of the experimental diets, cassava leaves, yam peels and browsed grasses is shown on Table 2. The crude protein content of the treatments were in the range of 14.66 – 15.46% and this range is well above the crude protein of 7% and 13.73% recommended by Lanyasunya *et al* (2006) and Okafor *et al* (2012) for sheep and goat production. The CP content of 17.94% reported for cassava leaves in this study compares favourably with the CP range of 16.7 – 39.9% reported by Yousuf *et al*

(2007) for cassava leaves. The CP content of 6.56% reported for yam peels in this study compares favourably with the CP content of 6.52% reported for yam peels by Ukanwoko and Nwachukwu (2017) but lower than that (12.69%) reported by Uchewa *et al* (2013) for yam peels. The variations might be due to differences in variety, sampling and analytical procedures (Gizzi and Givens 2004). The CF contents of the treatments were 12.42%, 18.91% and 19.60% for T₁, T₂ and T₃, respectively and these CF contents were well above the 12% CF requirement recommended for sheep and goat production (Rashid 2008). The CF content of 48.97% reported for cassava leaves in this study is high compared to the CF content of 23.67% reported by Ukanwoko and Nwachukwu (2017) for cassava leaves. The CF content of 38.77% reported for yam peels in this study is higher than the CF content of 17.25% reported by Ukanwoko and Nwachukwu (2017) for yam peels. Again the variations might be due to differences in variety, sampling and analytical procedures (Gizzi and Givens 2004).

The performance characteristics of Red Sokoto bucks on yam peels – cassava leaf meal diets are shown on Table 3. There were significant differences (P<0.05) in the body weight gain and feed conversion ratio of the bucks. Body weight gain was highest in T₃ (2.13kg) and T₁ (1.71kg) and lowest in T₂ (1.21kg). This agrees with the reports of Ukanwoko and Ironkwe (2012). FCR was best in T₃ (0.26) and T₁ (0.32).

The haematological indices of the Red Sokoto bucks on the experimental diets are shown on Table 4. There were no significant differences (P>0.05) in the PCV, Hb, RBC, WBC, neutrophils, lymphocytes, eosinophils and monocytes values of bucks on the experimental diets though they were all within the normal ranges (RAR 2009). There were more lymphocytes than neutrophils as agreed by Olusanya *et al* (1976). There was significant difference (P<0.05) in the platelet values of bucks on the experimental diets. The platelet range of 214.37 – 232.37x10³/ul reported in this study fell within the range of 150 – 230x10³/ul reported by RAR (2009). Haemostasis is maintained by platelet.

Table 1: Experimental diet

Ingredients (%)	Treatments		
	1	2	3
Wheat offals	62	52	42
Yam peels	0	5	10
Cassava leaf meal	0	5	10
Palm kernel cake	19	19	19
Brewer's dried grain	10	10	10
Soybean meal	5	5	5
Bone meal	3	3	3
Common salt	1	1	1
Total	100	100	100

Table 2: The proximate composition of the experimental diets, cassava leaves, yam peels and browsed grasses

Parameters	Treatments			Cassava leaves	Yam peels	Browsed grasses
	T ₁	T ₂	T ₃			
Dry matter	91.90	83.90	86.70	86.70	83.80	24.80
Crude protein	14.66	15.31	15.46	17.94	6.56	5.25
Ether extract	3.60	2.70	5.30	0.40	1.70	2.30
Ash	17.20	3.20	8.80	8.50	0.20	1.50
Crude fibre	12.42	18.91	19.60	48.97	38.77	11.70
NFE	53.11	55.88	52.74	24.20	52.77	79.25
CHO	45.02	39.78	39.44	10.89	36.57	4.05

Table 3: Performance characteristics of grazing Red Sokoto bucks fed yam peel – cassava leaf meal diets.

Parameters	Treatments			SEM
	T ₁	T ₂	T ₃	
Initial body weight (kg)	15.25	15.49	14.75	3.52
Final body weight (kg)	16.96	16.71	16.87	4.21
Body weight gain (kg)	1.71 ^a	1.21 ^b	2.13 ^a	0.23
Total feed intake (kg)	17.40	16.50	17.05	2.59
Feed intake (g/day)	0.55	0.64	0.56	0.01
Feed conversion ratio	0.32 ^b	0.53 ^a	0.26 ^b	0.05

^{abc}Means having different superscripts on the same row are significantly (P<0.05) different.

