THE EFFECT OF REPLACING MAIZE WITH DRIED SWEET POTATOES ON THE PERFORMANCE OF LAYERS

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ABSTRACT

Sweet potato was incorporated into layers diet to replace 0, 5, 10, 15 and 20 per cent levels of maize respectively. The effect on the performances of 26-week old pullets for 10 weeks was studied. Replacement of maize with dried sweet potato up to 20% in layers ration, did not have an appreciable effect on feed intake, weight gain, total egg production, egg weight and feed conversion, as the apparent differences were not significant.

Key Words: Layers, sweet potatoes, maize substitute, performance.

INTRODUCTION

Sweet potatoes are utilized in many forms as livestock feed. They are fed raw, cooked, as silage or in dehydrated form. Results from various studies (Rosenberg and Sen, 1952; Yoshida and Morimoto, 1959; Edmond and Ammerman (1971), Job *et al* , 1979 and Oboh, 1986) point to dehydrated sweet potato as being fairly suitable as partial replacer for maize in livestock diets. Lee *et al* , (1973), showed that dehydrated sweet potato chips had approximately 87% of the feeding value of maize, when supplemented with either soyabean cake or a yeast-mixed feed. Gohl (1975) reported that dehydrated sweet potatoes had approximately 90% of the feeding value of maize, when constituting up to 60% of the ration.

Comparative studies of sweet potato with other roots and tubers (Gerpacio *et al* , 1974; Fetuga and Oluyemi, 1976; Lee *et al* , 1977; Cerning-Beroad and Dividich, 1977) in-

dicated that sweet potato could compare favourably as replacement for maize.

The present study is designed to contribute to the existing knowledge on the utilization of sweet potato, through evaluation with performance of layers.

MATERIALS AND METHODS

Forty layers (of the Golden Hubbard strain and 26 weeks old) were randomly allocated into five dietary treatments. The treatments were replicated twice, each with 4 birds. There were five diets in which 0, 5, 10, 15 and 20% sweet potato replaced maize (Table 1). The sweet potato tubers used in the experiment, were harvested fresh from the International Institute of Tropical Agriculture (IITA), Ibadan. The tubers were chopped into pieces, dried in the sun for eight to ten days, then milled into particle size suitable for chicken.

During the 10-week experimental period,

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all the pullets were housed in battery cages, where they were fed the experimental diets, *ad libitum*. They had free access to water daily. Weekly records of feed intake, changes in body weight, mortality, total egg production and egg weight were kept. Samples of each diet were obtained for chemical analysis (Table 2) using the methods of A.O.A.C. (1975).

The data obtained were analysed statistically using analysis of variance (Snedecor and Cochran, 1967).

Table 1
Composition of Diets

Ingredients	% Maize Replacement with Sweet Potato				
	0	5	10	15	20
Maize	68.20	64.79	61.38	57.97	54.56
Sweet potato	—	3.41	6.82	10.23	13.64
Groundnut cake	10.93	10.93	10.93	10.93	10.93
Fish meal	6.00	6.00	6.00	6.00	6.00
Brewers grain	4.77	4.77	4.77	4.77	4.77
Oyster shell	5.70	5.70	5.70	5.70	5.70
Bone meal	4.00	4.00	4.00	4.00	4.00
Common salt	0.30	0.30	0.30	0.30	0.30
Vitamin supplement (Minovit super) ¹	0.10	0.10	0.10	0.10	0.10
Total	100.00	100.00	100.00	100.00	100.00

1. Minovit Super by Intervet International B V Boxmeer, Holland. Composition 1000g⁻¹: vitamin A, 7500000 I.U., vitamin D3 1500000 I.U.; vitamin B1, 1000mg; vitamin B2, 2750mg; vitamin B12, 5mg; D-calcium panthethenate, 5000mg; vitamin E, 2500mg; vitamin K, 1500mg; niacin, 12500mg; chlorine chloride, 60000mg; ethoxyquin, 5000mg; manganese chloride, 600000mg; potassium iodide, 353mg; cobalt sulphate, 286mg; zinc oxide, 12500mg; copper oxide, 1283mg; ferro carbonate, 20323mg.

Table 2
Proximate composition of experimental diets

Constituent (%)	% Maize replaced with sweet potato				
	0	5	10	15	20
Dry matter	89.000	90.80	91.10	89.10	89.60
Crude protein	20.16	20.47	20.20	20.38	19.78
Crude fibre	5.06	6.60	6.32	5.05	4.63
Ether extract	2.42	2.42	2.75	2.69	2.51
Ash	10.67	13.11	13.46	11.67	13.08
Nitrogen free extract	61.70	57.39	57.27	60.20	60.00

RESULTS AND DISCUSSION

Table 3 presents the performances of pullets on the test diets.

Though birds on diets 4 and 2 (15% and 5% levels of replacement respectively) had higher feed intakes than birds on other treatments; variations observed were not however significant.

Differences observed among the average egg weights were not significant as well. Birds on treatments 4 and 2 still maintained higher values. There was not any noticeable grade difference among the eggs due to treatment effect. Since egg size is believed to vary with age and strain of birds (Oluyemi and Roberts, 1981), since the experimental birds were both of the same age and strain, the close values could be attributed to high degree of utilization of sweet potato and maize to the same extent.

Table 3
Performance of layers on the experimental diets

Parameters	% Replacement of maize with sweet potato				
	0	5	10	15	20
Average initial liveweight (g)	1800	1745	1720	1860	1765
Average final liveweight (g)	1865	1875	1790	1970	1820
Average daily feed intake (g)	101.66	107.22	100.65	116.28	100.32
Average daily weight gain (g)	0.93	1.86	1.00	1.72	1.08
Total egg production	414	417	398	435	397
Average egg weight (g)	52.98	54.75	54.11	56.03	53.01
Feed conversion ratio (feed/egg weight)	1.92	1.97	1.86	2.08	1.89

n.s. = not significant ($P < 0.05$).

The feed conversion in this study was calculated for layers as the amount of feed taken per weight of egg produced. Differences occurring among the treatment means were not significant. This suggests that the diets were not significantly different, nutrient-wise, and were utilized to the same extent. The poorer values recorded for birds on treatments 4 and 2 could be related to the size of the birds and/or their rate of egg production. Generally, large birds and those with faster rate of egg production, consumed more to meet the extra demand for production. But, according to McDonald *et al.*, (1966), no function, not even body maintenance can be said to have absolute priority

for food energy. Therefore, the extra feed intake might tilt towards either extra body maintenance requirement or the compensation for extra egg production. It seems that the former was the case for the birds on treatments 4 and 2. That is, they had more of their extra feed intake used to meet the requirement for their larger size. In essence, they had a lower proportion of the extra feed intake going into egg production, thus leading to the poorer feed conversion as observed. No mortality was recorded among the 40 layers during the 10-week period of treatment.

The results obtained in the present study indicate that the replacement of maize with

dried potato up to 20% are meaningful and suitable for layers.

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