

NUTRIENT DIGESTIBILITY OF YANKASA RAMS FED TOASTED SORREL SEED (*HIBISCUS SABDARIFFA*) MEAL IN SEMI-ARID REGION OF BORNO STATE.

¹Kaganami, M., ²Usman M. Kolo, Asheikh, L.G., ¹Mohammed, A., ²Aisha Girgiri, ²Zannah, B.B. and ²F.I. Abbator

¹Department of General Agriculture Borno State University Maiduguri, Borno State, Nigeria

²Department of Animal Science, University Maiduguri, Borno State, Nigeria

Corresponding author: Kaganami, M., Mobile: 08039235714 Email – mustaphakaganami2016@gmail.com

ABSTRACT

The experiment was conducted at the Department of Animal Production Technology Teaching and Research Farm Ramat Polytechnic Maiduguri Borno state. To generate information and determined the nutrient digestibility of Yankasa rams and proximate composition of toasted sorrel seed meal and other feed ingredient in the experimental diet formulated fed to Yankasa breed of rams in semi-arid region of Borno State. A total number of 16 rams with average weight of 17.5 - 27 kg were used for the experiment and there were divided into four (4) treatment with four (4) replicates allocated to complete randomized design (CRD) for period of eight (8) weeks. The toasted sorrel were fed at the cushion level of 0% T1, 10% T2, and 15% T3 and 20% T4 respectively. Water and experimental diet formulated were given ad-libitum during the feeding trial. This study therefore compared the effect of different inclusion level of toasted sorrel seed in ruminant diet. This was with the aim of enhancing its utilization as protein source for ruminant nutrition and factional ingredient. The criteria for the assessment were nutrient digestibility and proximate composition of toasted sorrel seed and other feed ingredient used. However four (4) animals were place in metabolic cage to assist feecal sample collection. The feed intake were measured by subtracting the left over from the feed serve. The result of proximate composition of the feed ingredient showed that toasted sorrel seed had the highest dry matter content of 95.54% compared to other feed ingredient. In general the result of nutrient digestibility parameters showed that there were no significant ($p > 0.05$) different among the treatments. However the result of nutrient digestibility showed that the highest dry matter digestibility were recorded in T3 (49.84%) while the lowest was recorded in T4 (37.57%). The highest crude protein digestibility were recorded in T1 and T4 with value of 99.06 and 99.03%. The result of this study also recommended 20% inclusion level of toasted sorrel seed in ruminant diets as it is readily available and being wasted by the local community farmers in the semi-arid region of Borno State of Nigeria.

Keywords: Toasted Sorrel seed, Nutrient, digestibility, Nutrient intake and Feecal output

INTRODUCTION

Feed availability for livestock nutrition is the major constraint to sustainable livestock product in dry land especially during the dry season kibitz *et al* (2006) and Mnene *et al* (2004) Small ruminant usually suffer from feed shortage and nutrition Gizaw *et al* (2010) and Tesfay *et al* (2012) small ruminant are largely made to grazed or browse on natural pastures . But the natural pasture are markedly declined their nutritional value during dry season. Similarly the residues from cereal crop are of low nutritive value and also less consumable Singh *et al* (2011) Supplementation with concentrate feeds or improved forage legumes can improved the feeding value of such feed resources. However, concentrate are costly and may not be easily accessible to small holder famers Tolera *et al*. (2000). The major problems to addressing livestock feeding during dry season and drought period are the lack of adequate information on the climatic condition and low adoption of improved feed production conservation, processing and feeding technologies being promoted. In addition , traditional dry seasons and drought period livestock feeding strategies are becoming in effective due to changing production environment galvin *et al* (2004) and Sidahmed (2008) dry season and drought period livestock feeding strategies should start with a better understanding of the dry land climatic condition and currently practiced livestock feeding strategies Lema and Majole (2009). This should emphasize the optimal use of the available non-conventional feed resources at the famers' level in order to guarantee greater productivity and sustainability of the small holder fattening scheme in increasingly resource limited environment of the northern Nigerian lamed *et al* (2008).

