Performance characteristics of weaner rabbits on cassava peel-based balanced diets

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Abstract

An eight – week trial was conducted to determine the optimum level of substitution of dried cassava peel meal (DCPM) for maize in rabbit diets balanced for varying energy, nitrogen and fibre contents. Six experimental diets were compounded such that DCPM replaced maize at 0%, 50%, 62.5%, 75%, 87.5% and 100% levels. Each diet was fed to five replicates of a weaner rabbit, averaging 0.49kg initial body weight. Water and feed were provided *ad libitum* throughout the 8-week period and their intake as well as faecal output were measured daily. Body weight gain and efficiency of feed conversion were determined weekly. No significant effects of replacement of maize in the control diet with graded levels of DCPM were observed on final body weight (FW), daily weight gain (DWG), feed conversion ratio (FCR) and feed cost per unit weight gain (FC/WG). However, there were significant effects of dietary treatments on daily faecal output (DFO) ($P<0.05$) and daily feed (DFC) and daily water (DWC) consumption ($P<0.01$). The results of this study demonstrate that DCPM could replace 100% of dietary maize without adverse effects on rate, efficiency and economy of weight gain. Savings in feed cost were also achieved as a result of the use of DCPM and these ranged from 13.2 to 18.7%.

Keywords: Cassava peels, balanced diets, rabbits

Introduction

Acute shortage of animal protein in the diet of the average Nigerian is well documented (FAO, 1982). One of the ways of bridging the demand-supply gap is through rearing of rabbits.

Rabbit production for fast meat yield is however affected by inadequate and high cost of feed ingredients brought about mainly by the stiff competition between man and monogastric animals for grain and oil seeds. Livestock producers have thus been forced to seek less costly alternative feed materials.

Cassava is a major food crop in Nigeria (Onwueme, 1982), the fleshy root is consumed while the peels which accounts for between 10-13% of the tuber by weight (Tewe and Kasali, 1986) is left to rot away on refuse dumps. Cassava peel meal (CPM) is thus one of such of alternatives having potential values as feeding resource.

Although dried cassava peel meal (DCPM) has been found useful as a feed ingredient in the diet meant for poultry and swine (Longe *et al.*, 1977; Obioha and Anikwe, 1982; Aina 1990 and Ogbonna, 1991), very little information is available concerning its value for the rabbit.

Maize is the major ingredient, which DCPM could replace, but a number of relative nutritional disadvantages of DCPM must be addressed for effective replacement to be achieved. Failure to do this in earlier studies on nutritive value of DCPM for rabbits has been responsible for some of the conflicting results obtained.

Consideration of optimum dietary fibre level has been one of the major aims of research in rabbit nutrition (Spreadbury and Davidson, 1978). This work was designed, therefore, to evaluate the nutritional worth of replacing maize with DCPM, in diets fed to weaner rabbits.

Materials and methods

Experimental animals and their management

Thirty weaner rabbits of mixed breeds (Newzealand White, Californian and Chinchilla) and sexes weighing 0.482 to 0.506kg were used. The rabbits were obtained from the Rabbit Unit, Teaching and Research Farm Olabisi Onabanjo University, Ago-Iwoye. They were randomly allocated to six dietary

treatments balancing for live weight, breed and sex. Each of the five animals in a group was housed individually in hutches located in an open-sided building. The dimension of the hutches were 58.0cm x 29.7cm x 41.7cm, length x breadth x height respectively.

Experimental diets

The weaner rabbits were fed six experimental diets formulated to contain 0%, 50%, 62.5%, 75%, 87.5% and 100% DCPM in replacement for maize (Table 1). Peels from a sweet cassava variety (TMS 30572) were collected fresh from local gari processors in the immediate environ. The peels were sun-dried to practical dryness on concrete platforms for 14 days and milled before being incorporated into the diets.

Feed and water were supplied *ad libitum*. During the feeding trial which lasted 56days, feed and water intake as well as faecal output were measured daily while body weight gain, efficiency and economy of feed conversion were determined weekly.

Table 1 Composition (g kg^{-1}) and nutrient contents of the experimental diets

	Levels of DCPM replacement (%) in diets					
	0	50	62.5	75.0	87.5	100
Maize	500.0	250.0	187.5	125.0	62.5	0.0
DCPM	0.0	250.0	312.5	375.0	437.5	500.0
Soyabean meal	120.0	220.0	240.0	240.0	260.0	260.0
Palm oil	0.0	30.0	60.0	90.0	100.0	110.0
Rice Husk	281.2	172.5	122.5	92.5	62.5	52.5
Blood meal	18.8	37.5	37.5	37.5	37.5	37.5
Oyster shell	10.0	10.0	10.0	10.0	10.0	10.0
Bone meal	20.0	20.0	20.0	20.0	20.0	20.0
Salt	5.0	5.0	5.0	5.0	5.0	5.0
Fish meal	40.0	0.0	0.0	0.0	0.0	0.0
Vit/Mineral Premix	5.0	5.0	5.0	5.0	5.0	5.0
	1000.0	1000.0	1000.0	1000.0	1000.0	1000.0
<i>Calculated Nutrient Content (g kg^{-1})</i>						
Crude protein	152.0	157.0	159.6	154.7	152.6	152.0
Crude fibre	108.2	131.4	130.0	151.2	137.8	188.0
DE (MJ/kg DM)	10.9	10.2	10.3	10.9	10.5	10.3

Cassava peels in rabbit diet

Table 2 *Performance characteristics of weaner rabbits fed diets containing cassava peel meal*
Level of DCPM replacement (%) in diets

