Energy requirement of ISA ESSOR Guinea fowl (*Numida meleagris*) as meat bird in a hot savanna climate

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ABSTRACT

Energy requirement of 144 8-week-old exotic ISA ESSOR Guinea fowls (*Numida meleagris*) in a hot savanna climate was determined. Three levels of metabolisable energy (ME) with equal crude protein (CP) level of 160 g CP kg^{-1} were offered during the second growth phase (8-15 weeks of age). The ME levels were E1, 10.88; E2, 11.30; and E3, 11.72 MJkg^{-1} dry matter. The mean final live weight (E1, 1898 g; E2, 1906 g; E3, 1936 g), mean live weight gained (E1, 613 g; E2, 620 g; E3, 650 g), mean daily feed intake (E1, 131 g; E2, 130 g; E3, 133 g), and feed conversion ratio ((E1, 8.33; E2, 8.78; E3, 8.91) recorded did not differ significantly during 8-15 weeks of age at different energy levels. Similarly, the mean slaughter weight (E1, 2043.75 g; E2, 2075.00 g; E3, 2112.50 g), mean bled weight (E1, 1950.0 g; E2, 1975.00 g; E3, 1993.80 g), mean dressed weight (E1, 1393.75 g; E2, 1412.50 g; E3, 1435 g), and mean dressing percent (E1, 68.2 %; E2, 68.0 %; E3, 67.9 %) recorded did not differ significantly ($P > 0.05$). Also, the differences ($P > 0.05$) among mean tissue fat (E1, 17.84 %; E2, 17.91 %; E3, 18.96 %) and protein (E1, 25.79 %; E2, 25.66 %; E3, 24.49 %) on the various energy levels were not significant. Based on this study, it is recommended that 10.88 MJkg^{-1} dry matter metabolisable energy should be adopted as desirable during 8-15 weeks of age to save cost of production.

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RÉSUMÉ

TEYE, G. A., GYAWU, P. & DEI, H. K.: *Le besoin d'énergie de la pintade d'ISA ESSOR* (Numida meleagris) *comme volaille à viande sous le climat de la savane chaude.* Le besoin d'énergie d'une pintade exotique (*Numida meleagris*) sous un climat de la savane chaude était déterminé en utilisant huit espèces d'ISA ESSOR ayant l'âge de huit jours. Trois niveaux d'énergie métabolique métabolique (EM) avec un niveaux égal de protéine brute (PB) de 160 g PB kg^{-1} étaient offerts pendant la phase de croissance seconde (8-15 semaines d'âge). Les niveaux d' EM étaient E1, 10.88; E2, 11.30; et E3, 11.72 MJ kg^{-1} de matière sèche. Le poids vif moyen final (E1, 1898 g; E2, 1906 g; E3, 1936 g), poids vif moyen gagné (E1, 613 g; E2, 620 g; E3, 650 g), consommation moyenne de ration quotidienne (E1, 131 g; E2, 130 g; E3, 133 g) et proportion de conversion de ration (E1, 8.33; E2, 8.78; E3, 8.91) n'ont pas différé considérablement pendant les âges de 8-15 semaines aux différents niveaux d'énergie. De la même façon, le poids moyen à l'abattage (E1, 2043.75 g; E2, 2075.00 g; E3, 2112.50 g), poids moyen des saignées (E1, 1950.0 g; E2, 1975.00 g; E3, 1993.80 g), poids moyen des préparées (E1, 1393.75 g; E2, 1412.50 g; E3, 1435 g) et pourcentage moyen de préparation (E1, 68.2 %; E2, 68.0 %; E3, 67.9 %) n'ont pas différé considérablement ($P = 0.05$). De plus, il n'y avaient pas des différences considérables ($P > 0.05$) parmi le moyen de la graisse de tissu (E1, 17.84 %; E2, 17.91 %; E3, 18.96 %) et la protéine (E1, 25.79 %; E2, 25.66 %; E3, 24.49 %) aux différents niveaux d'énergie. Basé sur cette étude, 10.88 MJ kg^{-1} d'énergie métabolique de matière sèche devrait être adopté pendant l'âge de 8-15 semaines afin d'économiser le coût de production.

