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NUTRIENTS INTAKE AND DIGESTIBILITY OF UDA RAMS FED GRADED LEVELS OF SWEET POTATO AND CASSAVA PEELS

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ABSTRACT

A 12 weeks feeding experiment involving 12 Uda rams were carried out in a randomized complete block design (RCBD) to determine the nutrients intake and digestibility of Uda rams fed graded levels of sweet potato and cassava peels. The rams were randomly assigned into four (4) dietary treatment groups containing 0% (control), 20% sweet potato peels, 20% cassava peels, 20:20 sweet potato and cassava peels coded as 1, 2, 3 and 4 respectively. Each group was replicated three (3) times. Record of daily feed intake was taken and total faecal output from each animal was recorded daily and then stored for subsequent analysis. The samples of the four experimental diets and faeces were collected and analyzed for proximate composition and fibre fractions. There were significant difference ($P < 0.05$) in all the parameters measured for nutrients intake. Treatment 4 (20:20 sweet potato and cassava peels) recorded higher ($p < 0.05$) nutrients intake than other treatment groups. There were significance differences ($P < 0.05$) on Dry matter, Crude fibre, Ash, Acid detergent fibre and neutral detergent fibre digestibility's across all the treatment diets. It was concluded that, inclusion of Treatment 4 (20:20 sweet potato and cassava peels) should be used for improve intake and digestibility of Uda rams.

Keywords: Digestibility, cassava, sweet potato, peels, Rams

INTRODUCTION

Sweet potato (*Ipomea batatas*) are produced in large quantities in Nigeria and form important energy sources for human and livestock feeding. The peels from processing of these roots are readily available at cheap costs in many parts of the country because they have limited or no human food value. Sweet potato is a staple food in Nigeria; it ranks fourth in production and importance after cassava, yam and cocoyam (Ikwele *et al.*, 2003).

Sheep are valuable domestic animals in the tropical livestock production system. Sheep in the tropics are approximately 34% of the total population of the world grazing ruminants and represent a valuable resource in the most developing world (Njidda, 2011). Sheep contribute significantly in converting feed resources into products of economic value as meat, skin, wool and milk. However, the conversion of food material to these products would not come easily and depending on the feed material. There may be some health problem which in most cases, is manifested in the blood. The scarcity of high quality conventional feeds especially in the dry season and also the competition between man and animals for the conventional feeds (Maigandi *et al.*, 2002) inevitably compelled the stakeholders in the livestock industry to exploit other sources of feed ingredients that are locally available, nutritious and affordable (Maigandi *et al.*, 2008).

Therefore the study aimed to determine the nutrient intake and digestibility of Uda rams fed graded level of sweet potato and cassava peels.

MATERIALS AND METHOD

Study Area

The research will be conducted at the Livestock Teaching and Research Unit, Department of Animal Science, Kebbi State University of Science and Technology, Aliero. The study area is located on latitude



11.6781° north and longitude 4.0695° east of the equator. The climate of the area is generally characterized by high temperatures ranging between March and May, with annual temperatures varying between 38°C to 42°C. The area experiences hamattan wind between late November to early February, with temperatures as low as 23°C (NPC, 2006)..

Source of experimental diets

The test ingredients (cassava peels and sweet potato peels) were sourced at Aliero town. Other ingredients are cowpea husk, cowpea hay, soybeans, rice offal and bone meal were sourced at Jega and Sokoto central markets. The rams were randomly assigned into four (4) dietary treatment groups containing 0% (control), 20% sweet potato peels, 20% cassava peels, 10:10 sweet potato and cassava peels coded as 1, 2, 3 and 4 respectively. Each group was replicated three (3) times. The diets were designated as treatments 1, 2, 3 and 4. The gross composition of experimental diets is presented in Table 1.

Table 1: Gross composition of the experimental diets

Ingredients	Treatments			
	1 (0%)	2 (20%)	3 (20%)	4 (40%)
Maize	21.46	5.99	7.70	0.00
Sweet potato peels	0.00	20.00	0.00	20.00
Cassava peels	0.00	0.00	20.00	20.00
Cowpea husk	13.55	12.75	12.30	8.00
Soybean meal	4.98	8.98	7.50	11.98
Rice offal	16.65	11.04	11.25	20.52
Cowpea hay	39.86	37.75	37.75	16.00
Salt	0.50	0.50	0.50	0.50
Bone meal	2.50	2.50	2.50	2.50
Premix	0.50	0.50	0.50	0.50
Total	100	100	100	100
Calculated composition of experimental diets				
Energy Kcal/kg ME	2235.44	2202.42	2209.75	2228.42
Crude protein %	12.14	12.20	12.04	12.27
Crude fibre %	22.17	21.08	23.93	16.42

Experimental design and procedure

Randomized Complete Block Design (RCBD) was used in this experiment as outlined by Steel and Torrie (1980). A total of twelve (12) Uda rams with an average weight of 23- 25kg were used in which three animals served as replicates. Each animal was individually housed in a pen, which has been previously disinfected. Each group was served one of the experimental diets and fed *ad-libitum* for eighty four (84) days. Water was also offered *ad-libitum*.