	0	50	62.5	75	87.5	100	SEm
Final body weight	1.50	1.52	1.65	1.62	1.55	1.57	0.96
Daily weight gain (g)	19.10	18.40	19.80	20.30	18.80	19.70	1.66
Daily feed consumption (g)	71.00 ^a	73.00 ^{ab}	78.60 ^{b^c}	73.40 ^{ab}	80.10 ^c	79.00 ^{bc}	2.88 ^{**}
Feed conversion ratio	4.03	4.14	3.97	3.69	4.32	4.03	0.48
Daily faecal output (g)	23.50 ^a	26.60 ^{ab}	30.30 ^{ab}	27.40 ^{ab}	30.10 ^{ab}	31.80 ^b	3.22 [*]
Daily water consumption (ml)	206.60 ^a	234.60 ^{ab}	280.70 ^{cd}	261.10 ^{cd}	293.10 ^{cd}	310.50 ^d	18.94 ^{**}

*, ** Means within row with different superscripts are significantly different ($P < 0.05$; $P < 0.01$).

Chemical and statistical analyses

Samples of experimental diets were analysed for proximate components as described by AOAC (1995). All data were analysed by analysis of variance using a completely randomized design as described by Steel and Torrie (1980). Significant differences between treatment means were determined using Duncan's multiple range test (Duncan, 1955).

Results

Effect of replacement level of CPM for maize on rabbit performance

Means and standard errors for initial body weight, daily weight gain (DWG), daily feed consumption (DFC), daily water consumption (DWC), daily faecal output (DFO) and feed conversion ratio (FCR) are presented in Table 2.

Replacement of maize with graded levels of DCPM up to 100% did not affect ($P > 0.05$) DWG and FCR. Daily feed (DFC) and water (DWC) consumption were however affected by level of DCPM replacement ($P < 0.01$). Feed consumption was generally higher on diets containing DCPM compared with the control. The highest water consumption (310.5ml/day) and faecal output, DFO (31.8g/day) were recorded for rabbits on diet 6 where DCPM completely replaced maize. Daily faecal output (DFO) was generally high for rabbits on DCPM.

Rabbits on diet 6 voided more faeces ($P < 0.05$) compared with rabbits on the control and other DCPM-based diets. Beyond 50% replacement of maize with DCPM, water consumption of rabbits increased significantly more than those on the control diet.

Feed economy

The effect of dietary treatment on feed cost and economy of feed conversion to weight gain is shown in Table 3. Increasing the inclusion levels of DCPM led to a reduction in feed cost. The savings in feed cost ranged from 13.2% for diet 4 (75% DCPM replacement for maize) to 18.7% for diet 2 (50% DCPM replacement). Feed Cost/Unit live weight gain was also reduced when rabbits were fed DCPM based diets.

Discussion

The results of the current study show that DCPM could replace 100% of dietary maize without adverse effects on weight gain, efficiency of feed conversion and economy of weight gain. This is contrary to the reports of Omole and Onwudike (1982) and Esonu and Udedibie (1993). These workers observed depressions in feed intake and body weight gain when 100% and 50% of dietary maize was replaced by DCPM respectively in weaner rabbit diets.

Table 3 Feed economy of rabbits fed diets containing cassava peel meal

	Level of DCPM replacement (%) in diets					
	0	50	62.5	75	87.5	100
Feed Cost/Weight Gain (N)	63.9	53.4	53.6	50.6	59.3	53.8
Feed Cost (N/kg)	15.9	12.9	13.5	13.8	13.7	13.4
Feed Cost Saving (%)	-	18.7	15.1	13.2	13.6	15.9

In this study rabbits on DCPM based diets grew as well as those on the 0% DCPM diet, i.e. daily weight gain of 18.40g to the 20.30g for DCPM – based diets compared with 19.10g for the control diet. Feed was also converted to meat with similar efficiency. The results obtained also spotlight the positive effect of proper nutrient balancing in enhancing the nutritive value of DCPM. In their observation of growth depression in rabbits fed diets containing more than 10% crude fibre, Omole and Onwudike (1982) concluded that the crude fibre content of DCPM could have significant effects on performance when up to 40% DCPM is incorporated in the diets. Contrary to this observation however, rabbits fed the diet containing 75.0% DCPM having 15.1% crude fibre content did not show evidence of growth depression in the study. In fact, the diet promoted the most efficient gain of 20.3g/day. That DCPM could have significant effect on digestibility when it completely replaced maize is evident from the faecal output data in this study. Longe and Adetola (1983) reported that feeds containing high fibre levels are usually not well digested and result in greater bulk of excreta, because high fibre diets speed up rate of passage of digestion in the gut. The feed is thus exposed to the action of digestive enzymes for a shorter period, such that there may be a reduction in its digestibility and as a result of this, a lot of it is excreted as faeces. This observation agrees with pig feeding reports of increasing faecal output with increasing levels of fibrous feedstuffs in the diet (Kass *et al.*, 1980; Hale and Mc Cormick, 1981 and Ravindra *et al.*, 1987). The increase in water consumption by rabbits as the level of DCPM increased as observed in this study is

thought to be related to the increasing bulkiness of the diets.

Although the prime objective of incorporating under-utilized feed resources such as DCP in animals diet is usually that of reducing feed cost, it is equally important to balance such diets for nutrients. The necessity to balance DCPM based diet for energy and protein led to an increasing use of palm oil and soybean meal. The use of these two expensive ingredients led to a situation where the feed cost was slightly increased for the diets where 62.5, 75.0, 87.5 and 100% DCPM replaced maize compared with the diet where DCPM replaced 50% of the maize. Although savings in feed cost ranged from 13.2-18.7% and slight improvements in economy of gain were achieved through the use of DCPM, results from the current study suggest the need to explore cheaper alternatives for nutrient balancing (protein and energy) in order for cassava peels to be used to greater advantage in rabbit feeding.

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