Short Communication

Performance of weaner rabbits fed graded levels of sun-dried sweet potato tuber meal (*Ipomea batatas*) diets

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Abstract

Forty weaned rabbits (8 weeks old) of mixed sexes and breeds, with an average initial live-weight of 680g, were used in a nine-week feeding trial to evaluate their performance on diets in which sun-dried sweet potato tuber meal (*Ipomoea batatas*) was included at the rate of 0, 10, 20, 30 and 40% levels in a 20% CP Iso-nitrogenous diets. Performance parameters showed that feed intake, weight gain and feed to gain ratio were not significantly different between treatments. Values obtained were poorer for the sweet potato based diets compared to the control. No mortality was recorded during the experiment. Carcass and organ weights expressed as percentage of live-weight showed no significant differences ($P>0.05$) across the treatments. It was concluded that sweet potato meal can be included up to 40% level in diets of young rabbits.

Key Words: Weaner rabbits, sweet potato, performance

Introduction

In the continuous search for means to close the dietary protein gap of rural small scale farming households, rabbit production has been identified to be of great importance (Aduku and Olukosi, 1990). Being small in size it can be afforded by most low income households (Cheeke and Patton, 1981). It has been reported that rabbits can be produced using local resources (Lebas, 1983) and therefore do not compete directly with man for available grain and legume resources as may be the case in monogastric animals.

The production of maize grain, which usually forms the bulk of diets for these classes of animals has fallen short of demand. This inadequate cereal production has justified an increasing interest for their substitution with non conventional feed ingredients in animal diets.

Sweet potato has received increased attention in past years in animal production (Yeh and Bouwkamp, 1985; Dominguez, 1992) due to a number of favourable features, such as adaptability to diverse environments and its high yielding ability (Velmurugu *et al*, 1995). It is not in much demand as maize, yam or cassava and may go into extinction if diverse use are not exploited (Hishashi *et al*, 1990). Velmurugu *et al*, (1995) suggested that sweet potato tubers can play an important role as an energy source in animal feeding in the tropics and sub-tropics. Most studies on sweet potato have indicated that it can partially replace maize in the rations of broilers (Agwunobi, 1999; Obeh and Tewe, 1992), Laying pullets (Shoremi and Job, 2000) and weaner and grower pigs (Fashina-Bombata and Fanimu, 1994). The use of sweet potato meal in Rabbit diets is still been studied. This paper

reports the performance and carcass traits of weaned rabbits fed graded levels of sun-dried sweet potato tuber meal.

Materials and Methods

Source and Processing of Sweet Potato Tubers

The fresh sweet potato tubers used for the study were purchased from Samaru market in Zaria, Nigeria. They were sliced into chips (about 5-10mm thick) and sun-dried to about 5-10% moisture content on a cement floor. Drying of the sweet potato chips were facilitated by the hamattan wind resulting in a good quality product. The dried sweet potato chips were then milled before inclusion into the experimental diets. *Experimental Diet* Five experimental diets were formulated such that Diet 1 (the control) contained maize as the main source of energy. Diets 2, 3, 4 and 5 contained sweet potato meal included at 10, 20, 30 and 40% of the diets, respectively (Table 1). The diets were iso-nitrogenous (20% CP) and were fortified with vitamins and minerals at recommended levels. Samples of the feeds and milled dried potato were assayed for proximate composition in accordance with A.O.A.C. (1990) procedures. *Experimental Animals and Design* Forty, 8-week old weaner rabbits of mixed breed and sexes with an average initial live weight of 680g were used for the experiment. The animals previously ear-tagged for identification were randomly housed in individual wire cages (40 x 60 x 40cm) on a three tier arrangement equipped with feeders and watercrs. There were eight animals per treatment in a completely randomized design. The animals were individually fed on weighed quantities of feed once daily and had free access to water. Leftover feed for each day were collected, cleaned, air-dried and weighed. The animals were weighed weekly and feed intake and weight gain determined. The experiment lasted for 63 days.