Introduction

Protein malnutrition is widespread in developing countries, particularly in rural areas. This calls for an increase in meat production, particularly of poultry species. Guinea fowl (*Numida meleagris*), which is reared extensively in the Guinea savanna zone of Ghana, had been recognised as a diversified poultry species for augmenting meat production. Guinea fowl production is relegated to the background as a result of its poor growth performance relative to the broiler chicken. However, they are hardier (Singh & Panda, 1984; Agwunobi & Ekpenyong, 1990) and also provide meat with higher protein, lower fat (Ayorinde, Ohuiyemi & Ayeni, 1988), and lower cholesterol contents (Singh & Raheja, 1990) than the chicken.

The performance of the Guinea fowl can be improved through genetic selection coupled with proper feeding practices. Preliminary studies with the exotic Guinea fowl, ISA ESSOR strain, from Belgium have shown considerable improvement in performance and the potential to be used as meat bird (Teye, Gyawu & Agbolosu, 2000). However, information on its energy nutrition under the hot savanna climate is limited due variously to lack of institutional support and funds.

Therefore, this study aimed at determining the energy requirement of growing Guinea fowl during 8-15 weeks of age.

Materials and methods

One-day-old ESSOR Guinea keets were procured from Belgium and brooded at the Poultry Section of the University for Development Studies Farm, Tamale, Ghana. One hundred and forty-four 8-week-old keets were weighed and randomly distributed into 12 uniform batches so that each batch had eight males and four females, with average live weight of 1285.7 g. A completely randomized design was used. Each group was housed in deep litter pens (2.4 m × 1.8 m) up to 15 weeks of age. All the groups received similar lighting, feeding, watering, and other management practices. Feed and water were supplied *ad libitum*.

In raising the birds, a three-stage feeding regime of 0-4 weeks (starter), 5-8 weeks (grower phase 1), and 8-15 weeks (grower phase 2) as recommended in the ISA ESSOR Production Manual was adopted. The temperature and relative humidity in the deep litter house during the experimental period were 35-39 °C and 40-45 per cent, respectively. Three experimental diets at different levels of energy with 160 g $CPkg^{-1}$ were formulated as follows: E1, 10.88 $MJkg^{-1}$; E2, 11.30 $MJkg^{-1}$; and E3, 11.72 $MJkg^{-1}$. Wheat bran was used to adjust the energy level of the diets.

Table 1 shows the ingredient and nutrient compositions of the experimental diets. Each dietary treatment was offered to four batches of Guinea keets. Feed residues were weighed at the end of each week and weekly feed intakes recorded. The birds were weighed individually at weekly intervals. The mortality was recorded. At the end of the experiment, two cockerels per

TABLE 1

Ingredient and Nutrient Composition of Experimental Diets

	E1	*E2*	*E3*
Ingredient composition (kg)			
Maize	51.90	57.00	61.48
Soyabean meal	11.50	12.20	9.10
Fishmeal	2.00	2.50	5.95
Wheat bran	31.60	25.30	20.47
Dicalcium phosphate	1.00	1.00	1.00
Oyster shell	1.00	1.00	1.00
Mineral and vitamin premix[1]	0.50	0.50	0.50
Salt	0.50	0.50	0.50
Nutrient composition (on a dry matter basis)			
CP[2] (gkg^{-1})	160.70	160.20	160.00
Lysine[2] (gkg^{-1})	7.22	7.41	7.19
Methionine + Cystine[2] (gkg^{-1})	5.46	5.56	5.93
ME[2] ($MJkg^{-1}$)	10.88	11.30	11.72

[1]The premix per kg of diet provided: 4000 iu, Vit. A; 1200 iu, Vit. D_3, 4 mg, Vit. E; 0.81 mg, Vit. K; 0.6 mg, Vit. B_1; 0.004 mg, Vit. B_{12}; 12 mg, nicotinic acid; 3.6 mg, calcium pantothenate; 0.6 mg, Vit. B_6; 0.4 mg, folic acid; 150, choline chloride; 12 mg, Vit. C and 18 g, iron; 2 mg, copper; 12 mg, manganese; 0.4 mg, cobalt; 20 mg, zinc; 0.8 mg, iodine; 8.1 mg, selenium; 25 mg, antioxidants and 0.3 mg, ascorbic acid.
[2]Calculated values.

replicate were randomly selected and slaughtered for carcass evaluation. Laboratory methods as described by AOAC (1984) were used in determining tissue fat and protein contents. Analysis of variance was used to analyse the data (Steel & Torrie, 1980).