Table 4: Haematological indices of grazing Red Sokoto bucks fed the experimental diets

Parameters	Normal range	T ₁	T ₂	T ₃	SEM
Packed Cell Volume (%)	24-45	27.00	27.00	22.00	0.73
Haemoglobin (g/dl)	8-16	9.00	9.00	9.33	0.13
Red Blood Cell (x10 ⁶ /ul)	2-4	4.25	4.23	3.73	0.15
White Blood Cell (x10 ³ /ul)	4-12	11.15	9.57	10.03	0.80
Platelet (x10 ³ /ul)	150-230	214.37 ^b	228.37 ^a	232.37 ^a	15.20
Neutrophils (%)	28-42	43.50	45.00	47.33	2.10
Lymphocytes (%)	40-60	46.00	46.67	48.00	3.20
Eosinophils (%)	0-10	3.50	2.67	3.67	0.62
Monocytes (%)	2-10	7.00	5.67	5.33	0.90

^{abc}Means having different superscripts on the same row are significantly (P<0.05) different. SEM=standard error of mean, Source (normal range): RAR (2009).

Table 5: Serum biochemical parameters of grazing Red Sokoto bucks fed the experimental diets

Parameters	Normal range	Treatments			SEM
		T ₁	T ₂	T ₃	
AST (u/l)	58-90	38.5	40.3	36.3	6.6
ALT (u/l)	10-30	6.85	7.50	4.93	2.0
ALP (u/l)	12-34	14.50	45.33	68.00	3.6
TP (g/l)	30-65	57.50 ^b	66.00 ^{ab}	69.33 ^a	4.0
ALB (g/l)	20-42	37.50 ^b	40.33 ^{ab}	42.33 ^a	1.4
TB (m/mol)	8-11.5	6.20	6.00	5.87	0.7
CB (m/mol)	1.8-9.4	3.60	3.60	3.73	0.5
K (m/mol)	1.30 – 6.0	8.90	10.83	6.77	0.1
Na (m/mol)	70 - 120	1.53	1.64	1.83	2.4
CL (m/mol)	50-95	63.50	68.00	65.00	3.8
UR (m/mol)	1-10.5	11.75	10.90	10.87	0.3
CR (m/mol)	60-140	1.81	1.69	1.67	2.2
HCO ₃ (m/mol)	20-32	24.00	27.33	25.33	1.0
TC	1-5	4.65	5.20	3.80	0.1
TG	0.2-0.8	0.59	0.90	0.73	0.04
HDL	1.0-3.2	1.49	1.67	1.35	0.1
LDL	1.0-3.2	3.44	3.37	2.47	0.09

^{abc} means in the same row with different superscripts differ significantly (P<0.05). AST= Aspartate aminotransferase ALT= Alanine aminotransferase ALP= Alkaline phosphatase TP= Total protein ALB= Albumin TB= Total bilirubin CB= Conjugated bilirubin, Na= Sodium K= Potassium CL= Chloride HCR₃= Bicarbonate UR= Urea CR= Creatinine TC= Total cholesterol TG= Triglycerides HDL= High density lipoproteins LDL= Low density lipoproteins. Source (normal range): RAR 2009.

The serum biochemical parameters of Red Sokoto bucks on the experimental diets are shown on Table 5. There were significant differences (P<0.05) in the total protein and albumin values of bucks on the experimental diets. The total protein range of 57.50 – 69.33g/l reported in this study compares favourably with the total protein range of 30 – 65g/l reported by RAR (2009). Total protein is a sum total of all serum proteins and it regulates immunity, osmosis and transportation of substances (Ikhimiyoa and Imasuen 2007). The albumin values tended to be in line with the total protein and fell within the normal range as reported by RAR (2009).

Conclusion and recommendation

The inclusion of yam peel – cassava leaf meal in the diets of Red Sokoto goats gave better body weight gain and FCR as shown in bucks on T₃, although numerically when

compared to the control diet. T₃ also proved superior in terms of platelet, total protein and albumin values of bucks on it. T₃ is therefore recommended for goat farmers in the South Southern Nigeria.

REFERENCES

- Adanlawo IG and Ajibade VA, 2006. Nutritive values of two varieties of *Hibiscus sabdariffa* seeds calyces soaked in wood ash. Pakistan J Nutri, 5(6): 555-557.
- Daramola JO, Adelofo AA, Fatiba IA, 2005. Haematological and biochemical parameters of West African Dwarf goats. Lives Res Rural Dev, 17: 20-25.
- Fajemisin AN, Fadiyimu AA and Alokun JA, 2010. Nutrient digestibility and performance of West Africa Dwarf sheep fed dietary inclusion of sun-dried or