Carcass Analysis At the end of the experiment, four rabbits, randomly picked from each

treatment were slaughtered and the hot carcass weight, offals, gut and organ weights were recorded. *Statistical Analysis* The data obtained from this study were subjected to the analysis of variance and treatment means were compared using Duncan's multiple range test using to SAS (1995) computer package.

Results

The response of the rabbits to the dietary treatments are shown in Table 2. There were no significant differences ($P>0.05$) in feed intake, weight gain, feed efficiency and cost per kg weight gain between dietary treatments. Rabbits on the control diet however, performed slightly better than those on sun-dried sweet potato meal diets. There was a slight increase in cost per kg weight gain as the levels of sweet potato increase in the diets. No mortality was recorded in the course of the experiment. The carcass characteristics results (Table 3) showed no significant ($P>0.05$) difference across dietary treatments.

Discussion

The similarity in feed intake across the dietary treatments supported earlier work on broilers (Agwunobi, 1999), pigs (Fashina-Bombata and Fanim, 1994) and Rabbits (Ngodigha and Okejim, 1999) fed sun-dried sweet potato meal. It is most likely that the high soluble carbohydrate in sweet potato (Ketiku and Oyenuga, 1973) improved the palatability of the sweet potato meal diets such that their consumption was at par with the control diet. The slight but not significant ($P>0.05$) decrease in feed intake of rabbits on 40% sweet potato meal diets could be due to microbial growth common with sun drying, of sweet potato. Furthermore, this can also be attributed to the dustiness of the sweet potato meal (Oben and Tewe, 1992).

The gradual decrease in live weight gain with increasing content of sun-dried sweet potato meal is consistent with the findings of Fashina-Bombata and Fanim, (1994) and Ngodigha and Okejim, (1999) on pigs and rabbits respectively. The reduced body weight gain of rabbits fed on the sweet potato diets compared to the control maize based diet could be an indication of the superiority of maize grain in promoting weight gain than sweet potato. Rate of gain is closely related to dietary intake of nutrients particularly protein and energy (Fetuga *et al*, 1975). At 40% level of inclusion, sun-dried sweet potato meal slightly depressed ($P>0.05$) feed intake and this would have affected the level of nutrient intake to bring about the decrease in weight gain of rabbits on that treatment.

The results of the feed conversion ratio are commensurate with that of feed intake as would be expected. Although the dietary fibre levels (Table 1) were within the tolerable level for rabbits, there was a slight increase in the levels of dietary fibre with increase in the levels of sun-dried sweet potato. This might have a slightly depressing effect on the utilization of the feed nutrients.

The results showed that in terms of feed cost per kg live weight gain, there was no beneficial effect of replacing maize with sweet potato meal. This is in agreement with the findings of Obeh and Tewe (1992) and Ngodigha and Okejim (1999) who observed increase in the cost to produce a unit gain with increase in the level of sweet potato in poultry and rabbit diets respectively. The higher feed cost per unit gain observed could be a reflection of the higher market value for sun-dried sweet potato compared with the price of maize around Zaria where this ingredient was obtained. The time (off season for sweet potato) of the study and also the source of procurement could also be another reason for the higher feed cost per unit gain. However, sweet potato could be a more readily available and cheaper source of carbohydrate if rightly sourced during the on season. Obeh and Tewe (1992) had earlier observed a further reduction in production cost below the control diet when sweet potato was cultivated by the farmer. The carcass data (Table 3), showed no significant differences between treatments. This observation agrees with the trend of the growth performance (Table 2).

