CRUDE PROTEIN REQUIREMENTS OF GUINEA FOWL KEETS (*NUMIDA MELIAGRIS GALEATA*, PALLAS) IN THE TROPICS

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ABSTRACT

Guinea fowl of both sexes were fed from 0 to 8 weeks on protein level ranging from 18 to 26% using constant energy concentration of 3000 kilocalories/kg diet. At the end of the experimental period, keets on 24 and 26% protein levels with liveweights of 854 and 867.3g respectively were significantly heavier than keets on the other diets. Keets on these two rations showed no significant differences in the final liveweights, liveweight gains and feed consumption. However, it appeared from the result that feed consumption was related to growth rate. The feed/gain ratio was significantly better for keets that received 24% protein level than for those on 26% protein. But feed/gain ratios generally tended to be inversely related to growth rate.

On the basis of this study it is recommended that the diet of guinea fowl keets in the tropics should not contain less than 24% crude protein for optimal results.

Key words: Crude Protein; Requirement; Guinea Fowl Tropics

INTRODUCTION

Current information on nutrient requirements of guinea fowl was reviewed by Olomu (1983). Few studies carried out elsewhere indicate that protein requirement of guinea fowl during the starter phase (0 — 4 weeks) is higher than that of chicken (Fracazani, 1966, Anonymous, 1974, Kivimae and Pamlenyi 1975, Blum *et al.*, 1975, Hughes and Jones, 1980). Fracazani (1966) recommended 25% protein from day old to 60 days of age while Kari *et al* (1978) recommended 24% protein from day old to 56 days of age. Auxillia (1969) found protein level of 22% adequate for 0 to 12 weeks of age. Ayeni *et al* (1983), working in Nigeria, recommended protein level of 20 — 24% for guinea fowl keets 0 — 8 weeks of age and 18 — 20% protein for growers. Obioha and Okonkwo (1983) concluded from their experiments that the protein require-

ment for guinea fowls aged 12 — 20 weeks was 14 — 16%. Most of these experiments were carried out at the energy level of 2800 — 3000 kcal/kg. The purpose of the present experiment was to study the effect of varying levels of protein at constant energy concentration of 3000 kcal/kg on body weight, rate of gain, feed consumption and feed efficiency of guinea fowl keets under tropical environment.

MATERIALS AND METHODS

The climatic circumstances under which the experiment was carried out has been described earlier (Knudsen and Sohael, 1970; Njike, 1981). The experiment involved 300 day old pearl keets obtained from our hatchery. The keets were randomly divided into five equal groups of 60 and each group of 60 was further divided into three sub-groups representing three replicates. The five groups were fed each

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TABLE 1

Ingredient	Percentage Composition of the Rations				
	1	2	3	4	5
Maize	76.9	70.3	63.4	56.4	51.9
Groundnut Cake	11.00	17	23.0	29.0	33.0
Fishmeal	5.0	5.0	5.0	5.0	5.0
Brewers dried yeast	3.0	3.0	3.0	3.0	3.0
Bone meal	3.0	3.0	3.0	3.0	3.0
Palm Oil	—	0.6	1.5	2.5	3.0
Premix*	0.2	0.2	2.0	0.2	0.2
Salt	0.25	0.25	0.25	0.25	0.25
Oyster shell	0.4	0.4	0.4	0.4	0.4
Methionine	0.25	0.25	0.25	0.25	0.25
Calculated Protein (%)	18	20	22	24	26
Determined Protein (%)	17.75	20.46	22.21	23.67	25.77
Calculated Energy (Kcal/kg)	3000	3000	3000	3000	3000

*Premix is a vitamin/mineral mixture supplying the following nutrients per kg diet: Vitamin A., 11,785.5 IU; D, 1964.3 ICU; Riboflavin, 5.40mg; Pantothenic acid 9.82mg; Nicotinic acid, 24.55mg; Folic acid, 0.98mg; Choline Chloride, 147.32gm; Vitamin E, 4.91 units; Vitamin K, 2.20mg; Vitamin B12, 0.01mg; Methionine, 245.53mg; Cobalt, 1.23mg; Iodine, 0.98mg; Copper, 9.82mg; Manganese, 55.00mg; Zinc, 49.11mg and Iron 19.64mg.

