

NUTRIENT INTAKE AND DIGESTIBILITY OF WEANER RABBITS FED YAM PEELS REPLACING MAIZE AT DIFFERENT LEVELS

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ABSTRACT

A fifty-seven days feeding trial was conducted using weaner rabbits of mixed breed. The aim was to determine nutrient intake and digestibility by the test animals fed graded levels of yam peels replacing maize. The experiment was laid in a randomized complete block design where the dietary treatments were 0%, 5%, 10%, 15%, and 20% which were replicated thrice. Results obtained revealed significant ($P < 0.05$) differences in all variables evaluated in terms of the nutrient intake while significant ($P < 0.05$) differences were observed only in respect to the crude fibre, acid detergent fibre, and neutral detergent fibre for the digestibility indices. Crude protein intake ranged from 10.78% to 16.62% while crude fibre intake was in the range of 3.32% to 5.53%. The crude fibre, acid detergent fibre and neutral detergent fibre digestibilities were 19.59%- 68.99%, 10.65%- 39.09% and 11.52%-44.78% respectively which increased with increase in the test material. From the results obtained, it is concluded that yam peels inclusion in the diet of weaner rabbits could be as high as 20% replacing maize without any harmful effect. It is however recommended that the experimental diets be fed to other categories of rabbits with a view to evaluate the nutrient intake, digestibility and other performance variables.

Keywords: Nutrient intake, digestibility, weaner rabbits, yam peels and maize

INTRODUCTION

The increase in feed prices and the scarcity of grains and protein plant supplements are key constraints hampering the livestock sub-sector in Nigeria and in many other countries (FAO, 2006). Tewe (1988) observed that under the prevailing circumstances, it is unlikely that there will be surplus from conventional cereals and pulses upon which livestock production can develop, he therefore suggested the "waste-to wealth" approach of directing efforts towards harnessing and utilizing by-products and wastes which are not directly being utilized by Man as the most logical step. This will reduce competition with Man and ensure an efficient disposal of the waste. While a lot of feed substances have already been investigated, yam peel (*Discorea rotundata*) is another feed resource that can be used as an alternative ingredient. Yam peel is consumed fresh by sheep and goats without any adverse effect. The present study was conducted to determine the effects of various inclusion levels of yam peels in the diet of weaner rabbits replacing maize on the nutrient intake and digestibility.

MATERIALS AND METHODS

The experiment was carried out at the rabbit unit of the Livestock Teaching and Research Farm, of the Department of Animal Science, Bayero University Kano. Kano state is located at longitude 9° 30 East and 12° 30 north and

latitude 9° 30 and 8° 42 and lies within the Sudan Savannah zone (KNARDA, 2001). The house was disinfected and washed a day before arrival of the rabbits. The hutches were swept clean, the drinkers and feeders were cleaned and placed in each individual hutch. The peels were collected within 12 hours of disposal from market and were shade dried for three days, milled bagged and kept for feed formulation and analysis. Fifteen rabbits of mixed breed and sexes were obtained from the rabbit unit of the National Animal production research institute (NAPRI), Zaria. They were housed in individual cages and allowed to adapt to the environment for two weeks. After the adaptation period, they were weighed individually and allotted into five dietary treatments comprising of three replicates each. Allotment into dietary treatment was done in such a way that each treatment had one male and two females each.

Data Collection

At weekly intervals, each experimental animal was weighed and live weight recorded to monitor live weight changes. Live weight was computed as final – initial weight (g). Daily feed intake was monitored which lasted for 2 months. Intake was computed as feed offered – left over (g). The feed intake and the amount of faeces voided in the last five days were recorded daily. The faecal samples were collected from each treatment for the ten rabbits for the period of three days. The faecal samples were weighed

and shade dried until completely dried. Each of the samples was crushed using pestle and mortar, labeled and then taken to laboratory for analysis. The test ingredients and diets were analyzed for proximate composition of dry matter (DM), ash, crude protein (CP), ether extract (EE), crude fiber (CF), acid detergent fiber (ADF), nutrient detergent fiber (NDF), nitrogen free extract (NFE) as described by AOAC (2005) and Van Soest *et al.* (1991). The energy (E) content in the feed was also determined. Faecal samples were collected on each treatment and shade-dried and later mixed to get a representative sample.