MATERIALS AND METHODS

Study Area

The experiment was carried out at the Department of Animal Production and Technology and research farm, Ramat Polytechnic Maiduguri Borno State of Nigeria.

Source of Feed Ingredient

The feed ingredients, sorrel seed, cotton seed cake, cowpea husk, wheat offal, sorghum husk and groundnut haulm was purchase from local animal feed ingredient sellers along Baga road behind flour mill Maiduguri while bone meal was purchased at Maiduguri abattoir and salt were bought from shops within Ramat Polytechnic in Maiduguri Metropolitan Borno State.

Table 1 Experimental Diet composition (%) of Feed Ingredient Used Formulated

Feed ingredients %	T ₁	T ₂	T ₃	T ₄
Toasted sorrel seed	0%	10%	5%	20%
Cotton seed cake	20%	10%	15%	0%
Sorghum husk	31.5	31.5	31.5%	31.5%
Wheat offal	25%	25%	25%	25%
Groundnut haulm	10%	10%	10%	10%
Cowpea husk	10%	10%	10%	10%
Bone meal	3%	3%	3%	3%
Salt	0.5%	0.5%	0.5%	0.5%
Total	100kg	100kg	100kg	100kg

Experimental Feed Preparation

The sorrel seed were toasted for about 8-10 minute and grinded into grit powder at Umarari grain grinding center. Groundnut haulm and cotton seed cake were grinded at flour mill, Bone Meal were grinded at Gamboru market Maiduguri Borno state of Nigeria. The above feed ingredient were grinded so as to increase the intake and digestibility of the feed served, while wheat offal, cowpea husk, Sorghum husk and salt were purchased and transported to the experimental site Ramat Polytechnic Livestock Teaching and Research Farm without grinding as there can be consumed and easily digested by the animal without being grinded. Finally the collected feed were thoroughly mixed and stored in well ventilated shade, then we supplement it to our livestock as livestock feed ingredient until the commencement of the feeding trial.

Experimental Animals and their Management:

Sixteen (16) Yankasa breed of rams aged 9-12 months and with an average weight of 17.5-27 kg were used for the experiment. The rams were purchased from Kukareta market kaga Local government Borno State. The animals were housed in individual pens with corrugated asbestos roof and a ground floor. The animals were treated against ectoparasites, using ivermectin injection, were dewormed with Albendazole suspension to take care of endoparasites and also injected intra-muscularly with Oxytetracycline-long acting broad spectrum antibiotic as a precautionary measure against bacterial infections. The animals were later allotted into four treatment groups and fed for a pre-treatment period of three days to enable them adapt to the experimental diets and the environment before the commencement of the actual experiment. Experiment diet and water was provided ad-libitum. Feed offered and feed refused were recorded for each animal in each group daily while animal weights were taken on a weekly basis, using a spring balance.

Digestibility trial (sample collection):

Four animals were randomly selected among the treatment at the termination of the growth study. They were placed in an individual metabolic cage with slatted floors adapted for faecal collection. Experimental diets fed were the same as those used in the growth study. An adjustment period of 2 days was allowed before the faecal samples were measured for the subsequent seven days. Faeces from animals on each treatment were weighted and bulked thoroughly mixed and sub-sampled taken. Feed intake was measured by finding the difference between the amount of feed offered and the amount left over. Feed and faecal samples were dried at 65°C to constant weight, milled and kept in air tight containers until required for analysis. Apparent digestibility of the diets was calculated as the difference between nutrient intake and excretion in the faeces expressed as a percentage of the nutrient intake Aduku (2004).

Statistical analysis:

All data generated were subjected to analysis of variance (ANOVA) using the General Linear Model (GLM) procedure of SAS (2008). Means were separated Using Least Significant Difference (LSD) test of the same package.

