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Performance Characteristics of Grasscutters (*Thryonomis Swinderianus)* Fed Rice Offal Partially Replaced with Cassava Peel Meal.

Gboshe. P. N.[1], Okpo Eze[2]

[1,2] Department of Animal Science, Faculty of Agriculture and Forestry, Cross River University of Technology, Obubra Campus, Cross River State, Nigeria

ABSTRACT: The study was conducted to determine the performance traits of grasscutters fed rice offal partially replaced with cassava peel meal. Sixteen (16) grower Grasscutters between the ages of 3-4 months were used for the feeding trial which lasted for 8 weeks (56 days). They were randomly assigned to the four diets in a Completely Randomized Design (CRD). The study had four (4) treatments and four replicates per treatment, with each animal serving as a replicate. The grasscutters were individually fed in their various experimental units. Parameters measured were performance traits (feed intake, growth rate and feed conversion ratio). Results shows that, the parameters measured; Average final body live weight (g), feed intake (g), daily weight gain (g), total weight gain (g) and feed conversion ratio were significantly ($P<0.05$) affected by the treatments. The results of this experiment generally showed that, rice offal can replace cassava peel meal up to 75% in the diets of grasscutter without any deleterious effect on the performance parameters but the best was on the replacement level of 25%, though it did not differ significantly ($P>0.0$) from 50% replacement level. On the basis of this present study, further study is suggested to affirm the 50% level. It is however, recommended that for optimum performance of grasscutter, rice offal could be included at 25%, considering the growth response and feed conversion ratio obtained from the present study.

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Corresponding Author:
Gboshe. P. N.

KEYWORDS: cassava peel meal, rice offal, grasscutters, growth characteristics.

INTRODUCTION

The popularity of grasscutter meat is the reason for the interest in the domestication of grasscutter for large scale farming and production of meat for human consumption. The suitability of the meat and range of products obtainable from processing depends on the chemical composition of meat. The level of nutrition do not only affects the growth of animals but the composition of their meats (Karikari and Nyameasen 2009). Grasscutter management requirements are low cost. It feeds on a wide range of feedstuff, such as grasses, legumes, to tuber crops-such as sweet potatoes and cassava and other industrial by-products (Bawa et al., 2008).

The grasscutters gastro-intestinal tract is adapted to handle high fibre materials because of the presence of a large caecum which houses some microbes that help in the digestion (Hemmer 1992). Animals with this system are referred to as hind-gut fermenters, meaning that feed is broken down by bacteria at the end of the digestive systems. The microbial activity of the caecum is of great importance for the processes of digestion and nutrient utilization from fibrous materials (Caraban`o and Piquer 1998).

Karikari and Nyameasem (2009), suggested that efficient production in captivity of grasscutter for high productivity require adequate nutrition. That though, grasscutters are herbivorous animals but they grow rapidly on compounded feeds. The domestication of grasscutter has not yet been perfectly established but when confined should be fed with forages and concentrate. Gboshe (2021) reported a significant difference in his study when he worked on nutrients intake, utilization and performance of Grasscutters fed *Pennisetum purpureum* as basal feed supplemented with concentrate feeding regimes .Captive reared grasscutter are fed with forages and concentrates depending on the availability of the feed source, but the concentrates must be in low quantity to avoid a negative influence on the animal. It has be suggested that waste to wealth approach which involves harnessing and utilization of by-products and wastes which are not directly utilized by human beings may be a logical step towards reducing competition between human beings and animals,. Use of feed materials such as cassava peel meal, rice offal, and brewers dried grain have been suggested. (Ogunjobi et al., 2014).

Palm kernel cake can be used as a preferred source of the fibre for feeding growing grasscutters (Wogar 2012). He investigated the performance of growing grasscutters fed different fibre sources of wheat offal, palm kernel cake, maize sievates, a combination of equal amounts of all the fibre sources and observed from the findings of the experiment that, the performance of growing grasscutters was best on the palm kernel cake diet. So can be a preferred source of fibre for feeding growing grasscutters. Banjo et al. (2012) reported that brewers dried grain can be included in diets of grasscutters up to 75% as a replacement for maize without any deleterious effect on the health of the grasscutters, but best level of inclusion is 25% for best performance.

According to Ayoade et al. (2007) exploitation of cheap feed resources for animal production would lower the market price of animals and their products and therefore, improve the intake of animal protein by the general populace in underdeveloped countries, such as Nigeria. In addition, the use of unconventional feed resources in the diet of Pseudo-ruminant animals will reduce their effects on our environment especially the bulky types of crop by-products such as cassava peels and rice offal.