Data Analysis

Data collected were subjected to Analysis of variance (ANOVA) in a Randomized Complete Block Design (RCBD). Where differences in means manifest, the LSD was used to separate means ($P < 0.05$) using the SAS (2000) package.

RESULTS AND DISCUSSION

The composition of the experimental diets is presented on Table 1 while the results obtained are presented in Tables 2, 3 and 4. Results in Table 2 revealed mean ash was significantly ($P < 0.05$) higher in animals fed 15% inclusion level (13.28%), the lowest value (5.28%) was recorded in the control based diet. Mean CP was significantly ($P < 0.05$) higher in animals fed 20% inclusion level (16.77%), the CP obtained in the present study was within the range of 16-18% as recommended by NRC (1990). These values were also reported by Aduku and Olukosi (1990) for growing rabbits. Crude fibre was significantly ($P < 0.05$) higher in animals fed 15% inclusion level (5.68%) while animals fed 20% graded levels of yam peels was the lowest (3.47%). The lower levels of crude fibre obtained in the diets of this study was probably due to crude fibre content of the yam peels. Mean ether extract values varied from 3.50% to 5.10%, and values differed significantly ($P < 0.05$) except for animals fed 5 and 20% inclusion level. NFE was significantly ($P < 0.05$) higher in animals placed on the control diet (70.96%) and lower in animals fed 15% inclusion level (65.36%). The mean ADF was significantly ($P < 0.05$) higher in control based diet (16.40%) and lower for animals fed 20% inclusion level (6.97%). The mean NDF was higher in experimental animals fed 0% yam peels (21.63%) and lower in 20% inclusion level (8.67%). Energy was found to be significantly ($P < 0.05$) higher in experimental diet containing 15% level of the test ingredient (5156.60kcal/g) and lower in the control based

diet (4868.88kcal/g). Results of nutrient digestibility presented in Table 3 revealed ash was significantly higher in animals fed 5% inclusion of yam peels (76.97%) and lower for animals without yam peels inclusion (55.50%). CP had the highest value in the control based treatment (91.18%) and least for animals offered 15% level (68.09%). CF was significantly ($P < 0.05$) higher in animals fed 5% inclusion while the lowest value was recorded in animals fed 15% (19.59%). Differences among other treatments varying significantly ($P < 0.05$), could be attributed to high crude fiber content of the shade-dried yam peels. This report is in agreement with that of Lebas (1983), who reported that an increase in crude fiber would result in increase in voluntary feed intake. There were no significant ($P < 0.05$) differences for CP, EE, and NFE. These findings could be due to the fact that digestibility of a food is influenced not only by its own composition but also by the composition of other food consumed with it (McDonald *et al.*, 1995). The inclusion of fibrous feed stuff had been reported to improve digestion in non-ruminants (Agunbiade *et al.*, 1999). Results of nutrient intake of the test animals is presented in Table 4. The ash intake was significantly ($P < 0.05$) higher in animals fed 15% inclusion level (13.13%) and lower in animals fed the control based diet (5.13%). The CP intake was highest in animals fed 20% inclusion level (16.62%) and the least was obtained in animals fed 15% inclusion level (10.79%). The CF was higher (5.53%) in animals fed 15% inclusion of yam peels and lower for animals fed 20% inclusion level (3.32%). This is as a result of high fibre content in the diet. Energy content was significantly higher in animals fed 15% inclusion level (5156.45%) and least for the control based diets (4868.73%). The diet containing 15% inclusion level of the test ingredient had the highest energy in the feed compared to other dietary treatments evaluated. According to Lebas (1983) the energy content of the diet is one of the main factors affecting the level of feed intake in rabbits.

CONCLUSION

It is concluded that the inclusion of yam peels up to 20% as a replacement for maize in the diet of weaner rabbits increases feed intake and digestibility. It is also concluded that yam peel can be used to replace maize in rabbit feed management without any adverse effect on its intake and digestibility.

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Table 1: Gross composition of experimental diets fed weaner rabbits containing yam peels at graded levels replacing maize.