TABLE 2

Average weekly live-weights (g) of guinea fowls on different levels of dietary proteins

Weeks	Diets				
	1	2	3	4	5
1	53.2 ^a	51.1 ^a	54.0 ^a	55.4 ^a	58.0 ^b
2	77.3 ^a	81.3 ^a	89.4 ^{bc}	94.6 ^{cd}	102.0 ^{de}
3	113.0 ^a	128.2 ^b	137.6 ^{bc}	144.3 ^{bc}	163.0 ^d
4	170.0 ^a	196.6 ^b	205.2 ^b	227.2 ^c	269.0 ^d
5	234.2 ^a	271.3 ^b	302.5 ^{bc}	336.4 ^{cd}	382.2 ^c
6	309.4 ^a	374.4 ^b	415.5 ^b	477.9 ^c	526.2 ^d
7	309.6 ^a	493.6 ^b	557.6 ^c	644.0 ^d	676.2 ^d
8	505.9 ^a	596.3 ^b	704.7 ^c	854.0 ^d	867.3 ^d

Means in horizontal rows followed by the same superscripts are not significantly different from one another ($P < 0.05$).

of the five diets formulated to contain 18, 20, 22, 24 and 26% crude protein on air dried basis. The composition of the diets is shown in Table 1. The keets were all housed in floor brooder pens; both the feed and water were provided *ad libitum*. Heat was provided for the first four weeks.

Feed consumption and body weight data were determined on daily and weekly basis respectively. The experiment lasted for 8 weeks and the data collected were analysed according to the procedure outlined by Steel and Torrie (1960). The statistical significance of mean differences was determined by the use of Duncan's Multiple Range Test (Duncan, 1955).

TABLE 3
Average weekly feed consumption (g) of guinea fowls on different levels of dietary proteins

<i>Weekly</i>	<i>Diets</i>				
	1	2	3	4	5
1	23.8 ^b	19.5 ^a	25.9 ^b	28.5 ^{bc}	35.5 ^d
2	33.8 ^a	45.9 ^b	63.2 ^c	71.7 ^d	96.1 ^e
3	52.2 ^a	90.7 ^b	98.9 ^{bc}	108.1 ^{cd}	131.2 ^e
4	108.6 ^a	134.5 ^b	146.2 ^b	187.6 ^c	255.3 ^d
5	139.7 ^a	153.3 ^b	203.4 ^c	263.2 ^d	286.4 ^e
6	162.4 ^a	220.6 ^b	254.2 ^c	336.8 ^d	391.8 ^e
7	226.7 ^a	312.3 ^b	395.1 ^c	440.4 ^d	442.5 ^d
8	244.6 ^a	273.2 ^a	406.1 ^b	594.0 ^c	602.0 ^e

Means in horizontal rows followed by the same superscripts are not significantly different from one another ($P < 0.05$).

TABLE 4
Average weekly liveweight gains (g) of guinea fowls on different dietary protein levels

<i>Weeks</i>	<i>Diets</i>				
	1	2	3	4	5
1	20.2 ^a	18.2 ^a	20.9 ^a	24.4 ^b	25.0 ^b
2	24.1 ^a	30.2 ^b	35.4 ^b	39.2 ^{cd}	44.0 ^d
3	35.7 ^a	47.0 ^b	48.2 ^b	49.7 ^b	61.0 ^c
4	57.0 ^a	68.3 ^b	67.6 ^b	82.9 ^c	106.0 ^d
5	64.2 ^a	74.7 ^b	97.3 ^c	109.2 ^{cd}	113.2 ^d
6	75.2 ^a	103.1 ^b	113.0 ^b	141.1 ^c	144.0 ^c
7	100.2 ^a	119.2 ^b	142.1 ^b	166.1 ^d	150.0 ^c
8	96.3 ^a	102.7 ^a	147.1 ^b	210.0 ^c	191.1 ^c

Means in horizontal rows followed by the same superscripts are not significantly different from one another ($P < 0.05$).

RESULTS

The summaries of the mean weekly body weight, feed consumption, liveweight gain and feed/gain ratio appear in Tables 2 to 5 respectively while Table 6 shows the cumulative body weight, feed consumption, liveweight gain and feed/gain ratio of the keets on different dietary treatments at 8 weeks of age. Mean weekly feed intake (Table 3) was significantly affected by the dietary treatments ($P < 0.05$). As protein level increased, there was progressive increase in

the feed consumption rates. Within the 8 weeks, the average daily feed intake by the birds on diet 5 (26% crude protein) was significantly higher than the figures obtained for all the other diets ($P < 0.05$). This was followed by diets 4, 3 and 2 in that order. Thus, it appears from the results that feed consumption was related to dietary protein level.