- fermented rumen digesta and poultry droppings. *J Sust Tech*, 1: 76-84.
- Gizzi G and Givens DI, 2004. Variability in feed composition and its impact on animal production. In: *Assessing quality and safety of Animal feeds*. FAO Animal Production and Health paper 160. FAO, United Nations. pp: 36-52.
- Ijeomah HM, Chima UD and Okagbare OH, 2013. Ecological Survey of Avifaunal Resources in University of Port Harcourt, Nigeria. *Ethiopian J Environ studies Mgt*. 6(6): 648-660.
- Ikhimiya I and Imasuen JA, 2007. Blood Profile of West African Dwarf goats fed *Panicum maximum* supplemented with *Azizelia Africana* and *Newbouldia Leaves*. *Pakistan J Nutr*, 5:79-84.
- Joshi PK, Bose M and Harish D, 2002. Changes in certain haematological parameters in a Siluroid catfish *Clarias batrachus (Linn.)* exposed to cadmium chloride. *Pollution Res*, 21(2): 129-131.
- Konlan SP, Karikari PK and Ansah T. 2012. Productive and blood indices of dwarf rams fed a mixture of rice straws and groundnut haulms alone on supplemented with concentrates containing different levels of shea nut cake. *Pakistan J Nutri*, 11(6): 566-571
- Lanyasanya TP, Ron WH, Abdulrazak SA, 2006. Factors limiting the use of poultry waste as supplement for dairy cattle on small holder farms in Kenya. *Int J Poult Sci*, 5: 75-80.
- Makun HJ, Otaru SM and Dung DD, 2013. Effect of management practices on milk yield and live weight changes of indigeneous breeds of goats supplemented with groundnut haulms and concentrates in sub humid zones of Nigeria. *Sokoto J Vet Sci*, 11(1): 45-50.
- Ogunbosoye DO, Akinfemi A and Ajayi DA, 2018. Blood profile of West African Dwarf (WAD) growing bucks fed varying levels of shea nut cake based ration in Nigeria. *Cogent Food Agric*, 4: 1474620.
- Ogunsami AO, Akpavieso PA and Anosa VO, 2002. Serum biochemical changes in WAD sheep experimentally infested with *Trypasoma brucei*. *Trop Vet*. 47(2): 195.
- Okafor EC, Lakpini CAM and Fayomi A, 2012. Dried *Gmelina (Gmelina arborea Roxb)* leaves as replacement forage to groundnut haulms in the diets of fattening Red Sokoto bucks. *Int J Agri Biosci*, 1: 5-10.
- Okoruwa MI, Obiku A and Agbonlahor I. 2013. Rumen indices and performance response of West African dwarf (WAD) as influenced by orange and pineapple pulp. *Int J Agri Sci*. 3(11): 862-870.
- Olusanya SK, Edewor EE and Health E, 1976. Studies on the blood chemistry and other haematology parameters in buffaloes in a ranch in Nigeria. *Nig Vet J*, 5(1): 27-31.
- Peacock C, Devendra C, Ahuya C, 2005. Goats. In: Owen E, Kitalyi A, Jayasuriya N and Smith T (Eds.), *Livestock and wealth creation: Improving the husbandry of animals kept by resource-poor people in developing countries*. Nottingham University Press. United Kingdom.
- Rashid M, 2008. Goats and their Nutrition. www.manitobagoats.ca
- Research Animal Resource [RAR]. 2009. Reference values for laboratory animals: Normal haematological values. RAR Websites, RAR, University of Minnesota. Retrieved from <http://www.ahc.umn.edu/rar/refvalues.html>
- Sodeinde FG, Asaolu V, Oladipo MA, 2007. Mineral and anti-nutritional contents of some forage legumes consumed by small ruminants in the derived savanna of Nigeria. *Res J Agro*, 1(1): 30-32.
- Uchewa EN, Orogwu CE and Nwakpu PE, 2013. Effects of yam peel meal (YPM) replacement for maize on the growth performance and carcass traits of weaner rabbits. *Int J Agri Innov Res*, 2(4): 2319-1423.
- Ukanwoko AI and Ironkwe MO, 2012. Growth performance and haematological values of West African Dwarf (WAD) goats fed *leucaena*, *Gliricidia* and cassava leaf meal – cassava peel based diets. *Int Res J Agri Sci Soil Sci*, 2(3): 098-101.
- Ukanwoko AI and Nwachukwu J, 2017. Nutrient and anti-nutritional composition of crop residues and kitchen wastes fed to small ruminants in Choba Port Harcourt. *Greener J Agri Sci*, 7(2): 054-059.
- Webb EC and Mamabolo MJ, 2004. Production and reproduction characteristic of South African indigenous goats in communal farming system. *South Afri J Anim Sci*, 34: 236-239.
- Yousuf MB, Belew MA, Daramola JO, 2007. Protein supplementary values of cassava-, *Leucaena*- and *gliricidia*- leaf meals in goats fed low quality *Panicum maximum* hay. *Lives Res Rural Dev*. <http://www.cipav.org.co/lrrd/lrrd19/2/yous1902>.