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Effect of Whole Cassava Root and Yam Tubers on Performance of Grasscutter (*Thryonomusswindarianus*) Held in Captivity

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Abstract

This study was carried out to investigate the effect of whole cassava root and yam tubers on performance of grass cutter. Twenty-seven young male grass cutter (*Thyrononysswindarianus*), 5-7 months old with an average body weight of679.00±1.95g were used in a completely randomized design experiment lasted for 12 weeks. Animals were groupedto three groups with nine animals per group, balanced for body weight (680.20.20± 1.80g, 678.50± 2.15g and 679.00± 1.90g) and designated as Gl, G2, and G3 groups respectively. Grass cutter in Gl was fed 200g/h/d of pelleted growers mash, G2 was offered 100g/h/d of pelleted growers mash and 200g/h/d of cassava tuber while G3 was served 100g/h/d of pelleted growers mash and 200g/h/d of fresh yam tuber. Fresh water was provided without restriction during the time of the trial. The results showed that crude protein and ash contents of the diet Gl, and G3 diets decreased compared to Gl diet. Dry matter and ether extract decrease in diet G2 to G3 compared to G1, while crude fibre and nitrogen free extract increased in G2 group compared to G1 and G3 groups and oxalate increased in G3 compared to G1 and G2 while Tanin % increase in G2 compared to G1 and G3 respectively. Dry matter intake, feed conversion ratio, weight gain and growth rate were higher ($P<0.05$) in G2 animals compared to G3 and G1 respectively. These results suggested that whole cassava roots and yam tubers can be included in grass cutter diet without any adverse effects on animals. However, cassava rooted-based diet improved performance of grass cutter held in captivity.

Keywords: *Cassava roots, Yam*tubers, *Grasscutter*, *Performance*, *Captivity*

Introduction

Grass cutters are group of animals that exist in the broader line between the ruminant and non-ruminant animals hence are referred to as herbivores feeding mainly on forage such as various grasses with succulent stalks; but still consume tubers and other agro product (Obi *et.al*., 2009). Yam and cassavatubers are largely cultivated in the country, while cassava tubers could be relatedly available in all parts of the country all year round.

Grass cutter is a micro-livestock, naturally found in the wild. It is widely distributed in Africasub-region as a supplementary source ofanimal protein (NRC, 1991). Grass cutter meat is a delicacy with low cholesterol level and well acceptable bythe populace. Infact, it is a proffered bush meat and perhaps the most expensive meat in Africa (NRC, 1991; Asibey and Addo, 2000). However high demand and attractive high market price coupled with the small amount ofinvestment required for its establishment or domestication make grass cutter rearing a worthy venture forincome generation in many-parts of West and Central Africa (Olukole *et. al*., 2009).

Mean while, alot of domestication efforts have been directed at grass cutter but only few of such effort have contributed significantly to-protein and meat production (Baptist and Mensah, 1986; and Williamson and Payne**,** 1991). (Ajayi and Tewe, 1980) earlier testifiedto captive rearing of grass cutter and suggested that the animal might be rearedin a semi-naturally fenced habitat. Also, Obi, *et.al.* (2009) noted that domestication of grasscutter will prevent them from going into extinction as a result of unguided/indiscriminate hunting and destruction of their natural habitat. This study was therefore carried out to assess the productive performance of young grass cutter fed cassava and yam tubers.

Materials and Methods

Twenty-seven young male grasscutter (*Thyrononysswindarianus*), 5-7 months old with an average body 679.00± 1.95g were used in the completely randomized design experiment lasted for 12 weeks. Animals were divided into three groups with nine animals per group, balanced for body weight (680.20.20± 1.80g, 678.50 2.15g and 679.00±1.90g respectively) and designated for Gl, G2, and G3 groups. Grass cutter in Gl was fed 200g/h/d of pelleted growers mash, G2 was offered 100g/h/d of pelleted growers mash and 200g/h/d of cassava tuber while G3 was served l00g/h/d of pelleted growers mash and 200g/h/d of fresh yam tuber. Fresh water was provided without restriction during the period of the trial.

Housing and Animal Management

The experimental animals were housed one per cage in a long tier metal cage supported at the base with strong iron rods such that the cage were raised to 45cm from the floor level (the dimension of each cage was 75cm x 60cm x 45cm). The cages were placed inside a well-ventilated and naturally illuminated Animal Nutrition Laboratory in the College of Agricultural Sciences at the Olabisi Onabanjo University, Yewa Campus, Ayetoro, Ogun State. The metal cages were washed and disinfected before the animals were moved into them.

The experimental diets were fed to the animals accordingly for a period of twelve weeks. Fresh clean water was provided regularly. Weighed quantities of pelleted meal, while cassava root and whole yam tuber were offered every morning. The feed refusal of the previous day's feeding were cleared out and weighted. The quantity of pelleted meal given was measured daily into specially made ceramic feeding to minimize spillage and wastage.