Feed Ingredients	Treatments				
	A (0%)	B (5%)	C (10%)	D (15%)	E (20%)
Maize	50.0	47.5	45.00	42.50	40.00
Yam peels	0.00	2.50	5.00	7.50	10.00
Soya bean meal	15.6	15.6	15.60	15.60	15.60
Rice offal	16.0	16.0	16.05	16.05	16.05
BIDG	15.0	15.0	15.00	15.00	15.00
Bone meal	2.50	2.50	2.50	2.50	2.50
Methionine	0.30	0.30	0.30	0.30	0.30
Salt	0.30	0.30	0.30	0.30	0.30
Vitamin/mineral premix	0.25	0.25	0.25	0.25	0.25
Total	100	100	100	100	100
Calculated CP	16.5	16.5	16.57	16.68	16.67

Table 2. Chemical and fibre fraction of Experimental diets fed weaner rabbits

Parameters (%)	Treatments					LSD
	A (0%)	B (5%)	C (10%)	D (15%)	E (20%)	
Dry matter (DM)	94.34 ^a	93.15 ^b	93.60 ^b	93.25 ^b	92.20 ^c	0.657
Ash	5.28 ^d	9.98 ^b	7.18 ^c	13.28 ^a	6.92 ^c	1.53
Crude protein (CP)	13.86 ^b	12.03 ^c	14.22 ^b	10.94 ^c	16.77 ^a	1.70
Crude fibre (CF)	4.80 ^{ab}	3.63 ^{dc}	4.60 ^{bc}	5.68 ^a	3.47 ^d	0.976
Ether extract (EE)	5.10 ^a	3.50 ^c	4.23 ^{bc}	4.73 ^{ab}	3.63 ^c	0.755
NFE	70.97 ^a	70.85 ^a	69.77 ^a	65.36 ^b	69.21 ^a	3.48
ADF	16.40 ^u	10.57 ^b	8.60 ^d	9.53 ^c	6.97 ^e	0.428
NDF	21.63 ^a	12.63 ^c	15.53 ^b	11.47 ^d	8.67 ^e	0.479

Energy (kcal/g)	4868.88 ^b	4958.74 ^b	4909.42 ^b	5156.60 ^a	4902.36 ^b	100.07
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Means with different superscripts denotes significant ($p < 0.05$) difference across rows.

Table 3. Nutrient digestibility by weaner rabbits fed diets containing yam peels replacing maize at graded levels

Parameters	Treatment					LSD
	A (0%)	B (5%)	C (10%)	D (15%)	E (E20%)	
Ash	55.5	76.97	73.5	76.66	63.33	30.326
Crude protein	91.18	74.09	78.13	68.09	77.55	24.253
Crude fibre	27.86 ^b	68.99 ^a	29.58 ^b	19.59 ^b	31.45 ^b	36.994
Ether extract	93.9	88.17	96.24	92.02	91.68	11.529
NFE	77.89	79.34	82.79	66.74	79.02	17.941
ADF	39.09 ^a	10.65 ^b	22.00 ^{ab}	27.23 ^{ab}	20.82 ^{ab}	25.441
NDF	44.78 ^a	16.58 ^{ab}	35.99 ^{ab}	44.32 ^a	11.52 ^b	31.288

a,b, means within the row with different superscript shows significant difference ($P < 0.05$)

Table 4. Nutrient intake by weaner rabbits fed diets containing yam peels replacing maize at graded levels

Parameters	Treatment					LSD
	A (0%)	B (5%)	C (10%)	D (15%)	E (E20%)	
Ash	5.13 ^d	9.83 ^b	7.03 ^c	13.13 ^a	6.77 ^c	0.5453
Crude protein	13.71 ^b	11.88 ^c	14.07 ^b	10.79 ^d	16.62 ^a	0.5453
Crude fibre	4.65 ^b	3.48 ^c	4.45 ^b	5.53 ^a	3.32 ^c	0.5453
Ether extract	4.95 ^a	3.35 ^c	4.08 ^b	4.58 ^{ab}	3.48 ^c	0.5453
NFE	70.61 ^a	70.70 ^a	69.62 ^b	65.21 ^d	69.06 ^c	0.5453
ADF	15.25 ^a	10.42 ^b	8.45 ^{cd}	9.38 ^{bc}	6.82 ^d	1.9322
NDF	21.48 ^a	12.48 ^c	15.38 ^b	11.32 ^d	8.52 ^e	0.5453
Energy kcal/g	4868.73 ^c	4958.59 ^b	4909.27 ^c	5156.45 ^a	4902.21 ^d	0.5453

a,b, means within the row with different superscript shows significant difference ($P < 0.05$)