FEED INTAKE AND NUTRIENT DIGESTIBILITY OF WEANER RABBITS FED CASSAVA PEEL AS REPLACEMENT FOR MAIZE

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ABSTRACT

Twenty 8-week old crosses of New Zealand White X Chinchila weaner rabbits were used to assess the performance of rabbits fed diets with cassava peel replaced with maize on a graded level. Five diets were formulated, diets 1 (control), 2, 3, 4, and 5 in which maize was replaced with cassava peel at 0%, 25%, 50%, 75%, and 100%, respectively. The 20 rabbits were used in a completely randomized design with five treatments and four animal replicates per treatment. The trial lasted for 8 weeks. Parameters measured were feed intake, weight gain, feed conversion ratio and feed cost per kg. It was observed that there was no significant difference (P > 0.05) in the average daily feed intake of the rabbits fed diets 3, 4 and 5. However, diets 3, 4 and 5 had significantly higher (P < 0.05) intake than diets 1 and 2. Similarly, rabbits on diets 3, 4 and 5 had higher (P < 0.05) growth rates than those fed the control diet and diet 2. Feed cost per kg (N/kg) decreased from N35.33 in the control diet to N19.75 in diet 5. Cost of feed/kg live weight gain (N/day) decreased from N3.21 in the control diet to N1.29 in diet 5. It was concluded that maize supplementation in the diets of weaner rabbits could be replaced by cassava peels up to 100 % without any adverse effect. However, 75% cassava peel replacement was found to be the optimum and therefore recommended.

Keywords: Cassava peel, Nutrient digestibility, Growth rate, Feed intake, Rabbit

INTRODUCTION

Animal protein content in the diet of most Nigerians is very low because the animal production level has not been able to meet the animal protein needs of the populace (Oyenuga, 1968). To redress this deficiency syndrome in animal production and hence protein intake, two options were suggested. The first is the use of minilivestock like rabbits for meat production and the next is the adoption of feeding strategy that maximizes the use of under-utilized feed resources and wastes in animal production (Omole and Onwudike, 1982; Onwudike, 1995). Cassava peel is one of such by-product emanating from industrial processing of cassave into garri, chips and industrial starch. It offers a tremendous potential as a cheap and alternative feedstuff to maize. It however contains hydrogen cyanide that has been shown to be toxic to livestock and could limit its usage in the raw state as feed for livestock (Smith, 1988; Mc Donald et al., 1995). Detoxification of cassava peels has been made possible by sun drying (Tweyong and Katonga, 2002).

The conventional feed ingredients, particularly the energy sources used in feed formulation such as Maize, millet, sorghum are very expensive. A partial or complete replacement of maize with cassava peel would be a cost-saving step in the right direction. Onifade and Tewe (1993) and Agunbiade et al. (1999) recommended complete replacement of maize grain with maize offal in the diets of growing rabbits, thus reducing the expenditure on maize and utilizing the offals. Similarly, Uko et al. (2001) concluded that maize, millet and sorghum offals could replace 100 % maize grain in rabbit diets without adverse effects on animal performance.

It is against this background that this study was designed to assess the performance of weaner rabbits fed diets containing graded levels of cassava peel replaced for maize meals

MATERIALS AND METHODS

Study Area: The study was carried out at the Rabbitary Unit, Teaching and Research Farm, Department of Animal Production and Fisheries Management, Ebonyi State University, Abakaliki. The station is located between latitude 06o 21 N and longitude 08o 51 E. The annual rainfall ranges from 1500 to 1800 mm with a temperature range from 21o to 30o C (Ofomata, 1975).

Rabbit: Twenty 8-week old crosses of (New Zealand White X Chinchila) rabbits were used for the feeding trial which lasted for 8 weeks. The mean weight of the rabbits at the inception of the trial was 745 ± 2.5 g. The rabbits were housed individually in one tier hutch measuring 0.4 m2 , equipped with facilities for individual feeding and watering, and wire gauze underneath for feacal collection. The hutch floors were cleaned daily throughout the experimental period.

