PERFORMANCE OF GUINEA FOWL BREEDERS FED VARYING LEVELS OF CYPERUS BULB

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ABSTRACT

Feeding between 0.00 and 54.55 percent of *Cyperus* bulb in guinea fowl diets resulted in significantly ($P<0.05$) different body weight gain, feed intake, egg production and egg weight. Mean weekly body weight gain was significantly ($P<0.05$) higher in birds fed rations containing between 0 and 41% of *Cyperus* bulb than those on ration containing 54.55% of *Cyperus* bulb. Males on rations containing between 0 and 41% of *Cyperus* bulb had significantly ($P<0.05$) higher weight gains than their female counterparts fed the same rations. Feed intake decreased significantly ($P<0.05$) with increased inclusion of *Cyperus* bulb. Weekly feed intake was however significantly ($P<0.05$) lower in male birds on rations 1 and 2 than those on 3 and 4.

The percentage of cocks in semen production ranged from 69.3 to 73.2% and was not significantly affected by ration. Egg weight and egg production became significantly ($P<0.05$) lowered as maize was replaced with *Cyperus* bulb though production on rations 1 and 2 were statistically similar.

The differences in nutrient digestibility and nitrogen retention are probably responsible for the varying performances. The results indicate that except for semen production and feed intake in the male, the other parameters were adversely affected by *Cyperus* bulb inclusion.

Key Words: Guinea fowl; levels; cyperus bulb; feeding.

INTRODUCTION

Earlier studies (Ayorinde, *et al.* 1986) have shown that *Cyperus* bulb, a plant cherished by wild guinea fowls, can economically replace 30, 20, 50, and 75 percent of yellow maize in the diets of guinea fowl starter finisher, grower and adult respectively without significantly affecting body weight. Apart from body

maintenance however, poultry breeders require additional nutrients for egg or semen production. In the normal breeder mash, the bulk of the energy is supplied by either yellow maize or guinea corn. These grains are seriously being competed for by both livestock and man in Nigeria. There is therefore the need to search for alternative energy

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source in place of grains in the livestock rations.

While a suitable energy source that is solely used by livestock has not been found, there is presently no report on the utilization of *Cyperus* bulbs as food by man. The present work was therefore designed to test the effect of feeding rations in which between 0 and 100 percent of the yellow maize has been replaced with dried *Cyperus* bulb on performance of guinea fowl breeders.

MATERIALS AND METHOD

A total of one hundred and eighty (180) 28 weeks old guinea fowls (120 females and 60 males) was put in battery cages two months (February) before the onset of rainy season when normal reproductive cycle in guinea fowl starts. The birds were randomly divided into five groups of 36 birds per treatment (24 females and 12 males). Each group was replicated three times (8 females and 4 males per replicate). Two birds were housed in each of 18" x 16" x 14' cages

Water and feed (Table 1) in which between 0 and 100 percent of the yellow maize was replaced with dried finely ground *Cyperus* bulb were provided *ad libitum* for each replicate throughout the experimental period.

Weekly record of body weight gain, feed intake, egg weight and number of cocks in semen production in each treatment were kept over the 28 week experimental period. Semen collection was twice weekly (Tuesdays and Fridays) by the double handed massage method (Gordon, 1979).

Digestibility trials were done in the 20th week of experimentation. Faecal droppings were collected from five birds of each sex per treatment over a period of five days. Each daily collection was

weighed and dried in the oven at 60°C to constant weight. The bulk from each treatment was finely ground and samples taken for analysis. The faecal droppings, maize, *Cyperus* bulb and feed were analysed for moisture, ash, crude protein, crude fibre, and ether extract by the methods of AOAC (1980). Metabolizable energy was obtained from published equation (Summers *et al.* 1988).

The data for body weight gain and feed intake were statistically analysed using a 2 x 5 factorial design (Steel and Torrie, 1980). The statistical model is

$$X_{ijk} = U + T_i + S_j + TS_{ij} + e_{ijk}$$

where U = common mean.
 T_i = treatment effect
 S_j = sex effect
 TS_{ij} = treatment x sex interaction
 e_{ijk} = uncontrollable environmental variations.

The data for egg production and number of cocks in semen production were analysed using the randomised block design (Steel and Torrie, 1980). The paired t-test was used to test for statistical significance between mean egg weights.