RESULT AND DISCUSSION

Nutrient Digestibility of Yankasa Ram Fed with Toasted Sorrel Seed Meal

The result of nutrient digestibility of Yankasa breed of ram fed with toasted sorrel seed meal and other feed ingredient formulated were presented in Table 4.3.1. The result showed that there were non-significant ($P>0.05$) different among the treatment for dry matter digestibility, crude protein digestibility, crude fibre digestibility, ether extract digestibility and nitrogen free extract digestibility for T1, T2, T3 and T4 respectively. The highest dry matter digestibility was recorded in T3 (49.84%) while the lowest was recorded in T4 (37.57%). The value of crude protein digestibility obtained in the present study were range from 76.73 - 99.06%. The highest crude protein digestibility were recorded in T1 (99.06%) while the lowest value were recorded in T3 (76.73%). The highest value of 99.03% recorded in the present study was higher than value of (79.82%) previously reported by El-adawy and klalil (1994) while the lowest value of 76.73% recorded in the present study was lower than value of (79–82%) reported by El-adway and Khalil (1994). This difference could be due to processing method used.

The crude fibre digestibility value obtained in the present study were range from 77.42% - 85.35% while the lowest were obtained in T4 with value of 77.42% the value of 55.42 – 85.35% for the present was superior than the value of (13.10-15.50%) recorded in toasted sorrel seed by Duwa *et al.* (2012). This variance can be due to processing method used. The ether extract digestibility value obtained in the present study were range from (50.72 – 83.46%). The highest value were obtained T1 with value of 83.46% while the lowest was recorded in T4 50.72%. The value obtained in the present study were higher than the range of (22.24–28.66%) reported in toasted sorrel seed meal by Duwa *et al.* (2012). This variation could be due to the processing method and the inclusion level of the test ingredient.

The result of Nitrogen free extract digestibility showed that the highest value of Nitrogen free extract digestibility were recorded in T1 and T3 with similar value of 63.83 and 63.76% while the lowest was recorded in T2 with value of 52.07%. The result of Nitrogen free extract digestibility with value range from 52.07–63.83% recorded for the present study was superior than value recorded with the range of (34.68–39.80%) reported in toasted sorrel seed by Galvin *et al.* (2004). This variation can be due to different breed of the animals fed, level of heat applied during processing method.

Table 2. Nutrient Digestibility of Yankasa Rams fed toasted sorrel seed

	T1 (Control)	T2	T3	T4	SEM
DMD	49.50	40.63	49.84	37.57	0.12 ^{NS}
CPD	99.06	98.93	76.73	99.03	0.03 ^{NS}
CFD	85.35	83.34	83.56	77.42	0.02 ^{NS}
EED	83.46	74.36	81.01	50.72	5.30 ^{NS}
NFED	63.83	52.07	63.76	53.40	0.07 ^{NS}

SEM = Standard Error of means, NS = Not Significant ($P > 0.05$), DM = Dry matter digestibility, CFD=Crude fibre digestibility, EED = Ether Extract digestibility, NFED = Nitrogen Free Extract digestibility

CONCLUSION

Base on the result of this research, it can be concluded that the result of Nutrient digestibility indicate that the rams fed on T4 with 20% inclusion level of toasted sorrel seed had the highest crude protein digestibility with value of (99.03%) compared to the other treatment with the exception of T4 control which were recorded with similar value of (99.06%). The high value of crude protein digestibility indicate that protein of toasted sorrel seed is highly digestible and such can serve as a nutritional source of amino acid, since digestibility is an important factor for determining the nutritional value of protein sources.

RECOMMENDATION

The result of this study revealed that the use of toasted sorrel seed is effectively recommended to feeding ruminant animals with up to 20% inclusion level in their diet as it readily available and being wasted by local community farmers, as provided that the crude protein digestibility showed that the dietary protein is highly utilized by the animal during dry season in semi-arid region of Borno State. However further research should be conducted for the use of sorrel seed as a protein source for ruminant animals especially during the dry season.

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