Table 1: Percentage and Proximate composition of rabbits experimental diets

PERCENTAGE COMPOSITION	Diet 1	Diet 2	Diet 3	Diet 4	Diet 5
Maize	41.0	30.75	20.5	10.25	0.0
Cassava peels	0.0	10.25	20.5	30.75	41.0
Soyabean meal	20.0	20.0	20.0	20.0	20.0
Palm kernel cake	19.0	19.0	19.0	19.0	19.0
Wheat offal	15.0	15.0	15.0	15.0	15.0
Bone meal	3.0	3.0	3.0	3.0	3.0
Lime stone	1.5	1.5	1.5	1.5	1.5
Premix	0.25	0.25	0.25	0.25	0.25
Salt	0.25	0.25	0.25	0.25	0.25
Total	100	100	100	100	100
Feed cost per kg (₦/kg)	35.33	31.44	27.54	23.65	19.75
Cost of feed consumed (₦/day)	2.70	2.52	2.27	2.02	1.91
Cost of feed /kg LWG (₦/day)	3.21	2.65	1.78	1.43	1.29
PROXIMATE COMPOSITION					
Dry matter	89.93	89.85	89.96	89.87	89.81
Crude protein	17.58	17.76	18.08	18.34	18.47
Crude fibre	7.37	7.54	8.17	8.32	8.49
Ether extract	5.11	5.15	5.18	5.27	5.39
Ash	5.91	5.96	6.02	6.13	6.17
NFE	42.66	43.0	43.28	43.48	44.19
GE (kcal/g)	3.994	3.982	3.957	3.968	3.974

Diet 1 (control) = 0% Cassava peel residue (CPR); Diet 2 = 25% CPR; Diet 3 = 50% CPR; Diet 4 = 75% CPR; Diet 5 = 100% CPR; LWG = Liveweight gain.

Table 2: Feed intake, growth rate and nutrient digestibilities of weaner rabbits fed cassava peel as replacement for maize

Item	Diet 1	Diet 2	Diet 3	Diet 4	Diet 5
Feed intake (g/d)	$76.39^{c}\pm 3.1$	$80.0^{bc}\pm 0.18$	$82.46^{ab}\pm 0.32$	$85.45^{a}\pm 0.17$	$86.21^{a}\pm 0.31$
Growth rate (g/d)	$11.77^{d}\pm 0.81$	$13.3^{c}\pm 1.31$	$17.82^{b}\pm 1.81$	$19.82^{a}\pm 0.57$	$18.53^{ab}\pm 1.06$
FCR	$6.64^{a}\pm 0.54$	$6.27^{a}\pm 0.7$	$4.8^{b}\pm 0.55$	$4.39^{b}\pm 0.33$	$4.7^{b}\pm 0.27$
DMD	$0.608^{ab}\pm 0.06$	$0.585^{b}\pm 0.03$	$0.659^{b}\pm 0.04$	$0.770^{b}\pm 0.04$	$0.562^{c}\pm 0.02$
CP digestibility	$0.608^{a}\pm 0.06$	$0.542^{c}\pm 0.02$	$0.576^{ab}\pm 0.02$	$0.657^{a}\pm 0.06$	$0.561^{b}\pm 0.04$
CF digestibility	$0.814^{c}\pm 0.04$	$0.809^{cd}\pm 0.01$	$0.849^{b}\pm 0.02$	$0.903^{a}\pm 0.01$	$0.786^{d}\pm 0.02$
EE digestibility	$0.905^{b}\pm 0.01$	$0.844^{c}\pm 0.04$	$0.915^{ab}\pm 0.01$	$0.936^{a}\pm 0.01$	0.799 ± 0.05

$^{a, b, c}$ Means in a row with common letter(s) superscript do not differ (P > 0.05). FCR = Feed conversion ratio; DMD = Dry matter digestibility; CP = Crude protein; CF = Crude fibre; EE = Ether extract.

The rabbits were allowed a one-week adjustment period during which they were treated against some common diseases (Coccidiosis and Mange) by administering prophylactic coccidiostat (Esb3 + terremycin chick formular) orally and ivermectin (20 g/kg body weight) subcutaneously against mange. They were randomly allocated to five treatments with four animal replications per treatment.

Feed Intake and Nutrient Digestibility: The five experimental diets were formulated with ingredients shown in Table 1. Cassava peel was collected from garri processing cottage industry. The cassave peel consisted of the white part of the fleshy tuber with the coat or brownish outer part of the cassava. The quantity collected after peeling was 800 kg. It was spread on a tarpaulin and sun dried, and turned 2-3 times daily during the process of drying. The dried peels was then stored, on a wooden bench so that it will not absorb moisture from the floor. Cassave peel residue (CPR) was incorporated at 0, 25, 50, 75 and 100 % levels in diets 1 (control), 2, 3, 4, and 5 respectively. CPR replaced maize quantity for quantity. Feed was offered daily at 0900 h and water provided ad libitum during the experimental period. The feed offered and refusals for each rabbit was weighed and recorded daily. Rabbits were weighed weekly and their growth rate determined. At the end of the trial, there was an 8-day collection period of daily feaces from each rabbit in addition to feed offered and refusals for the determination of nutrient digestibility.