Cassava peels and rice offal are available at the Metropolis of Obubra Local Government Area, Cross River State, Nigeria. The cassava peels and rice offal pollute the environment; so there is need for it to be converted to useful animal products. Cassava is a staple food in the humid tropics and the peels are produced in large quantities and in most cases disposal becomes difficult. There is guaranteed future in the steady supply of the peels and as a waste product it does not attract competition between man and animals. Cassava peel contains 5.29-5.61% Crude protein, 1.18-1.39% ether extract, 10.31-20.97% Crude fibre, 4.44-5.93% ash and 66.63% nitrogen free extractive (Aduku 2012). Its low energy content makes it attractive where high energy content of the diet is not desirable (Obioha and Anikwe, 1982). The use of Cassava peel in animal feed is hampered by its high content of prussic acid especially the bitter variety but this could be taken care of by adopting different processing methods, such as boiling (Longe, 1980; Obioha and Anikwe, 1982), ensiling and sun drying (Obioha *et al*., 1984).

Rice offal, a by-product of rice milling, make up about 40% of the parboiled rice and contain husk, bran polishing and small quantities of broken rice. The nutrients composition of rice offal has been reported as 94.42% dry matter, 5.09% Crude protein, 5.6% crude fat, 33.0-30.39% Crude fibre, 16.67% ash and 46.10% nitrogen free extracts, 0.17% Calcium, 0.49% Phosphorus, 0.16% lysine, 0.06% Methionine and 1319 Metabolizable energy (Aduku, 2012).

MATERIALS AND METHODS

Experimental Site

The study was carried out at Ofodua-Adun in Obubra Local Government Area, Cross River State. This is located between Longitude 8^0 - 9^0E and Latitude 6^0 -7^0N of the Equator. The mean annual rainfall of the area ranges from 500 to 1070mm, with a warm weather and ambient temperature of about 20^0C - 30^0C (Mfam, 2002).

Experimental Animals and Management

Sixteen (16) grower Grasscutters between the ages of 3-4 months were used for the feeding trial which lasted for 8 weeks (56 days). The Grasscutters were individually housed in concrete cells measuring 50 x 50 x 40 cm (length x width x height), open at the top. The top was partly covered to create a darkened area. Each cell was provided with a feeder and a drinker. The cells was constructed inside a building, built with a half wall and roof with corrugated iron sheet to prevent direct sunlight and rain.

Processing of Cassava Peel Meal

Composite cassava peel (CP), was sourced within the campus's environs, washed and sun dried intensively on a concrete slab for a period of 7 days and was roughly crushed with a hammer mill for inclusion in the test diets. Cassava peel meal was served as the test ingredient and partially replaced with rice offal's while other feed ingredients were palm kernel cake, maize, maize offal and bone meal. All feed ingredients were sourced from markets around the university communities. Micro nutrients were added in small amount to the diets so as to improve palatability and nutrient requirements.

Experimental Design

Sixteen (16) grower grasscutters were randomly assigned to the four diets in a Completely Randomized Design (CRD). The study had four (4) treatments and four replicates per treatment, with each animal serving as a replicate. The grasscutters were individually fed in their various experimental units.

EXPERIMENTAL DIETS

Four (4) experimental diets were formulated in the weaner-grower phase meant for the study. The treatments were designated as T_1, T_2, T_3, T_4. to Diet 1(T_1) which contained 0:100%, Diet 2 (T_2) 25: 75%, Diet 3 (T_3) 50: 50% and Diet 4 (T_4) 75: 25% cassava peel meal and rice offal respectively. The percentage ingredients composition of the experimental diet is presented in Table 1.

Table 1: Percentage composition and calculated nutrients of experimental diets

	Experimental Treatments			
Ingredients	**T_1 O% CPM 100% RO**	**T_2 25% CPM 75% RO**	**T_3 50% CPM 50% RO**	**T_4 75% CPM 25% RO**
Cassava peel	0.00	8.75	17.50	26.25
Rice offal	35.00	26.25	17.50	8.75
Palm kernel cake	30.00	30.00	30.00	30.00
Maize	20.00	20.00	20.00	20.00
Maize offal	10.00	10.00	10.00	10.00
Bone meal	2.50	2.50	2.50	2.50
Salt	1.50	1.50	1.50	1.50
Premix	0.50	0.50	0.50	0.50
Lysine	0.25	0.25	0.25	0.25
Methionine	0.25	0.25	0.25	0.25
Total	**100.00**	**100.00**	**100.00**	**100.00**
Calculated nutrients				
Crude protein	10.40	10.41	10.40	10.41
Crude fibre	17.45	15.28	13.11	10.92
ME kcal/kg	2004.15	2130.15	2256.16	2382.15

CPM= cassava peel meal, RO= rice offal, ME kcal/kg= Metabolizable energy kilocalories per kilogram

Chemical Analysis

The Cassava Peel Meal (CPM) and Rice Offal was subjected to proximate analysis using the method of official analytical chemist (A .O .A. C. 2010).

