

EVALUATION OF THE EFFECTS OF SORREL SEED MEAL SUPPLEMENTED TO GROUNDNUT HAY OF MIXED BREEDS OF GOATS IN SEMI ARID ENVIRONMENT

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ABSTRACT

The study was conducted to evaluate the effects of using sorrel seed meal as a supplement to groundnut hay on nutrient digestibility in mixed breeds of goats and it lasted for 68 days. A total of four (4) bucks were used for the experiment which comprised of an animal per treatment with an average weight of 19.8kg. They were individually weighed and were randomly allocated in metabolic cages. The observed and recorded parameters were; feed intake, weight changes and digestibility. Groundnut hay was used as the basal diet supplemented with SSM at graded levels of 0%, 20%, 40% and 60% for treatment 1, 2, 3, and 4 in a Latin Square Design. The nutrient digestibility was higher in all the animals, The study indicated significant difference ($P < 0.05$) in total feed intake among the animals. However, there was no significant ($P > 0.05$) difference in live weight changes, hence of animal D tends to have higher value of 650/period with corresponding feed intake of 1012g/DM/day. There was no significant difference ($P > 0.05$) difference in nutrient digestibility among the animals, although the values were all higher which indicates that supplementing goats with SSM result to better nutrient digestibility and a good protein source.

Key words; sorrel seed meal, groundnut hay, nutrient digestibility and goats

INTRODUCTION

Goats have economic potentials due to high fertility, fecundity, prolificacy, early maturity and their adaptability to the humid environment (Fasae, 2011), but the economic benefits obtained from these animals are far below expectation due to low productivity because of poor nutrition. Olorunsomo (2008) reported that available feed resources are low on nutritive values and supplementary concentrates are very expensive. Therefore, there is need to search for non-competitive and low cost alternative feeds for livestock. Hence sorrel seeds can serve as one. Sorrel (*Hibiscus sabdariffa*) is a popular plant belonging to the family *malvaceae* and the presumed origin is South East Asia in the region of India to Malaysia. It has long been cultivated in Africa, probably, it was carried by slaves to the new world (Duke, 1999), Sorrel can tolerate little shade and can be grown in green house but it normally grows best in field conditions under full sunlight. It is widely grown in north Eastern and middle belt regions of Nigeria (Akanfa *et al.*, 1997). The plant has been found to thrive on a wide range of soil conditions. It can perform satisfactorily on relatively infertile soil but for economic purposes, a soil well supplied with organic materials and essential nutrients is needed (Tindal,). Literature shows that sorrel seed is comparable to soybeans with regard to the essential amino acid profile. The fat of the seed is a good source of essential fatty acids (arachidonic, linoleic and linolenic acids) which are required to prevent fatty acid deficiency diseases such as skin lesions and low growth rate (Kinsella, 1987). This study was therefore aimed at determining the effect sorrel seed meal for groundnut hay in goat diet.

MATERIAL AND METHODS

This research was carried out at the University of Maiduguri Teaching and Research farm Department of Animal Science, Faculty of Agriculture. Maiduguri is located at latitude of 11.15° north and longitude 30.05° east and at an elevation of 364m above sea level in the North – eastern part of

Nigeria (Alaku, 1983). It is characterized by hot and dry climate and the annual rainfall ranges from 300mm-700mm and falls mostly between June to September. The ambient temperature ranges between 30 - 45°C and usually cold during the harmattan period which falls to about 15°C to 19°C and relative humidity ranges from 3 – 43.5% (Alaku, 1983). A total of four (4) mixed breed male goats were used for the study, with an average weight of 19.8kg in a 4×4 Latin Square Design (LSD). Ten (10) days adjustment period were allowed by each animal followed by (7) days collection period, in all the periods. The experiment lasted for 68 days. The animals were weighed and allocated to metabolic cages. The observed and recorded parameters were; feed intake, live weight changes and nutrient digestibility. Two (2) experimental diets were used, groundnut hay as the basal diet supplemented with sorrel seed meal (SSM) at graded levels of 0%, 20%, 40% and 60%. Each of the experimental diets was subjected to proximate analysis, according to the method of AOAC (1988).

The dry matter content of the feeds was determined by taking a weighed quantity of the feed and oven dried at 105°C for 24 hours. This was repeated twice until a constant weight was obtained. The crude protein was determined using kjeldahl method. This method involves digesting the different samples using digesting tablets and concentrated sulphuric acid. The samples were further diluted with distilled water and later distilled using sodium hydroxide (NaOH) and boric acid. The distilled samples were then titrated using 0.1 normal hydrochloric acid. The crude fiber was determined using trichloroacetic acid (TCA) method. The sample were digested with trichloroacetic acid (TCA) to boil and allowed to reflux for about 40 minutes. The digested sample were later rinsed several times with hot water and then with petroleum ether. The Samples were then allowed to oven dry overnight at 105°C before being taken for ashing, during which final weight was obtained. The fat content was determined by using the soxhlet apparatus, 2g of the experimental diets were put into a tinsle and corked with cotton wool. It was then placed into extraction Chamber. The collection flask contains 50ml of petroleum ether. The apparatus was heated to boil and reflux for two (2) hours. Fat was collected in the flask and cooled then weighed. The ash was determined by direct burning of the samples to ash. Here the samples were subjected to muffle furnace at a temperature of 500-600°C for 3 hours until ash was obtained. The weight of the ash was obtained. The data generated were subjected to analysis of variance using statistical package (Statistix 8.0). Significant differences between the means were compared Least Significant Difference (LSD)