Analytical Methods: Feed samples were ground in a hammer mill to pass a 1mm mesh sieve for proximate analysis according to the procedure described by (AOAC, 1990) Crude protein was calculated as N x 6.25. Samples of faeces were dried at 65 oC for 48 h, ground through a 1 mm diameter screen and were analysed for proximate composition (AOAC, 1990). Gross energy of feed and faeces were measured by bomb calorimetry using benzoic acid as a standard (26437 J/g) (Miller and Payne, 1959).

Statistical Analysis: Data generated were subjected to Analysis of Variance (Steel and Torrie, 1980). Means were separated using Duncan's Multiple range test (Duncan, 1955).

RESULTS

The composition of experimental diets and the chemical composition and gross energy content of the experimental diets is presented in Table 1. The

crude protein content of the diets were approximately 18 % crude protein (CP). The crude fibre (CF) levels of the diets increased with increasing levels of cassava peel residue (CPR), (7.37 - 8.49 %).

Feed intake, growth rate and nutrient digestibilities of weaner rabbits fed cassava peel as replacement for maize is summarised in Table 2. There were significant ($P < 0.05$) differences in the feed intake, growth rate, feed conversion ratio and nutrient digestibilities among the treatments. Rabbits fed diets 3, 4 and 5 had significantly higher ($P < 0.05$) daily feed intake than rabbits fed the control diet. There was however no difference in daily feed intake of rabbits fed diets 2 and 3. Similarly, rabbits on diets 3, 4 and 5 had a higher growth rate ($P < 0.05$) than those fed control and diet 2 respectively. A lower ($P < 0.05$) feed conversion ratio was observed in rabbits fed diets 3, 4 and 5 when compared with rabbits fed the control and diet 2.

Dry matter, crude protein, crude fibre and ether extract digestibility were significantly different ($P < 0.05$) among treatments. Rabbits fed diet 4 showed a consistently higher nutrient digestibility values ($P < 0.05$) than those fed diets 1, 2, 3, and 5. However, the dry matter digestibility, crude fibre and ether extract digestibilities of diets 3 and 4 were not significantly different ($P > 0.05$). Feed cost per kg (N/kg) decreased from N35.33 in the control diet to N19.75 in diet 5. Cost of feed/kg live weight gain (N/day) decreased from N3.21 in the control diet to N1.29 in diet 5.

DISCUSSION

The crude protein level of the diets were within the level of 18 % recommended for growing rabbits in a tropical environment (Omole, 1982). The crude fibre levels of the diets (7.37 – 8.49) were lower than the 14 % recommended by Ikurior and Kem (1998) for growing rabbits. The fat levels (5.11 – 5.39) of the diets were higher than the minimum level of 3 % desirable to provide the essential fatty acids and maintain glossy sleek hair (Cheeke et al., 1986). The gross energy values of the diets fell within the recommended range (2390 - 2500/kcal digestible energy) for optimum growth and performance in rabbit (Aduku and Olukosi, 1990).

The poor growth performance on the control diet may have been due to inadequate fibre in the diet. According to Champe and Maurice (1983) rabbit require crude fibre in excess of 9 % for normal growth. Reduced growth rates as observed in diets 1 and 2 may be due to decrease in dietary fibre (Bamgbose et. al., 2002). The mean weight gain recorded in this study compared favourably with the reports of Agunbiade et. al. (1999) and Schiere (1999). The increased mean weight gain of rabbits fed diets 3, 4 and 5 over those fed diets 1 and 2, respectively, could be attributed to the favourable effect of fibre, termed a “ballast” effect (Colin et al., 1976).

The daily feed intake and feed conversion ratio obtained in our study tally with the values reported by other workers (Onifade and Tewe, 1993; Agunbiade et al., 2002) who fed diets containing about 30 % of maize offal to growing rabbits. The low feed intake (76.39 – 86.21) g/day as per the value 131 g/d reported by Cheeke (1984) for rabbits reared in temperate countries may be due to the variation in ambient temperature. Felding (1991) reported that high ambient temperature has adverse effect on feed intake.

Apparent nutrient digestibility showed that the rabbits on diets 3 and 4 had better nutrient digestibilities than those on diets 1, 2, and 5, respectively. This may be the optimum range for efficient nutrient utilisation.

It was observed that total feed cost reduced as the level of the cassava peel meal increased, while the lowest cost/kg liveweight gain was observed in diet 5 (100 % cassava peel) replacement. The highest relative cost advantage observed in diet 5 was as a result of the lower cost of cassava peel compared to maize in the diets.

Conclusion: The result from this study showed that there is a great potential for improvement in feed intake, growth rate and nutrient digestibilities of weaner rabbits fed casava peels as replacement for maize. The results of the present study has shown that maize could be replaced by cassava peel meal up to 100 % without any adverse effect. However, the optimum performance was observed when 75 % cassava peel replaced maize in the diet.

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