Results and discussion

Table 2 shows the effects of dietary energy levels on body weight, feed intake, and feed conversion ratio. The mean live weight gain was unaffected (P>0.05) by the various energy levels during 8-15 weeks of age of the birds. The results agree with those reported by Mandal, Pathak & Singh (1999). The fact that growth in all experimental groups was not retarded could be due to limited change in calorie: protein ratio (Summers, 1974). The feed intake (g per bird) was comparable (P>0.05) at different levels of energy. The results of different energy levels on feed intake agree with the observations of Agwunobi & Ekpenyong (1991) and Mandal *et al.* (1999). The feed conversion ratios (feed:gain) due to different energy levels were similar (P>0.05) during the growth phase. Though reports (Blum, Guillamme & Leclercq, 1975) indicated an improvement in feed conversion efficiency with increasing energy content of the diet, the effect of energy levels was not so in this study, which might be due to the effect of the hot climate (Mandal *et al.*, 1999).

TABLE 2

Effects of Dietary Energy Levels on Body Weight, Feed Intake and Mortality of ISA ESSOR Guinea Fowl from 8 to 15 Weeks of Age

Parameter	*E1*	*E2*	*E3*	*SE*
Mean final live weight (g)	1898	1906	1936	9.79NS
Mean weight gain (g)	613	620	650	0.73NS
Mean feed intake (g/d)	131	130	133	0.36NS
Feed: gain	8.33	8.78	8.91	0.17NS
Mortality (%)	0	2.1	6.3	-

NS = Not significant
Initial mean live weight at 8 weeks of age = 1286 g

Mortality ranged from 0 to 6.3 per cent in different dietary treatments (Table 2). Some of the birds died due to injury, while others showed typical symptoms of perosis. These were eliminated from the dietary treatments.

Table 3 shows the effects of dietary energy levels on slaughter weight, bled weight, carcass weight, and dressing percentage. All these carcass features of the randomly selected birds were not significantly (P> 0.05) affected by the varying energy levels, though the numerical differences were progressive.

TABLE 3

Effects of Dietary Energy Levels on Slaughter Weight, Bled Weight, Carcass Weight, Dressed Weight, Dressing Percent, Tissue Fat and Protein Accretion of ISA ESSOR Guinea Fowl at 15 Weeks of Age

Parameter	*E1*	*E2*	*E3*	*SE*
Mean slaughter weight (g)	2043.75	2075.00	2112.50	14.02NS
Mean bled weight (g)	1950.00	1975.00	1993.75	12.59NS
Mean dressed weight (g)	1393.75	1412.50	1435.00	13.06NS
Dressing percentage	68.20	68.00	67.90	-
Mean tissue fat[1] (%)	17.84	17.91	18.96	0.65NS
Mean protein[1](%)	25.79	25.66	24.49	0.17NS

NS = Not significant
[1]on fresh meat basis

The percent tissue fat and protein contents of the carcasses were not significantly ($P > 0.05$) influenced by the energy levels. However, the correlation between the amount of protein and fat in the carcasses was inverse. The parallel increases in the fat content with the increasing energy values of the diet indicate the negative effect energy values exceeding the ideal for the birds will have on the quality of Guinea fowl meat.

Conclusion

It is concluded that 10.88 $MJkg^{-1}$ dry matter should be adopted as metabolisable energy requirement for the ISA ESSOR Guinea fowl in a hot savanna (tropical) climate during 8-15 weeks of age. This will save cost, since the higher energy levels are associated with higher production costs.

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