The results presented in Table 4 reveal the pattern of growth during the experimental period. During the first 6 weeks, diet 5 promoted the best gains

TABLE 5
Average weekly feed/gain ratios of guinea fowls on different dietary protein levels

Weekly	Diets				
	1	2	3	4	5
1	1.18 ^a	1.05 ^a	1.24 ^b	1.17 ^a	1.42 ^c
2	1.40 ^a	1.52 ^a	1.79 ^b	1.83 ^b	2.18 ^c
3	1.46 ^a	1.93 ^b	2.05 ^b	2.18 ^c	2.15 ^c
4	1.91 ^a	1.97 ^a	2.16 ^b	2.26 ^b	2.41 ^c
5	2.18 ^b	2.05 ^a	2.03 ^a	2.41 ^b	2.53 ^b
6	2.15 ^{ab}	2.13 ^a	2.25 ^{bc}	2.38 ^{cd}	2.72 ^e
7	2.26 ^a	2.64 ^b	2.78 ^c	2.65 ^b	2.95 ^d
8	2.54 ^d	2.66 ^b	2.76 ^{bc}	2.83 ^{cd}	3.15 ^e

Means in horizontal rows followed by the same superscripts are not significantly different from one another ($P < 0.05$).

TABLE 6
Effect of feeding different dietary protein levels on mean liveweight gain, feed consumption and feed/gain ratio of guinea fowls at 8 weeks of age

Parameters	Dietary				
	1	2	3	4	5
Liveweight (g)	505.9 ^a	596.3 ^b	704.7 ^c	854.0 ^d	867.3 ^d
Liveweight					
Gain (g)	472.9 ^a	563.6 ^b	671.0 ^c	823.0 ^d	834.3 ^d
Feed Con-					
sumption (g)	991.8 ^a	1250.0 ^b	1593.0 ^c	2030.3 ^d	2240.8 ^d
Feed/Gain					
Ratio	2.10 ^a	2.22 ^b	2.37 ^c	2.47 ^d	2.58 ^e

Means in horizontal rows followed by the same superscripts are not significantly different from one another ($P < 0.05$).

throughout, although mean weekly weight gain of the birds on diet 5 was in most cases not significantly better ($P > 0.05$) than those on diet 4 but was significantly higher ($P < 0.05$) than those on diets 1, 2 and 3. At 7th and 8th weeks of age the birds on 24% protein gained more than those on 26% protein and in fact at the 7th week the gain was significantly higher than the figure obtained for 26% protein diet ($P < 0.05$). Birds on diet 1 recorded the least gain followed by those on 2 and 3 in that order. it seemed that dietary treatment affected the pattern of growth rate.

The weekly values for the efficiency of feed conversion (feed/gain ratio) appear in Table 5. Depression of feed efficiency was noticeable with increasing dietary protein level.

The cumulative effect of dietary treatment at 8 weeks of age is summarized in Table 6. There were no significant differences ($P < 0.5$) between birds on diets 4 and 5 in terms of average feed consumption, final body weight and liveweight gain. In the experiment generally, these three parameters increased as dietary protein increased. The reverse was the case in feed efficiency

which became poorer as the dietary protein increased. Mortality was low, two birds died in diet 5 and one in diet 2 groups. This could not be related to the dietary treatments.

DISCUSSION

The results presented in this study indicate that guinea fowl is a slow growing bird inspite of its high protein requirement at the starter phase. It is evident from the data that variation in dietary protein affects its feed intake. This is in agreement with the earlier data of Blum *et al.* (1975). At the energy level tested, the feed efficiency ratio was depressed with the increase in the level of protein fed. This is consistent with figures obtained by Hughes and Jones (1980) but differs from those of Blum *et al.*, (1978). However, the results showed that feed utilization in guinea fowl is poor compared with chickens (Njike *et al.* 1984, Blum *et al.*, 1975).

The results of this experiment indicate that guinea fowl keets appear to perform best on 24 and 26% protein diets when compared with their performances on the lower protein diets. This contradicts the observation that a protein level of 24% decreasing to 18% with metabolizable energy level of 3000 calories/kg diet or even a lower protein level might be commercially more feasible (Anonymous, 1974). It is also at variance with the general practice in this country of feeding guinea fowls under intensive management with chick mash and worse still with grower's mash containing between 19 to 20% and between 15 to 16% protein respectively.

The idea that the requirements for protein (and other nutrients) were the same as (or at least very similar) to those of chicken (Luhman, 1970) would appear not to be supported by the results

reported here. However, the figures obtained in this experiment are in agreement with those of Ayeni *et al.* (1983), Kari *et al.*, (1978); and Blum *et al.*, (1975). In spite of their slow growing rate, guinea fowl keets unlike chicks, appear to have a relatively high protein need. Whether this phenomenon is due to a general need or to a specific need for only one of several amino acids requires to be investigated.

Blum *et al.*, (1975) have suggested phase feeding of 0 — 4 weeks and 4 — 8 weeks and Olomu (1983) in his review made similar recommendation. The current investigation would indicate that through eight weeks of age, a 24% protein diet with metabolizable energy level of 3000 kcal/kg gave the best growth rate. However, whether growth rate to eight weeks could be improved by feeding a higher protein diet during the first four weeks of life needs further investigation.

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