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Response of Juvenile Giant Land Snail *Achartina marginata* Fed Varying Levels of Cocoa Pod Husk

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Abstract: Fresh cocoa pod husks were collected from cocoa farms near the Federal University of Technology Akure.The cocoa pod husks were sun dried and milled thoroughly. It was then mixed at different levels to replace maize in the experimental diets. The proximate analysis was determined. The cocoa pod husk(CPH) was used to replace maize in the diets of juvenile giant land snails *Achartina marginata*. 48 hatchlings of the snail were used for a feeding trial. There were four treatments with three replicates .There were four diets in which maize was replaced at 0,20,40 and 60% CPH. The animals were fed ,*ad libitum* .The snail pens were cleaned everyday while the soil in the snail pens were changed fortnightly. The experiment lasted 12 weeks . The following parameters were determined: feed intake, weight gain, feed conversion, empty shell weight, edible flesh weight and shell length.The results show that there was a significant difference ($P<0.05$) in weight gain ,feed conversion and weight of edible flesh between only the snails fed the 0 and 60% CPH diets. However, there was no significant difference between the control and the diets where CPH replaced maize up to 40 % level of substitution in all the parameters tested. Mortality was low in all the diets. It was concluded that cocoa pod husk like most other farm waste products, could easily replace maize in the diet of juvenile giant snail without any adverse effects on the animal.

Key words: Farm waste, Cocoa pod husk, Juvenile snail, Performance

Introduction

Cases of malnutrition are. more rampart in the developing countries than what it Is in the other parts of the world and thousands of children die every year of starvation and malnutrition in the region (FAO, 1996).An average Nigerian does not have access to adequate protein in his diets. Animal protein is by far superior to plant protein. as it contains all the essential amino acids in adequate proportions (Tewe, 1996). Animal production is faced with many problems in Nigeria for instance, high cost of animal feed constitutes a major impediment to animal production.

Feed is the most expensive of the various factors of production and it represents about 60% of the cost of animal production. Feed cost is high because of the continuous competition between man and animal for most of the feed ingredients (Adeyemo and Longe, 1987).The most expensive portion of the animal feed are protein and energy. Therefore , there is an urgent need to look for feed ingredients that have little or no monetary values such as the farm wastes and industrial waste products to remove competition between man and livestock (Ravindran *et al.*,1983) Use of farm waste products with little or no monetary values and which often constitute problems in the environment ; when allowed to accumulate , in animal feed formulation , will greatly reduce cost of animal production and make them available to Nigerians at moderate costs (Tewe, 1996). Some of the farm waste products include cassava peel, cocoa pod husk, yam peel and kola nut shell .All these products are available in large quantities on the farms in most parts of the year. The nutrient value of all these ingredients is high enough to replace maize in animal diet. Moderate use of these ingredients are not injurious to animal body system.(Ravindran *et al.*, 1983). Most of these nutrients contain many toxic substances which might be very risky to be left unused in the environment. The farm waste products used for this study is cocoa pod husk (CPH) It is produced in large quantities in the cocoa producing areas of Nigeria .It contains theobrome a toxic substance which if allowed to accumulate continuously in the environment could create serious health hazards to both man and wildlife.

Snail is a wild animal that is found under debris and shed plant leaves in different agricultural farms especially during the raining season in the tropics (Adeyemo and Borire, 2002). It is a delicacy for many people both in the rural and urban areas of Nigeria.It serves as a ready source of meat to the rural communities where majority can not afford the high cost of beef meat (Emevbore, 1990).Snail meat has a unique taste and aroma. It is very rich in iron, calcium and phosphorous .It is low in fat and cholesterol (Afolyan, 1987). It is high in quality protein, as it contains all the essential amino acids in adequate proportions. The amino acid profile compares favourably with those of broiler, mutton, and beef (Omole, 1999).This makes it's consumption beneficial and safe to the consumers. Apart from serving as a source of food, snail is very important in traditional medicine. It is mixed with other ingredients to prepare concoctions for the treatment of many diseases in west Africa (Omole, 1999). It feeds on plant leaves, fruits, shrubs and organic matter. This shows that its requirements are not expensive. Therefore, it could be reared at the back of a house with ease with little capital (Ngoupyou, 1992).

This study is aimed at assessing the nutritive value of cocoa pod husk a farm waste products , in animal nutrition to reduce cost of production to make them more available to man at affordable prices.

Materials and Methods

Samples of cocoa pod husk were collected from different farms where they are produced in large quantities. The samples were collected from different farms randomly chosen near Akure metropolis. The samples were sun dried and thoroughly milled. Samples of available maize in this region used for animal feed production were also milled. farm waste product was compared with that of maize Proximate analysis of the feeds were done.

48 hatchlings of Archartina marginata were used for the experiment.The snails were randomly divided into four equal groups according to body weights. There were 3 replicates. They were raised in the snail pens of the University domestication unit. The snail pens were kept in a house where a portion of it was open roofed for extensive snail rearing. The other portion of the building was covered with corrugated iron sheets. The floor was covered with concrete The pens were of 40cm x 40cm x 40cm, in size. The pens were one third filled with loamy soil .The outer part of the pens were covered with black cellophane paper to keep the pens dark and damp as

physiologically required by the snails. The pens were covered with wire mesh.

There were four dietary treatments in which maize was replaced at 0, 20,40 and 60% by CPH. The snails were fed *ad libitum* throughout the experimental period. They were fed every day with clean feed and water. The pens were cleaned regularly while the soil in them were changed every fortnight to avoid a build up of parasites and pathogenic organisms.. The snails were fed for 12 weeks. The following parameters were determined: feed intake, weight gain, feed conversion, Shell length, shell width and shell thickness.