RESULTS AND DISCUSSION

Chemical composition

Weight by weight replacement of maize with dried *Cyperus* bulb was observed to result in decreased crude protein, ether extract, metabolizable energy and nitrogen free extratives (NFE), since the *Cyperus* bulb (Table 1) had lower values of these nutrients than maize. However since *Cyperus* bulb contained higher levels of ash and crude fibre than maize,

Table 1:

PERCENT AND PROXIMATE COMPOSITION OF
EXPERIMENTAL RATIONS

Ingredient	Rations				
	1	2	3	4	5
Maize	54.55	40.90	27.28	13.64	0.00
<i>Cyperus</i> bulb**	0.00	13.65	27.27	40.91	54.55
Groundnut cake	11.80	11.80	11.80	11.80	11.80
Fish meal	3.60	3.60	3.60	3.60	3.60
Wheat offal	20.00	20.00	20.00	20.00	20.00
Bone meat	2.00	2.00	2.00	2.00	2.00
Oyster shell	7.50	7.50	7.50	7.50	7.50
Salt	0.30	0.30	0.30	0.30	0.30
Zoodry 30IM*	0.25	0.25	0.25	0.25	0.25
Determined					
NFE (%)	52.1	52.8	48.2	47.9	44.7
DM (%)	87.4	89.4	86.9	88.0	87.1
Ash (%)	11.5	12.9	14.7	16.7	18.9
Crude protein (%)	16.9	16.3	16.3	16.0	15.6
Ether extract (%)	1.86	1.9	1.5	1.3	1.2
ME(Kcal/kg	2712	2695	2635	2596	2555

*Zoodry 301—M a vitamin/trace mineral Antioxidant premix (Koffolk 1949 Ltd) Contains per kg. Vit. A 8,000,000 I.U., Vit. E, 3,000 I.U., K3—KASTAB. 200mg., B2—Riboflavin 3,000mg., Cobalamin, 8mg., Choline chloride, 150,00mg., Antioxidant, 125,000mg., Fe. 25,000mg., Mn. 80,000mg., Zn. 50,000mg., Cu 2000mg., I. 1,200mg. Co. 200mg., Se. 100mg.

** The dried *Cyperus* bulbs used in this study contained: 90.45% dry matter, 6.81% crude protein, 2.53% Ash, 6.90% crude fibre, 1.48% Ether extract, 3528 kcal Gross Energy/Kg, 0.48% calcium, 0.10% phosphorus.

the levels of these nutrients rose as more maize was replaced. The yellow maize used in this study contained 89.30% dry matter, 10.80% crude protein 2.5% crude fibre, 2.7 ether extract, 1.4% ash 0.96% Ca and 0.21% P.

Nutrient Digestibility

The nutrient digestibility coefficients of birds fed the diets containing varying levels (0 to 54.55 percent) of *Cyperus bulb* are shown in Table 2. Except in the control ration, the females significantly ($P<0.05$) utilized a better fraction of the dry matter content of the feed than the males. There were also significantly ($P<0.05$) higher digestibilities of the dry matter content of diet containing *Cyperus bulb* (Table 2) than the maize based control.

Crude fibre digestibilities decreased with increased level of *Cyperus bulb* in the diets and was not sex influenced. The poorer digestibilities of the fibre in rations with high inclusion of *Cyperus bulb*, hence high crude fibre (Table 1), was probably due to more rapid passage of the bulky feed through the birds' gastro intestinal tract and the absence of cellulose digesting enzymes in birds.

The fat content of the diets was however more highly digested by the females and was lowest in ration 3. The guinea hens were able to retain more of the nitrogen fraction than the cocks fed same diet (Table 2). Also, the birds were able to retain more of the nitrogen contained in diets with lesser amount of *Cyperus bulb*.

A summary of the performance of the birds fed diets containing varying levels of *Cyperus bulb*, is shown in Table 3. Unlike in a previous report (Ayorinde *et al*, 1986) body weight gain was significantly ($P<0.05$) affected by feeding diets containing varying levels of dried

Cyperus bulb. In both sexes combined and in the male the birds fed diets containing 54.55 percent *Cyperus bulb* that is no maize at all had significantly ($P<0.05$) lower body weight gains than the other four rations. In females, incorporating to 40.91 percent of *Cyperus bulb* in the diet significantly ($P<0.05$) lowered body weight gain. The males, except those fed the ration without maize had higher weight gain than females fed the same diets. The decreased weight gain as more maize was replaced was probably due to the lowered digestibilities and nitrogen retention (Table 2).

Though feed intake decreased with inclusion of *Cyperus bulb* in the female and the sexes combined, it increased in the male up to the 75 percent maize replacement level (Table 3). The differences in feed intake between rations and sexes were also significantly ($P<0.05$) different. The increased feed intake with maize replacement was probably due to lower energy content of the feeds as animals tend to consume more of diets containing lower energy so as to meet energy requirements. However the results of the feed intake tend to indicate that the females were probably not very sensitive to the energy content in the feed as feed intake decreased significantly ($P<0.05$) with lower energy. The progressive lowering of the feed intake by the females also probably indicates that guinea hens were more sensitive to the fibre content of their feed and as such tended to consume less of the bulk and probably less palatable feed than the males.