Parameters Measured

A decided amount of feed in kg were measured daily and given *ad-libitum* to each grasscutter daily and the remnant was weighed and the difference obtained served as the amount of feed intake daily.

The Grasscutter were weighed at the beginning of the experiment and weekly thereafter, the average daily weight gain was obtained by dividing the mean weekly weight gain by seven (7). The weighing of the animals was done in the morning before feeding.

The ratio of daily feed intake to daily live weight gain in (kg) was computed to determine the efficiency of feed utilization.

Data Analysis

Data obtained were subjected to analysis of variance (ANOVA) using Mini-tab statistical software. Means that were significantly different, were separated using Fisher's least significant difference (FLSD) as contained in the statistical package.

RESULTS AND DISCUSSION

The proximate composition of the test ingredients

The proximate composition of the test ingredients is presented in Table 2.

Table 2: Proximate composition of test ingredients

Nutrient composition	**Percentage**	
	Cassava peel meal	**Rice Offa[**
Moisture content	10.60	7.40
Crude protein	5.51	3.94
Ether extract	3.53	5.87
Ash	5.01	11.91
Crude fibre	15.49	36.90
Nitrogen free extract	59.86	33.98
Energy Kcal/kg	2584.90	1832.24

The performance parameters of grasscutters fed rice off partially replaced with cassava peel meal.

The results of the performance of grasscutters fed rice off partially replaced with cassava peel meal is presented in Table 3

Table 3. Performance of Grasscutters fed cassava peel meal partially replaced with rice offal

Parameters	T1 0% CPM 100% RO	T2 25% CPM 75% RO	T3 50% CPM 50% RO	T4 75% CPM 25% RO	SEM
Initial weight (g)	450.00	500.00	450.00	400.00	
Av. Final weight (g)	1175.00^{a}	1525.00^{ab}	1425.00^{bc}	1062.50^{c}	59.58
Av. feed intake(g/day)	67.03b	89.85a	83.90a	71.28b	0.36
Av. Weight gain (g/day)	12.96^{b}	18.31^{a}	17.42^{a}	11.83^{c}	0.72
Average total weight gain	725.00^{b}	1025.00^{a}	975.00^{a}	662.50^{c}	10.05
Feed conversion Ratio	5.18^{b}	4.92^{b}	4.81^{b}	6.03^{a}	0.27
Mortality (%)	0.00	0.00	0.00	0.00	

a, b, c Means with same letter(s) in a row are not significantly ($p>0.05$) different, SEM =standard error of means, CPM= Cassava peel meal, RO=Rice offal, Av=Average

DISCUSSION

Performance of Grasscutters fed rice offal partially replaced with cassava peel meal

The results of the Performance of Grasscutters fed rice offal partially replaced with cassava peel meal shown in Table 4, indicated significant differences ($P<0.05$) in average daily feed intake, daily weight gain, total weight gain and feed conversion ratio. Generally, there was no particular trend followed based on the replacement levels of the test diets fed to the grasscutters. This could be attributed to their individual response to the diets. The results agrees with the reports by Gboshe et al. (2022) except daily feed intake when they worked on the replacement of sugarcane peel meal with cassava peel meal in the diets of grasscutters but however, agrees with the finding of Banjo *et al*. (2012) when they work on the replacement of maize with graded level of brewer's dried grain (BDG) in the diet of weaner grasscutters.

The average daily intake of the diets was highest (89.85 g) for grasscutters on the grasscutters fed 25% CPM and 75% RO though did not differ ($P>0.05$) from those fed 50% CPM and 50% RO and the lowest (69.03 g) for grasscutters on those fed 0% CPM and 100% RO. Feed intake did not follow any particular trend so as to be attributed to the different levels of replacement of rice offal with cassava peel meal. The feed intake in this study was higher than the value range 56.08-58.36 g reported by Gboshe et al. (2022) but was less than the range of values reported by Onyeanusi et al. (2008), 178.02- 262.05 g, Henry et al. (2009) value range of 161.97-213.88 g and values range (92.98-148.75 g reported by Gboshe et al. (2018) when concentrate feed supplementation regime was assessed on the growth performance and economics of production of Grasscutters. The variations in the feed intake with the various researchers may be attributed to factors like size of the animal and variation in level of nutrients composition in feeds. This agreed with the assertion of Mc Donald et al. (1995) that animals tend to be eating more feed of low quality in order to satisfy their need for energy and other nutrients. Another possible reason for the variation in the feed intake could be as a result of individual

preference by the grasscutters or differences in the feeding habits of the animals as reported by Payne (1990) and Lynch *et al*. (1992) who stated that individual variations among animals affects the rate of feed intake.