Table 1. *Composition of Experimental Diets*

Ingredients	Inclusion Levels of Sweet Potato (%)				
	0	10	20	30	40
Maize	48.75	36.28	23.82	11.73	1.07
Potato	0.00	10.00	20.00	30.00	40.00
Soyabean	38.15	40.62	43.08	45.17	45.83
Wheat offal	10.00	10.00	10.00	10.00	10.00
Limestone	0.50	0.50	0.50	0.50	0.50
Bone meal	2.00	2.00	2.00	2.00	2.00
Salt	0.50	0.50	0.50	0.50	0.50
Vit Premix ^a	0.10	0.10	0.10	0.10	0.10
Total	100	100	100	100	100
Calculated Analysis					
Crude Protein %	20.00	20.00	20.00	20.00	20.00
Metabolizable Energy					
ME (Kcal/Kg)	2840.13	2805.20	2825.14	2835.69	2859.23
Dry matter	93.85	94.13	94.45	94.66	94.83
Crude protein	20.07	21.03	21.31	20.18	20.06
Crude fibre	4.41	4.49	4.97	5.04	5.89
Ash	5.76	5.76	4.46	4.95	4.61
Ether extract	8.33	7.85	7.76	7.61	8.66
Nitrogen free extract	61.43	61.06	61.50	62.22	60.78

^a**Premix:** Roche Vm 502 contributed the following per kg of diet. Vitamin A, 12000 I.U, Vitamin D3, 1200 I.U. Vitamin E 3.6 I.U, Vitamin K, 1.8mg. Vitamin B₂, 3.6mg. Nicotinate 18mg, calcium -d- Panthothenate, 9.6mg. Biotin, 0.36mg. Vitamin, B₁₂, 0.12mg, Choline chloride, 120mg, chlortetracycline, 4.8mg manganese 124mg, iron 48mg, Zinc 96mg, copper 60mg, iodine 1.8mg cobalt 48mg.

Table 2: *Response of Rabbits to Graded Levels of Sweet Potato Meal*

	Inclusion Levels of Sweet Potato Meal					SEM	
	0	10	20	30	40		
Initial Weight (g)	650	675.00	700.00	675.00	700.00	65.2	NS
Final Weight (g)	1487.50	1480.00	1482.50	1455.00	1355.00	84.2	NS
Average Daily Weight Gain (g)	13.38	13.36	13.34	12.22	10.99	2.09	NS
Average Daily Feed Intake (g)	56.27	53.49	53.12	53.85	47.58	5.24	NS
Feed to Gain Ratio	4.37	4.23	4.21	4.52	5.02		
Costs/kg feed (₦)	20.00	20.05	20.12	20.32	21.85	0.16	NS
Cost/Kg Gain in Weight (₦)	87.75	89.00	90.25	96.25	113.75	11.7	NS
Mortality %	0	0	0	0	0		

*NS – Non Significant difference ($P>0.05$).

Sweet potatoe tuber meal in rabbit diets

Table 3: Comparison of Carcass Traits of Rabbits Fed Sweet Potato Based Diets

Parameters	Inclusion Levels of Sweet Potato Meal					SEM	
	0	10	20	30	40		
Live weight (g)	1487.50	1480.00	1482.50	1455.00	13.55.00	32.30	NS
Carcass Weight (g)	1090.00	1070.00	960.00	870.00	860.00	30.40	NS
Dressing Percentage	58.00	58.67	52.67	54.67	56.00	11.69	NS
Liver wt (% live-wt)	3.52	3.80	3.79	3.50	3.16	0.28	NS
Kidney wt (% live wt)	1.59	1.52	1.72	1.78	1.79	0.28	NS
Heart wt (% live wt)	0.81	0.77	0.68	0.78	0.76	1.15	NS
Lung wt (% live wt)	1.40	1.52	1.55	1.30	1.27	0.21	NS
Head wt (%live wt)	9.67	9.63	9.97	9.26	9.08	0.34	NS
Feet wt (% live wt)	3.21	3.04	3.44	3.07	2.77	0.23	NS
Length of intestine (cm)	278.50	272.00	251.00	269.00	281.00	16.9	NS

*NS – Non significant difference ($P>0.05$).

In conclusion, the high cost of feed per unit gain observed on rabbits fed with the sun dried sweet potato meal notwithstanding, sun-dried sweet potato can be included up to 40% level in diets of weaner rabbits without adverse effect on performance. Procurement of the sweet potato during the on season or better still on-farm production of the potato for inclusion in rabbit diets may result in cost effectiveness. Cultivation of the potatoes by the farmers could also have an added advantage of supplying sweet potato leaves and vines as supplement for the rabbits.

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