Chemical Analysis

Samples of feed offered and feed refusals were taken during-each collection period for dry matter determination according to AOAC (2002). The total nitrogen in feed was determined by Kjeldahl procedure (AOAC, 1995). Soxhlet extraction procedures were used for the determination of ether extract. Gross energy content of feed was determined using bomb calorimetry. Phytic acid was determined using the method of Buetler *et al.* (1980). Oxalic acid was also determined using the precipitation method of AOAC (2002). Each animal was also weighed weekly. The feed conversion ratio (FCR) was calculated from records of average daily feed consumed and daily weight gain.

Statistical analysis

Data collected from the investigated parameters were subjected to the analysis of variance in Completely Randomized Design using the procedure of SAS (2002).

Results and Discussion

Chemical composition of Gl, G2 and G3 diets are shown in Table 1. The crudeprotein and ash content increased in G1 and G3 compared to G2 of the diets. While DM and ether levels decreased in G2 and G3 compared to G1. Crude fibers and nitrogen free extract increased in G2 compared to G1 and G3 respectively.

Table 1. Proximate composition of the experimental diets

Diet	DM	CP	CF	EE	Ash	NFE	Ex Cal/kg
G1	91.92	17.00	2.13	1.92	5.43	78.95	2560
G2	63.43	6.36	2.61	1.23	3.02	86.78	2653
G3	60.55	9.25	2.20	1.12	4.57	82.86	2695

The anti-nutrition factor (%) presents in the pelleted meal and tubers are shown in Table 2. Percentages of phytic acid and Tannin in G2 and G3 were higher than G1. While oxalate in G3 was higher than G1 and G2 respectively.

Table 2. Antinutritional factors in the experimental diets

Factors (%)	Diets			SEM
	G1	G2	G3	
Phytic acid	0.66^{b}	1.65^{a}	1.72^{a}	0.39
Tannin	0.075^{b}	0.092^{a}	0.084^{b}	0.006
Oxalate	0.00052^{b}	0.00042^{c}	0.0006^{a}	0.00007

^{abc} mean within each subclass with different superscript are significantly different (P<0.05)

The productive performance of experimental animals over the 12 weeks periods are shown in Table 3. The animals were generally healthy with no morality recorded during the experiment. Average daily dry matter intake (DMI), weight gain and feed conversion ratio (FCR), were significantly (P<0.05) higher in G2 diets than G3 and G1 diets respectively.

Table 3. Performance characteristics of growing grass cutter fed the experimental diets

Measurement	Treatment			SEM
	G1	G2	G3	
No of Animals	9	9	9	
Expected period (wks)	12	12	12	
Av. Initial weight gain (g)	680.20	678.50	679.00	0.42
Av. Final weight gain (g)	751.06[c]	1453.44[a]	1222.80[b]	2.11
Av. Daily DM intake (g)	101.22[c]	152.05[a]	136.01[b]	1.09
Av. Growth rate (g)	0.84[c]	9.26[a]	6.48[b]	0.15
Feed conversion ratio	120.50[c]	16.12[a`]	20.99[b]	2.50

[abc] mean within each subclass with different superscript are significantly different ($P<0.05$)

It has been observed by Williamson and Payne (1991) that animalsfed low protein or low energy diets increased their feed consumption presumably overcomes the protein or the energy deficiency. It is therefore observed that animals fed G2 and G3 groups with low protein diets increased their feed consumption compared to G1. Average dry matter intake (101.22g) of animals observed on G1 might not be unconnected with the pelleted grower's mash which was very light, dry and not handy compared to the other diets (Table 3). Also, the inability of the animals to handle the pelleted meal led to wastage when picking and so reduced intake.

The different ($P<0.05$) in dry matter intake between animals fed G2 and G3 diets might be due to whole cassava root meal (WCRM) which was highly relished by the animals which found to increase ($P<0.05$) the levels of crude fibre and nitrogen free extract as shows in (Table 3). Animals fed G2 diet (where dietary carbohydrate was supplied by unpeeled whole cassava root tuber, which was supplemented with pelleted growers mash) had the highest average growth rate compared to other groups. Whole yam based diet (G3) were also found to be better converter feed to G1 animal whose rate of consumption was the least. The live body weight and performance of animals on whole cassava root meal (WCRM) were in agreement with the report of Onyeanusi and Famoyin (2005) who found that cassava is superior to other sources of carbohydrate particularly when fed along with balanced protein sources.

The presence of antifeedants, tannins, saponnins and mimosines, reduced the growth rate of animals (Fayenuwo *et al.,* 2003***)***. Despite the higher valuesin feed intake of animals on G2 and G3; high anti-nutritional concentrations (Table 2) in cassava root based and yam based diets were found to be low to prevent any actual hazard. (Olomu *et al*., 2003). Also, the characteristic tolerance of the growing grass cutter might suggest that the caecal microbes present in the gastro-intestinal tract of the animals are able to detoxify these poisonous substances as observed in rabbit (Adu *et al.,*1999) and ruminant (Onyeanusi and Famuyin, 2005).

Conclusion

In conclusion, this result suggests that whole cassava root and yam tubers can be included in grass cutter diet successfully. However, grass cutters are known to be herbivore and good converter of feed to meat, so they should be supplied with concentrate as a minimum level. However, the best performance of the grass cutter with respect to weight gain, dry matter intake and feed conversion ratio was obtained on whole cassava root based diet.

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