The total weight gain in this study ranged from 662.50-1025.00 g with the highest on the grasscutters in 25% CPM and 75% RO. The lowest was on those fed 75% CPM and RO 25%. The value range was less than 894-1206 g reported by Gboshe et al. (2022). The values recorded were however, similar to the value range 650-850 g reported by Onyeanusi et al. (2008) reported when the grasscutters were fed varying levels of dietary protein on growth performance. It was also similar at the lower limit 1024 and 1121 g reported by Obi et al. (2008) where performance of grasscutters were assessed when fed four different conventional forages. Also Karikari and Nyameasem, (2009) reported values range of 650-1190 g as total weight gain for grasscutters fed concentrate diets containing varying level of guinea grass but higher than reported values range 225-625 g by Annor et al. (2009) as total weight gain for grasscutters. Henry *et al*. (2012) reported 993.14-1182.72 g when they fed elephant grass as basal feed and a mixed feeding regime with crude protein of 24% and Metabolizable energy of 2340 kcal/kg. Ogunjobi *et al*. (2014) reported 528.08-532 g when they assessed elephant grass, Gambia grass and their fractions using concentrate supplement of 16% and Metabolizable energy of 2500 kcal/kg but lower than 667.5-2185 g reported by Gboshe *et al*. (2018) with the exception of the lower range and some similarities with other researchers also. These variations may be attributed to the nature of diet and the feeding regime adopted by the various researchers.

The average daily weight gains of the grasscutters were significantly ($P<0.05$) affected by the percentage levels of the replacements though no defined trend in the relationship between average daily weight gains and the levels of replacements. It followed the same pattern like the total weight gain, of course, that is expected because the accumulations of daily weight gain gives the total weight gain over the period of study.

The marginal decline in weight gain observed in this study as the level of the combination of CPM 75% and 25% RO may be attributed to the low protein content of the rice offal and the cassava peel meal and also it's lower nutrients content which affected the low weight gain. This agrees with report that, CPM and rice offal could serve as a cheap source of energy for farm animals but should be fortified with additional protein source because of its low protein level (Obioha and Anikwe, 1982).

The study disagrees with reports by Ogunjobi et al. (2014) and Henry et al. (2012) who had no significant ($P>0.05$) differences in their studies but agrees with Gboshe et al. (2018) and Gboshe et al. (2022) who had a significant ($P<0.05$) different and their reports. The average daily weight gain was highest (18.31 g) for grasscutters on 25% CPM and 75% RO level though did was not significant ($P>0.05$) to those fed 50% CPM and 50% RO% level and lowest (11.83 g) was on 25% cassava peel meal and 75% rice offal. This daily weight gains was almost higher than the values range reported by Onyeanusi et al. (2008) 13.27- 15.00 g, 9.41 g, 10.88 g reported by Wogar et al. (2007), Gboshe et al. (2018) with value range of 9.23-15.93 g. and Gboshe et al. (2022) 10.64-14.36 g.

The feeding trial on the grasscutters had a significant ($p<0.05$) effect on the feed conversion ratio. The worst FCR recorded was in 75% cassava peel and 25% rice offal (6.03) and it differed from other test ingredients and the best was in 50% CPM and 50% RO (4.81) which did not however, differed from other treatments level except 75% CPM and 25% RO. This FCR values obtained in this research are better than the values of 543.24, 82.30 and 119.38 reported for grasscutters at the end of a 24 weeks feeding trial (Annor et al., 2009). These values are however, higher than the value ranges of 1.66 - 3.52 Wogar et al. (2007), Onyeanusi *et al*. (2008) whose values ranges from 0.80-0.96 and value ranges of 1.81-6.95 by Henry and Njume (2008). It was almost similar to 4.86-5.04 by Obi et al. (2008) and 4.8-7.5 Karikari and Nyameasem, (2009) but less than the value range 9.91-19.49 reported by Gboshe et al. (2018) but almost similar to 4.03-5.47 reported by Gboshe et al. (2022). The variations in FCR values may be attributed to the differences in the experimental diets used by different authors and the feeding regimes practiced while carrying out their various experiments.

CONCLUSION AND RECOMMENDATION

The results of this experiment showed that, cassava peel meal can replace rice offal up to 75% in the diets of grasscutter without any deleterious effect on the performance parameters but the best level of replacement was 25% CPM and 75% RO, though it did not differ significantly ($P>0.0$) from 50% CPM and 50% RO replacement level. Further study is suggested to affirm this percentage levels. Based on this present study, It is however, recommended that for optimum performance, rice offal could be included at 75% RO and 25% CPM, considering the growth response obtained from the present study.

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