Data Collection

Initial body weight of each of the animal was taken prior to the commencement of the trial and then weekly thereafter. Body measurement was done between the hours of 8- 9am after withdrawing feed for 14-16 hours, to avoid error due to gut fill. Feed intake of each animal was recorded on daily basis.

Chemical analysis

Cassava and sweet potato peels, faeces and thoroughly mixed representative samples of the four experimental diets were analyzed for proximate composition (AOAC, 1990). Fibre fraction analysis (ADF and NDF) (Van Soest *et al.*, 1991).



Digestibility Trial

At the end of the feeding trial, digestibility study was conducted which lasted for 14 days (7 days for adaptation to harness bag and 7 days for collection of faeces). Record of daily feed intake was taken. Total faecal output from each animal was recorded daily and 5% of it has been oven-dried at 80°C for dry matter determination and then stored for subsequent analysis.

Statistical Analysis

All the data obtained from the experiment was subjected to analysis of variance (ANOVA) using the statistical package for social sciences (SPSS, 2007). Duncan multiple range test was also used to separate means.

RESULT AND DISCUSSION

Nutrient intake of Uda rams fed graded level of sweet potato and cassava peels is presented in Table 2. Treatment 4 (10:10 sweet potato and cassava peels) recorded higher ($p < 0.05$) nutrients intake than other treatment groups. Higher feed intake is a good indication of proper utilization of the experimental diets (containing graded level of sweet potato peels) by the animals, which could also be attributed to the aroma and palatability of the diets, Mohammed *et al.* (2012).

Table 2: Nutrient Intake of Uda rams fed graded level of sweet potato and cassava peels

Parameters	Treatments				SEM
	1(0%)	2(20%)	3(20%)	4(40%)	
Dry matter intake	572.04 ^d	603.67 ^c	619.90 ^b	698.02 ^a	1.30
Crude protein intake	71.25 ^b	70.89 ^b	61.58 ^b	75.26 ^a	0.72
Organic matter intake	514.02 ^d	540.19 ^c	556.4 ^b	574.80 ^a	1.73
Crude fiber intake	137.03 ^d	150.48 ^c	161.9 ^b	173.81 ^a	0.58
Ether extract intake	48.26 ^b	44.34 ^c	45.15 ^c	53.66 ^a	0.58
Ash intake	58.22 ^d	66.30 ^c	61.32 ^b	73.39 ^a	0.57
Acid Detergent Fibre intake	208.81 ^c	201.96 ^c	217.91 ^b	256.96 ^a	1.57
Neutral Detergent Fibre intake	217.73 ^d	259.96 ^b	238.14 ^c	264.26 ^a	0.86

abcd = mean values along the row with different superscripts are significantly different ($P < 0.05$)

Nutrient digestibility of Uda rams fed graded levels of sweet potato and cassava peels is presented in Table 3. There were significant differences ($P < 0.05$) on Dry matter, Crude fibre (CF), Ash, Acid detergent fibre and neutral detergent fibre digestibility's across all the treatment diets. The Crude protein (CP), Organic matter and Ether extract did not differ significantly ($P > 0.05$) among the treatments. FOA (1991) classified digestibility of feeds as high (> 60) medium (40-60) and low (< 40). With this report, the digestibility of all the nutrients were comparably high as observed in the present study. It has been reported that maximum dietary CF digestion in the rumen occurs when dietary CP is between 12 and 16 (McAllan, 1991). The CP digestibility shows that dietary protein was highly utilized by the animals. This could be attributed to the sweet taste of both the potato and cassava (palatability) that prevent protein degradation in the rumen so that it can be effectively utilized by the rumen microbes. It was further reported that adequate nitrogen in the diets enhanced the activities of rumen microbes which eventually improved the CP digestibility in diets (Maigandi *et al.*, 2008).

Table 3: Nutrient digestibility of Uda rams fed graded levels of sweet potato and cassava peels

Parameters	Treatments				SEM
	1(0%)	2(20%)	3(20%)	4(40%)	
Dry matter digestibility	81.60 ^{bc}	84.67 ^{ab}	88.00 ^a	77.77 ^c	1.35
Crude protein digestibility	72.52	71.33	69.67	72.67	3.29
Organic matter digestibility	79.48	77.00	76.35	73.95	1.37



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Crude fiber digestibility	66.72 ^{ab}	65.93 ^{ab}	71.00 ^a	58.07 ^b	2.11
Ether extract digestibility	62.00	62.67	64.35	65.00	1.22
Ash digestibility	77.38 ^a	73.33 ^{ab}	64.67 ^b	70.08 ^a	2.30
Acid Detergent Fibre digestibility	85.71 ^a	80.33 ^a	70.35 ^b	60.60 ^c	2.08
Neutral Detergent Fibre digestibility	70.57 ^{ab}	66.67 ^{bc}	71.33 ^a	63.14 ^c	1.55

abcd = mean values along the row with different superscripts are significantly different (P<0.05)

CONCLUSION

It was concluded that, inclusion of Treatment 4 (10:10 sweet potato and cassava peels) should be used for improve intake and digestibility of Uda rams.

RECOMMENDATION

Further studies should be focused on increase level of sweet potato and cassava peels on different species of ruminants.

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