Evaluation of Corn Cob on the Growth Performance of Grasscutter (*Thryonomys swinderianus*)

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Abstract

This experiment was conducted at the livestock unit of the University for Development Studies (UDS) to determine the effect of corn cob on the performance of grasscutters (Thryonomys swinderianus). A total twelve weaned grasscutters of about 6 to 8 weeks old were assigned to two treatments, T0 containing 0% corn cob (control) and T1 containing 15% corn cob (CC). The experiment lasted for 8 weeks during the dry season. Data on feed intake and weight gain were collected over the period. Feed and feacal samples were collected from each treatment and their proximate composition analysed at the Spanish Laboratory of the UDS. There was no significant difference (P>0.05) between the two diets for crude protein (CP), ether extract (EE), Feed intake and final weight gain of the animals on the corn-cob based diets were similar to those on the non-corn cob base diet. It is concluded that corn cob could be included up to 15% in grasscutter diet without any detrimental effect on digestibility.

Keywords: apparent digestibility, corn-cob, feed intake, growth

1. Introduction

Globally, wildlife has great potential for meat production and serves as an important source of highly desired animal protein to the people of Africa both in urban areas and rural communities [1]. The preference for bush meat or the meat of commercially available game animal is widely accepted [2; 1].

The grasscutter (*Thryonomys swinderianus)* is a hystricomorphic rodent widely distributed in the African sub-region and exploited in most areas as a source of animal protein [3; 4; 5]. It is the most preferred and most expensive meat in West African countries like Togo, Nigeria, Benin, Ghana and Cote d'Ivoire [2; 6]. Feeding is the most essential factor in the production of any animal in captivity. Feed quality and quantity determines the level of output from the captive animal. Under-feeding can lead to mortality especially in young ones, low weight at birth and at maturity. The non- availability and quality of grass and legume herbages such as *Pennisetum purpureum, Panicum maximum Stylosanthes gracilis* and *Stylosanthes hamata* makes feeding a major problem especially in the dry season.

So far, knowledge in feeding standards for grasscutter remains fundamental and the feeding method used has been proven to be inadequate for growth and reproduction [7].

Generally grass with a high content of protein and a good digestibility are only available at the beginning of the rainy season for two months. In the dry season, fodder quality becomes poor with livestock feeding being constrained by inadequate supply of good quality feed. In an attempt to reduce or eliminate this problem, other feed resources like agro and industrial by-products should be exploited as feed materials for these animals. It is against this background that a proportion of maize was replaced with corn cob to formulate a diet for the grasscutter in the dry season in the Northern Region of Ghana.

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2. Materials and methods

Location

This experiment was conducted at the livestock unit of the University for Development Studies (UDS) and the Spanish Laboratory of the UDS in Nyankpala. Nyankpala is located 16km West of Tamale. It lies within latitude $9^0 25'$ N and 10^0 00'N and longitude 1^0 00' E.

Climate

The study area has a unimodal rainfall pattern which lasts from May to October. Mean annual rainfall is 1,043mm. Temperature generally fluctuates between 15^0C (minimum) and 42^0C (maximum) with mean annual temperature of 28.3^0C. The mean annual day time relative humidity is 54% [8]. There is cold harmattan wind from November to February and a period of warm dry months of March and April. The dry season stretches from November to April.

Housing of experimental animals

Each grasscutter was placed in a wooden pen with wire mesh floor within a block house with a concrete floor and aluminum roofing. The walls of the house had ventilation holes to facilitate ventilation. Within each pen were water and feeding troughs for water and feed.

Source of Experimental Animals

Twelve weaned grasscutters were obtained from Asuakwa, a farming community in the Sunyani West District of the Brong Ahafo Region.

Experimental Diet

Two experimental diets were formulated and fed to the grasscutters. The control diet (T1) contained no corn cob while the treatment diet (T2) contained 15% of corn cob. The animals were fed twice a day (5:30am and 6:30pm) and water provided *ad libitum*. Each animal was given a feed quantity of 200g a day, 100g in the morning and 100g in the evening (Table 1).

Design of Experiment and Duration

A Randomized Complete Design was used to assign animals to the diets (control and treatment). Animals were fed and faeces collected at the same time each day till the end of the 8th week. The experiment lasted for a period of 8 weeks during the dry season

Table 1. Inclusion levels and analysed Nutrient Composition of experimental diets

Ingredients/Inclusion level	T0 (0%)	T1 (15%)
Corn	35.0	20.0
Corncob	0	15.0
Soya bean meal	21.0	21.0
Brewers spent grain (BSG)	42.0	42.0
Salt	0.5	0.5
Premix*	0.5	0.5
Dicalcium	1.0	1.0
Composition (%)		
Crude Protein	16.8±1.1	17.1±1.1
Ether Extract	8.7±0.67	7.5±15.6
Ash	10.2±3.5	10.0±6.5