Table 1: Proximate Composition of Experimental Diets

Nutrient (%)							
Ingredients	DM	CP	CF	EE	NFE	ASH	ME
Groundnut hay (Basal diet)	97.1	6.26	18.0	2.0	1.05	3.0	430.90
Sorrel seed meal (supplement diet)	97.2	16.19	23.0	4.0	2.59	5.0	1014.98
Total nutrient intake	97.15	22.75	41.0	6.0	3.64	8.0	1456.97

Paunzenga (1985) ME (Kcal/kg) = $37 \times \%CP + 81 \times \%EE + 35.5\%NFE$

Table 2: Feed Intake and Live Weight Changes of Mixed Breed of Goats Supplemented with SSM

Parameters	Animals				SEM
	A	B	C	D	
Basal diet intake (gDM/ani.)	733.45 ^b	731.71 ^b	771.59 ^b	983.13 ^a	53.281 [*]
Supplement intake	29.16 ^a	29.16 ^a	29.16 ^a	29.16 ^a	14.490 ^{NS}
Total feed intake	762.6 ^b	760.9 ^b	800.8 ^b	1012.3 ^a	58.091 [*]
Live Weight changes	0.575 ^a	0.475 ^a	0.475 ^a	0.650 ^a	0.2331 ^{NS}

Key: SEM =Standard error of mean. *= Means significantly different. NS = Not significantly different.

Table 3: Nutrient Digestibility of Goats Supplemented with SSM

Nutrient (%)	Animals				SEM
	A	B	C	D	
Dry matter	56.820	56.085	64.977	60.305	5.3197 ^{NS}
Crude protein	75.915	78.230	79.345	78.628	2.6973 ^{NS}
Crude fibre	75.785	73.228	79.073	76.283	3.2075 ^{NS}
Ether extract	92.800	92.683	91.245	93.883	0.9834 ^{NS}
ASH	66.268	62.268	64.980	62.788	4.4599 ^{NS}

RESULTS AND DISCUSSION

The proximate composition of the experimental diets is presented in table 1. The crude protein (CP) and ether extract (EE) content of the raw sorrel seed was 16.19% and 4.0% respectively which is lower than the range value of 25.85-27.10% and 5.0% reported by Duwa *et al.*, (2012). It's also lower than the range value of 37.4-38.59% and 16% reported by kwari *et al.*, (2011) and FAO (1968). The ash value of sorrel was within the range reported by Dashak and Nwanegbo, (2002), John *et al.*, (2010) and Duwa *et al.*, (2012), But it was above the values reported by FAO (1968). The dry matter (DM) content of groundnut hay was 97.1% which is higher than 91.08% and 94% reported by Siulapwa and Mikoko (2001) and Yahaya *et al.*, (1999) respectively. It has crude protein (CP) of 6.260% which is lower than the value of 10.9% reported by Addass *et al.*, (2011). Crude fiber (CF), nitrogen free extract (NFE) and ash values were less compared to the values reported by Smith (1988) and ether extract value of 2.0 was within the range of 1.5 -2.5 reported by Smith (1988). The differences could also be due to variety, type of soil and storage conditions.

For feed intake and live weight changes, there were no significant differences ($P>0.05$) among the animals in supplement intake, the values are the same because they all ate the same amount at different periods. There was significant difference ($P<0.05$) among the animals in basal diet intake with animal D having the highest value of 983.13g, it shows that it consumed more of the basal diet

than the other treatments. The total feed intake ranges from 762.6-1012.3g which shows that there was a significant difference in T4 having 1012.3g as the highest value. There was no significant ($P>0.05$) differences among the animals, however, D tends to have higher live weight gain than other animals. The results obtained compares favorably with the report of Reddy (2001).

Table 3 shows the nutrient digestibility of goats supplemented with SSM. It was observed that nutrient digestibility was higher in all the animals. The value for dry matter digestibility ranges from 56.085-64.977 and no significant ($P>0.05$) differences were observed among the treatments. This result agrees with that reported by Siebert and Hunter (1982). The values of crude protein (CP), crude fiber (CF) and ash ranges from 75.915-79.435, 73.228-79.073 and 62.788-66.268 respectively which shows that there was no significant ($P>0.05$) differences. The ether extract digestibility values ranged from 91.245-93.883 with animal D having the highest value. This agreed with the report of Olaleru (1995) who stated that proteinous feed increase ether extract digestibility in ruminant because it supplies the rumen microbes with enough nitrogen that will nourish them and multiply their population thereby increasing the host animal digestibility.

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