Egg production and egg weight were significantly ($P<0.05$) lowered when maize was replaced with *Cyperus bulb* in the diets of guinea fowl breeders (Table 3). However, unlike egg weight,

Table 2
NUTRIENT DIGESTIBILITY COEFFICIENTS (%) BY GUINEA
FOWL BREEDERS FED DIETS CONTAINING VARYING LEVELS
OF DRIED *CYPERUS* BULB

Parameter (%)	1		2		3		4		5	
	M	F	M	F	M	F	M	F	M	F
Dried matter	56.72 ^a	37.40 ^b	75.44 ^b	89.20 ^a	69.64 ^b	64.26 ^a	72.06 ^b	90.68 ^a	74.68 ^b	87.4 ^a
Crude Fibre	58.53	51.75	52.30	52.37	43.59	42.55	34.26	49.93	45.96	43.60
Ether extract	55.89 ^b	74.16 ^a	56.59	54.53	47.95	49.26	61.76 ^b	76.10 ^a	56.00	54.80
Nitrogen retention	55.52	55.48	51.71	44.15	47.40 ^a	33.50 ^b	53.47 ^a	34.60 ^b	36.60	35.28

Figures in the same row (within ration), bearing similar letter superscript are not significant ($P>0.05$).

Table 3

**PERFORMANCE OF MALE AND FEMALE GUINEA FOWL
BREEDERS FED DIETS CONTAINING VARYING LEVELS
OF DRIED *CYPERUS* BULB**

Parameter	Sex	Rations		3	4	5
		1	2			
Weekly body weight	Combined	11.93 ^a	9.17 ^a	7.71 ^a	9.19 ^a	0.08 ^b
	SE	7.96	2.11	1.67	2.62	0.98
gain (g)	Female	8.25 ^a	5.00 ^a	5.33 ^a	2.50 ^b	1.67 ^b
	SE	1.67	0.96	1.11	0.86	1.57
	Male	15.35	12.33 ^a	10.08 ^a	14.17 ^a	1.83 ^b
	SE	3.25	3.46	2.98	3.67	0.65
Weekly feed intake (g)	Combined	808 ^a	735 ^{ab}	742 ^{ab}	783 ^{ab}	681 ^b
	SE	94	95	110	98	114
	Female	945 ^a	758 ^b	645 ^b	678 ^b	681 ^b
	SE	89	68	117	94	105
	Male	672 ^a	712 ^b	850 ^a	888 ^a	770 ^{ab}
	SE	101	122	98	78	104
Cocks in semen production (%)		73.17 ^a	66.67 ^a	73.19 ^a	69.27 ^a	73.10 ^a
	SE	6.93	7.76	5.89	8.11	4.97
Mean egg production (number)		50.20 ^a	48.19 ^a	34.00 ^{ab}	22.81 ^{bc}	4.20 ^c
	SE	5.46	6.32	4.48	3.97	2.62
Mean egg weight (g)	83.	38.55 ^a	37.93 ^a	35.01 ^b	34.98 ^c	31.45 ^d
	SE	2.97	3.64	2.98	2.70	3.96

Figures in the same row with identical letter superscripts are not significant ($P > 0.05$) ($P < 0.05$).

S.E. = Standard error.

egg production in birds fed diets in which 0 to 50 percent of the maize was replaced with *Cyperus* bulb (rations 1 to 3), did not differ significantly. Birds fed rations 1 to 3 laid significantly ($P < 0.05$) more eggs than those on ration 5 (100 percent maize replacement). The control birds (ration 1) also laid significantly

($P < 0.05$) more eggs than those on ration 4 (75 percent maize replacement). Egg weights in the five rations, except 3 and 4, differed significantly ($P < 0.05$) from each other.

In spite of the replacement of maize with *Cyperus* bulb, semen production in the guinea cocks (Table 3) was not signi-

ificantly influenced by diet. Infact, there were as many cocks producing semen on diets containing high levels of *Cyperus* bulbs as on those fed the maize based control.

The differences in nutrient digestibility and nitrogen retention are probably responsible for the poorer performance (lower body weight gain egg production and egg weight) of birds fed diest containing *Cyperus* bulb. Since body weight, feed intake and egg size are normally positively correlated, it is possible that the higher feed intake and egg weight of birds fed lower amounts of *Cyperus* bulb is on account of the heavier bodies. As egg numbers alone can account for as much as 90 percent of the variation in economic returns (Johansson and Rendel, 1972), diets of guinea hens should not contain more than 13.65 percent of *Cyperus* bulb. The cocks can however be fed rations containing as much as 40.91 percent *Cyperus* bulbs and about 13.65 percent of yellow maize as both semen production and body weight gain were not reduced appreciably.

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