** Premix composition (per kg of diet): vitamin A, 12,500 IU; vitamin D3, 2500 IU; vitamin E, 50.00mg; vitamin K3, 2.50mg; vitamin B1, 3.00mg; vitamin B2, 6.00mg; vitamin B6, 6.00mg; niacin, 40mg; calcium pantothenate, 10mg; biotin, 0.08mg; vitamin B12, 0.25mg; folic acid, 1.00mg; chlorine chloride,300mg; manganese, 100mg; iron, 50mg; zinc, 45mg; copper, 2.00mg; iodine, 1.55mg; cobalt, 0.25mg; selenium, 0.10mg; antioxidant, 200mg*

Table 2. Chemical composition of corn-cob

Composition	percentage
Crude protein	3.50
Crude fibre	35.50
Phosphorus	0.08
Crude fat	0.60
Calcium	0.35
cellulose	32.3-45.60
hemicellulose	39.80
lignin	6.7-13.90

Source: [16; 17]

Data collection

A catching net was used to restrain the animals during weighing and an electronic weighing balance was used to record the weekly weight gain of the animals. Feed and faecal samples were collected from each treatment for digestibility studies.

Chemical Analysis

The proximate composition of the diet was analysed at the Spanish Laboratory of the University for Development Studies using the [9] methods.

Statistical Analysis

Data was analysed using Analysis of Variance (ANOVA) from Genstat discovery edition and the results are presented in tables.

3. Results and discussion

Growth and apparent nutrient digestibility

The results on the growth and apparent digestibility of the two diets are presented in table 3. The protein content of the two diets was within the range of 14-18% recommended by [10] and [11] for grasscutter.

Animals on non-corn cob based diet had an average intake of 115g/day compared to 114g/day observed in animals on corn cob based diet and the difference was not significant (P>0.05). The feed intake compared favorably with that reported by [12] when concentrate was fed to grasscutter in the dry season. Despite the high crude fibre and lignin content in the corn cob, feed intake matched favorably with the non-corn cob diet. This may be due to the high nitrogen (crude protein) contribution coming from the soybeanmeal inclusion. High crude fibre and lignin content are often associated to a reduction in feed intake in most livestock. Grasscutter is reported to tolerate high fibre diet compared to rabbits [11].

Table 3. Growth and Apparent Nutrient Digestibility (%) of the Two Treatments

Parameters	T0	T1	s.e.d	F Pr.
Average daily intake (g/head/day)	115	114	6.61	0.89
Feed conversion efficiency (Intake/gain)	31.1	23.4	9.14	0.45
Daily weight gain (g/day)	4.54	4.96	1.58	0.80
Final weight gain (g)	254	278	88.2	0.80
Final weight (g)	814	911	150.9	0.56

Apparent Digestibility

Nutrient	T0 (±sd)	T1 (±sd)	sed	F Pr
CP	67.7±2.37	69.5±6.52	4.0	0.68
EE	72.2±1.54	83.7±13.93	8.09	0.23
Ash	9.9±13.06	51.7±2.89	7.72	0.35

***sed** = standard error of difference, **sd** = standard deviation, **CP** = Crude Protein, **EE** = Ether Extract*

The FCE of the corn cob based diet was higher than those on the control but the effect was not significant (P>0.05). The FCE recorded in this study was relatively higher than what was reported by [13] when whole *Panicum maximum* was fed to grasscutter. This implies that the animals on the corn cob based diet could utilize the feed more efficiently compared to the control and even better than animals on sole grass. This could be attributed to slightly higher crude protein content and digestibility in the corn cob based diet.

Final weight gain and daily weight gain were relatively higher for animals on the corn cob compared to the animals fed non-corn cob base diet. The difference was however not significant (P>0.05). The daily weight gain was slightly higher than what was reported by [13] when whole *panicum maximum* was fed to grasscutter. The difference may be due to the high crude protein present in the corn cob based diet (17.1%) compared to the 9g reported for whole *Panicum maximum* reported by [13]. The relative improvement in weight gain of the corn cob fed animals over the non-corn cob could be attributed the higher digestibility observed. The presence of microbes in the caecum might have contributed to the improved digestibility in the corn cob based diet despite the high fibre content of the corn cob. The fermentative activity of these microbes in the caecum produces volatile fatty acids which serve as a source of energy for maintenance and growth. This can be confirmed from the high final weight gains of animals on the corn cob diets.

The apparent digestibility of CP for T1 was 69.5% and that of the control (T0) was 67.7%. The corn cob meal increased the CP digestibility over the control by 1.8%. However there was no significant difference (P>0.05) between the two. The high apparent digestibility could be an indication that the high crude fibre of the corn cob did not disrupt the digestive system of the grasscutter but rather slightly enhanced it hence the better performance of the animals on corn cob based diet. This is contrary to reports that suggest that high crude fibre protect feeds from attack of digestive enzymes and microbes and also reduce the diffusion rate of digestion products to its mucosal surfaces due the water-binding capacity [14; 15]

4. Conclusion

It is concluded from this study that corn-cob can replace maize up to 15% in the diet of Grasscutter without having any detrimental effect on the animal. It is recommended that a further study be conducted to determine the effect of corn cob on grasscutter beyond 15%.

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