Data were subjected to analysis of variance (ANOVA) while significant differences between the means were separated using LSD test.

Results and Discussion

The results were presented in Tables 2 and 3 .The results show that feed intake increased with age in all the treatments. It shows that feed intake increased with the level of CPH in the diets. There were no significant difference in feed intake between snails fed 0 and 20% diets. However, there was a significant difference ($P<0.05$) between those on 0% and 60% CPH diets. The higher feed intake observed with the level of CPH might be due to the lower metabolizable energy value of the ingredient than maize which might have compelled the animals to eat more to meet their body energy requirements. This confirms the findings of Cowan and Miche (1983) which reported that animals feeding on low energy diets eat more, in order to meet their energy requirements.

Table 1: Composition of experimental diets

Ingredient	Dietary level of CPH			
	0%	20%	40%	60%
Maize	60.5	48.2	36.4	24.6
Palm kernel cake	20.0	20.5	20.5	20.5
Coca pod husk	0	11.8	23.6	35.5
Blood meal	13.5	13.5	13.5	13.5
Oyster shell	3.5	3.0	3.0	3.0
Bone meal	3.0	3.0	3.0	3.0

The determined gross energy values of maize and CPH were 5.1 and 4.3 (MJ/kg) respectively

Table 2: Proximate analysis of experimetnal diets

Ingredient	0%	15%	30%	45%
Crude protein	18.10	17.42	16.91	16.77
Ether extract	36.01	36.42	36.50	35.22
Crude fibre	10.35	11.32	11.51	11.40
Ash	14.31	15.81	15.73	15.71
Nitrogen free extract	21.28	19.07	19.36	20.9

Table 3: Performance of snails fed varying levels of CPH

Parameters	0%	20%	40%	60%
Average feed intake (g)	24.64a	27.18a	28ab	30.88b
Average body weight gain (g)	18.57a	16.96a	15.71b	14.35b
Average feed gain ratio	0.55a	0.51a	0.49ab	0.42b
Flesh weight (g)	131a	129a	128b	123b
Shell length (cm)	8.23	8.16	7.61	7.48
Shell thickness (mm)	1.09	1.08	1.09	1.09
Percentage mortality	0	0	0	0

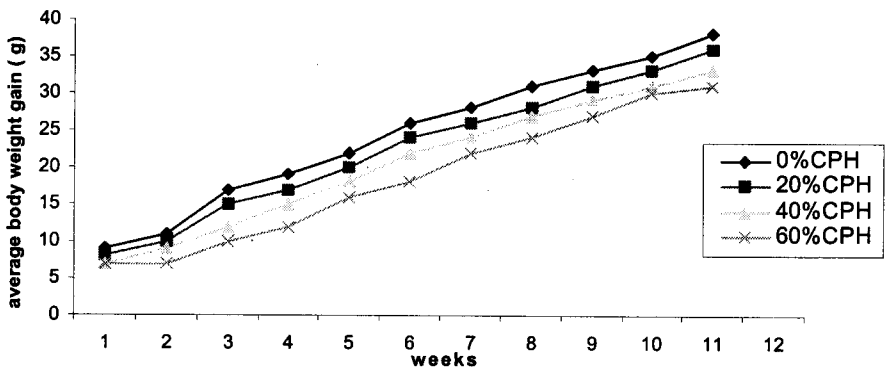

Fig. 1: Average body weight gain of juvenile snails fed varying levels CPH

However, significant differences (P<0.05) were observed between snails fed 0% and those on 60% CPH diets., in body weight gain,feed intake, feed conversion and edible flesh weight .The higher feed intake with CPH in the diet might be due to the higher metabolizable energy content of maize than CPH. The snail therefore, has to eat more of the CPH, diets to meet their body energy requirements. Metabolizable energy requirement for maintenance of animals decline with increasing ambient temperature (Balnave and Farrel, 1978). Animals in the tropics have nutrient requirement different from those raised in the temperate climate as the environment Ibeawuchi and akinsoyin, 1991 often determines their requirement The results show that body weight gain increased with age in all the treatments. And there was a significant difference (P<0.05) between snails raised on 0% and 20%CPH diets in body weight gain. The result on feed conversion followed the same order as those observed in body weight gain. This is in line with the findings of Adeyemo and Borire (2000) which reported significant differences in the body weight gain of snails fed different levels of yam peel. Mortality was generally low in all the diets indicating that the treatments were not detrimental to the health of the snails (Ngonpayou, 1992).

Results for the shell thickness and shell length followed the same order in all the treatments. There were no significant differences between the snails in all the treatments. Shell thickness is a measure of the state of health of a snail ,hence the non significant difference in shell thickness observed among the treatments is an indication that the treatments did not have any adverse effect on the animal (Omole, 1999). In all the parameters tested, it was apparent that there was no significant differences between snails raised on 0% and those on 20%CPH diets .This implies that when maize is replaced at moderate levels with CPH the animal would easily tolerate it and bring about a high yield.

Conclusion

IT was concluded that cocoa pod husk a waste farm product, can be used as an energy source in a juvenile snail diet when used at moderate levels without any adverse effect on its performance . Use of cocoa pod husk, which is a toxic waste substance, in animal diet, will greatly, reduce its accumulation in the farms. This will make life safer for both man and wildlife as it will prevent environmental pollution.

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