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The effect of feeding cassava root meal on the performance, carcass characteristics, serum and urinary thiocyanate concentration of fryer rabbits.

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Abstract

Thirty-two, five-weeks old New Zealand White fryer rabbits were fed four diets containing 0, 15, 30 or 45% cassava root meal (CRM) in an experiment designed to investigate the utilization of CRM by fryer rabbits.

The levels of CRM fed did not adversely affect the growth rate of the rabbits, but those fed 0 and 15% CRM diets consumed significantly less ($P< 0.05$) feed than those on the 45% CRM diets. Similarly, rabbits fed the control (0% CRM) diet utilized their feed better ($P< 0.05$) than those on the CRM diets. The 15 and 30% CRM diets were utilized similarly but were superior to the 45% CRM. The serum thiocyanate concentration of rabbits fed the 0, 15, 30 and 45% CRM diets were 1.59, 1.72, 1.66 and 1.76mg/100ml respectively. Corresponding values for urine thiocyanate were 2.94, 3.15, 3.15 and 3.21mg/100ml. These values were however not significantly different. Carcass quality was similar across treatments.

Introduction

The high cost of livestock feeds particularly in the tropics has stimulated the search for cheap substitutes for grains. Earlier studies with poultry indicated that cassava, *Manihot esculenta* Crantz, has great potential as a major energy source (Enriquez and Ross, 1967; Muller and Chou, 1972). Nevertheless, the low protein content and presence of a toxic substance, hydrocyanic acid, in cassava, has hampered its use as animal feed. More recent studies (Chou and Muller, 1972) have shown that high levels of cassava could be included in pelleted poultry diets without adverse effects on performance. According to Eshiett and Ademosun (1976) the poor performance usually observed when high dietary cassava levels are fed to poultry may be due to the powdery and dusty nature of the diets.

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There is at present, no information on the utilisation of cassava root meal by rabbits. The present study was therefore designed to investigate the effect of feeding graded levels of cassava root meal on the performance of frver rabbits.

Materials and Methods

The cassava used in this study was a mixture of many local varieties. The tubers were harvested from 12-15 month-old cassava plants, peeled and the central fibrous shaft removed. The pulp was then sliced into thin flakes approximately 0.5cm thick and about 8cm long and sun-dried on concrete floors until they contained between 10 and 12½% moisture. The dried flakes were then milled to obtained the cassava root meal (CRM). Samples of the CRM were taken from time to time, pooled and the chemical composition determined (AOAC, 1975). The hydrocyanic acid content of the CRM was determined using the method of Wood (1965) as modified by Tewe (1975)

Thirty-two five weeks old New Zealand White rabbits were allocated on weight basis to four treatments using a completely randomized design. The treatment consisted to four pelletted experimental diets containing 0, 15, 30 or 45% CRM (Table 1). Samples of the diets were taken, milled and the proximate analysis determined according to the methods outlined by AOAC (1975).

The rabbits were housed in groups of four in tow cages with wire screen floors. The cages each measured 76cm x 62cm x 42cm, and were raised to a height of 90cm from the concrete floor. Feed and water were offered *ad libitum* for the experimental period of 56 days. Daily feed intake, fortnightly body weight changes, were recorded, and the feed to gain ratio calculated for the entire eight-week period. Because of group feeding, record of feed intake and efficiency of feed utilization were kept on cage basis.

During the eighth week, urine was collected from each replicate group for thiocyanate determination (Bowler, 1944). At the end of the experimental period, two rabbits per cage were sacrificed for carcass evaluation. Each rabbit was killed by cervical dislocation and the blood, skin, kidney, kidney fat, intestine, ceaca and liver were collected and weighed. The blood serum thiocyanate content was determined by the method of Bowler (1944).

The data were treated statistically by analysis of variance (Steel and Torrie, 1960) and Duncan's multiple range test was used to detect the difference between treatment means (Duncan, 1955).

Result

The chemical composition of the CRM used in this study is given in Table 2. The rate of gain did not differ significantly between treatments (Table 3). The rate of gain was particularly close among the rabbits offered the cereal-based control diet and those fed the 15 and 30% CRM diets.

The daily feed consumption increased with increasing dietary level of CRM, but was not significantly different from the control until 45% CRM had been incorporated in the diet. Rabbits offered the 15% CRM diet also consumed less ($P < 0.05$) than those fed the 45% CRM diet.

Rabbits fed the control diet utilized their feed better ($P < 0.05$) than those on the CRM diets. The efficiency of feed utilization of rabbits fed 15 and 30% CRM diets was similar, but both were superior ($P < 0.05$) to the efficiency of feed utilization of rabbits that consumed the 45% CRM diet.

There were no differences in the carcass measurements taken (Table 4). The weight of the carcass, skin, liver, kidney and the thickness of the ceacum and intestine were not significantly influenced by the inclusion of CRM in the rabbits diets. Though not consistent, nor significant, there was a general tendency for both serum and urine thiocyanate level to increase with increase in the level of CRM in the rations.

Discussion

It is postulated that the lower efficiency of the CRM diets observed in this study was due to the variation in the fat content of the diets. In order to maintain the isocaloric nature of the experimental diets, the level of palm oil was decreased progressively as the level of CRM in the diets increased. In fact, the 45% CRM diet contained no added fat. It has been reported that the addition of fat to rabbit diet improves feed conversion (Raimondi, Auxilia, Maria and Masaero, 1973: Arrington, Platt and Frank, 1974; Parigibini, Chieriocata and Lanari, 1974). Similar result has been obtained for poultry Rosenberg Baldini, Sunde and Bird, 1955).

Cassava root meal is deficient in essential fatty acids. Hudson and Ogunsua (1974) reported that the fat of cassava tuber contain 14.6% linoleic acid. This is low compared to the value of 60.8% for maize

fat (Hilditch and Williams, 1964). Omole (1977) observed that under practical conditions, linoleic acid may be submarginal in CRM diets containing low levels of yellow maize and no added fat.

In a subsequent study at this station, where 0, 15, 30 and 45% CRM were fed to fryer rabbits, the diets were modified slightly by the addition of 2% palm oil to each diet. In addition, 200g of green herbage *(Aspilia africana)* was offered every other day. There was no difference in the performance of the rabbits. In fact the usual decline in the rate of growth and feed efficiency was not evident.

Diets containing high concentration of CRM especially the 45% level did not form pellets that were as firm as those from the control diet and so the high CRM pellets crumbled more easily during feeding and were wasted more. Although efforts were made to weigh back most of the wasted feed, a slight over-estimation of the feed consumption of rabbits fed these diets is conceivable. This could also be partly responsible for the low efficiency of utilisation of these diets. It is possible that the addition of binders like mollasses will solve this problem.

The slightly higher serum and urinary thiocyanate concentration of rabbits fed the CRM rations may indicate that the hydrocyanic acid concentration of the CRM may assume greater importance in long term or reproductive studies.

It may be concluded from this study that up to 45% CRM may be incorporated in the diet of fryer rabbits without a significant decline in their growth performance.

TABLE 1: PERCENT COMPOSITION OF THE EXPERIMENTAL DIETS

Feed ingredients	*Treatments (% CRM)* 0	15	30	45
Maize (yellow)	52.45	33.50	15.00	0.00
Groundnut cake	20.00	21.00	22.45	27.00
Fish meal	4.00	4.50	5.24	6.00
Cassava root meal	0.00	15.00	30.00	45.00
Palm oil	2.50	2.00	1.50	0.00
Brewers dried grain	15.00	17.95	20.00	16.45
Rice bran	3.00	3.00	3.00	3.00
Dicalcium phosphate	2.00	2.00	1.76	1.50
Salt	0.50	0.50	0.50	0.50
Vitamin-mineral mix[1]	0.50	0.50	0.50	0.50
Ofuracin[2]	0.05	0.05	0.05	0.05
Total	100.00	100.00	100.00	100.00
Calculated analysis (%)				
D.E. (kcal/kg)	3,476	3,485	3,494	3,505
Calcium	1.47	1.53	1.49	1.47
Phosphorus (avail)	0.62	0.64	0.61	0.59
Lysine	0.90	0.94	1.29	1.06
Methionine + cystine	0.69	0.68	0.68	0.68
Determined analysis				
Crude protein	22.76	22.59	23.04	22.67
Ether extract	7.46	6.52	5.96	4.36
Crude fibre	7.15	8.67	8.38	7.98
Ash	8.22	8.75	9.07	9.17

[1] Stablized vitamin-mineral premix supplying the following per 100g of ration: Vit. A, 500,000 I.U; Vit. D, 6,600 I.U; Vit. E, 1,000 I.U; riboflavin, 440mg; calcium pathothenate, 860mg; niacin 2g; choline chloride, 2.2g; Folic acid, 15.0mg; vitamin B, 1.0mg; copper, 15ppm; iodine, 2ppm; manganese, 34ppm; zinc, 50ppm; iron, 100ppm; plus antioxidant.

[2] A commercial coccidiostat containing a nitrofurazone base

TABLE 2: CHEMICAL COMPOSITION OF THE CASSAVA ROOT MEAL USED IN THE STUDY.

Moisture (%)	12.00
Cruide protein (%)	1.90
Ether extract (%)	0.55
Crude fibre (%)	2.00
Ash (%)	3.10
Nitrogen free extract (%)	80.45
Phosphorus (%)	0.09
Calcium (%)	0.02
Free HCN (mg/kg)	19.09
Total HCN (mg/kg)	40.35

TABLE 3: THE EFFECT OF FEEDING GRADED LEVELS OF CASSAVA ROOT MEAL ON THE PERFORMANCE OF FRYER RABBITS

Parameter	*Treatments (% CRM)* 0	15	30	45	S.E. (+)
Rate of gain (g/rabbit/day)	18.25	18.53	18.52	16.72	1.49
Feed intake (g/rabbit/day)	42.02^{a}	56.43^{a}	60.54^{ab}	79.92^{b}	5.27
Feed/gain	2.63^{a}	3.05^{b}	3.26^{b}	4.78^{c}	0.07
Mortality (%)	25.00	12.50	12.50	25.00	8.84

a, b, c, Row means bearing different superscripts differ ($P < .05$)

TABLE 4: EFFECT OF FEEDING GRADED LEVELS OF CASSAVA ROOT MEAL ON THE CARCASS CHARACTERISTICS, SERUM AND URINE THIOCYANATE CONCENTRATION OF FRYER RABBITS

Parameter	*Treatments (% CRM)* 0	15	30	45	S.E (±)
Carcass yield (g/100g live weight)	47.35	50.30	48.14	47.63	1.99
Skin (g/100g live weight)	10.03	11.18	9.75	9.00	0.53
Kidney (g/100g live weight)	0.56	0.64	0.55	0.53	0.11
Liver (g/100g live weight)	3.27	3.13	2.90	2.64	0.33
Weight of 1cm intestine	0.15	0.17	0.15	0.18	0.04
Weight of 1cm ceacum	0.30	0.29	0.26	0.23	0.02
Serum thiocyanate (mg/100ml)	1.59	1.72	1.66	1.76	0.14
Urine thiocyanate (mg/100ml)	2.94	3.15	3.15	3.21	0.15

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