Effect of varying energy and protein levels on carcass characteristics of helmet Guinea fowls in the tropics

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Abstract

*The effect of energy and protein and their interaction on carcass characteristics of helmet Guinea fowls in the tropics was investigated using one hundred and thirty-five Guinea fowls. The experiment which lasted for 5 weeks involved a 3*3 factorial in completely randomized design. The birds were randomly assigned to experimental diets containing three energy levels: 2500, 2600 and 2700 kcal/kg denoted as E₁, E₂ and E₃, respectively and three protein levels: 15%, 16% and 17% CP denoted as P₁, P₂ and P₃, respectively. The factorial design involved nine treatment combinations. The birds were allocated to each diet and were replicated three times to contain five birds per replicate and 15 birds per treatment. The result revealed significant (P<0.05) differences in the main effects of protein on dressed weight, thigh weight and breast weight. The 17% CP recorded the most significant values for dressed weight (689.44 g) and breast weight (24.89g). The varying energy levels also affected significantly (P<0.05) the dressed weight, thigh weight, wing weight, breast weight, back weight and gizzard weight of the birds. The 2600 kcal/kg recorded the highest dressed weight (717.22 g) compared to the other energy levels. However, the 2700 kcal/kg recorded the most significant values in thigh, wing, breast, back and gizzard weights. The interaction effect of protein x energy levels revealed significant (P<0.05) effects on live weight, wing weight, breast weight, back weight and gizzard weight of the Guinea fowls. The findings from this experiment conclude that diet of Helmeted Guinea fowl containing 15% CP and 2700kcal/kg ME gave the best carcass performance.*

Keywords: Energy, protein, carcass characteristics, helmet Guinea fowls

Introduction

Guinea fowl production could be more efficient for meat production compared to domesticated fowls as their feed cost per kg edible parts is less than that of the fowls (Veicman, 1970). When compared to local chickens, Guinea fowl has numerous advantages are numerous. These advantages include low production costs, premium quality meat, greater capacity to scavenge for insects and grains, better ability to protect itself against predators and resistance to common poultry diseases (Microlivestock, 1991). Guinea fowl production provides one of the best alternatives for the rural populace to access meat and eggs as well as potential for

revenue generation through sales of live fowl and eggs. However, Guinea fowls are kept for egg and meat production (Ajala *et al.*, 1997; Magaga and Haule, 1998; Smith, 2001), and poultry farmers want birds that will maximize production at an economic rate and still maintain a market carcass value at the end of production. Nsoso *et al.* (2003; 2006) and Nahashon *et al.* (2007) noted that Guinea fowl showed consistent significant increase in body weight over time but are slow in growth rates compared to broilers which reach 1.5 to 2kg in 6-8 weeks. Ayorinde and Ayemi (1983) also reported that Guinea fowls tend to be slow in growth, weighing less than 1kg at eight weeks of age. Ayorinde *et al.* (1988)

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reported that Guinea fowl has a characteristic low live weight compared to chicken. The objective of this study is to determine the optimum energy and protein levels for the best carcass characteristics of helmeted guinea fowls in the tropics

Materials and methods

One hundred and thirty-five Guinea fowls were used for this experiment. The birds were randomly assigned to experimental diets containing three energy levels: 2500, 2600 and 2700 kcal/kg and three protein levels: 15%, 16% and 17% CP in a 3*3 factorial in a CRD. The birds were allocated to each diet and were replicated three times with five birds per replicate and 15 birds per treatment. Data collection was for five weeks. The carcass quality of the Guinea

fowl was determined when the birds were eight weeks of age. It was carried out in the morning hours before the birds were fed. Two Guinea fowls were selected at random from each replicate, weighed individually, killed by cutting the neck close to the head, and allowed to bleed completely. Scalding was done in hot water and the feathers plucked off by hand individually. Evisceration was done with a very sharp knife and entire gut contents (organ and intestine) carefully removed and weighed immediately. The organs were weighed with a sensitive weighing (Acculab) scale. Data collected were subjected to analysis of variance (ANOVA) and significant means were separated using Duncan's Multiple Range F-test (Duncan, 1955).

Results and Discussion

Table 1: Effect of varying protein levels on carcass characteristics of helmet guinea fowls

Parameters	Crude protein level			SEM
	15% CP	16% CP	17% CP	
Live weight(kg/b)	1.28	1.29	1.34	0.02
Dressed weight (g/b)	672.22 ^b	666.67 ^c	689.44 ^a	8.70
Thigh weight (g/b)	11.81 ^b	11.83 ^a	11.69 ^c	0.96
Wing weight (g/b)	20.12	19.75	20.08	1.78
Neck weight(g/b)	5.12	5.42	5.87	0.40
Drumstick (g/b)	11.69	11.70	11.51	1.02
Breast weight (g/b)	22.52 ^{ab}	20.97 ^b	24.89 ^a	2.43
Back weight (g/b)	16.83	15.69	17.27	2.10

a, b Means with different superscripts across the rows are significantly different at P<0.05

Table 2: Effect of varying energy levels on carcass characteristics of helmet guinea fowls

Parameters	Energy levels (kcal/kg)			SEM
	2500	2600	2700	
Live weight (kg/b)	1.27	1.33	1.39	0.01
Dressed weight (g/b)	633.33 ^b	677.78 ^b	717.22 ^a	5.00
Thigh weight (g/b)	12.07 ^c	10.85 ^b	12.41 ^a	1.01
Wing weight (g/b)	17.62 ^b	18.65 ^b	23.68 ^a	1.63
Neck weight (g/b)	4.92	5.36	6.14	0.54
Drumstick (g/b)	12.11	11.02	11.77	1.02
Breast weight (g/b)	20.45 ^b	20.50 ^b	27.43 ^a	2.30
Back weight (g/b)	14.56 ^b	15.94 ^{ab}	19.29 ^a	1.03

a, b Means with different superscripts across the rows are significantly different at P<0.05

Table 3: Effect of interaction between protein and energy levels on carcass characteristics of helmet guinea fowls

Parameter	Energy x protein interaction										SEM
	2500 kcal/kg x 15% CP	2500 kcal/kg x 16% CP	2500 kcal/kg x 17%CP	2600 kcal/kg x 15% CP	2600 kcal/kg x 16%CP	2600 kcal/kg x 17%CP	2700 kcal/kg x 15%CP	2700 kcal/kg x 16%CP	2700 kcal/kg x 17%CP		
Live weight (kg/b)	1.17 ^c	1.25 ^{abc}	1.20 ^{bc}	1.20 ^{bc}	1.40 ^b	1.40 ^b	1.48 ^a	1.23 ^{abc}	1.47 ^a	0.015	
Dressed weight (g/b)	608.33	625.00	666.67	725.00	733.33	693.33	683.33	641.67	708.33	10.80	
Thigh weight (g/b)	12.43	12.19	11.58	10.61	10.71	11.24	12.38	12.60	12.24	1.02	
Wing weight (g/b)	17.55 ^{bcd}	19.05 ^{bcd}	16.25 ^{ad}	14.04 ^d	21.49 ^{bc}	20.42 ^{bcd}	28.77 ^a	18.70 ^{bcd}	23.56 ^{ab}	3.10	
Neck weight (g/b)	4.11	5.51	5.14	4.52	5.65	5.89	6.73	5.10	6.58	0.60	
Drumstick (g/b)	12.50	12.23	11.58	10.89	10.97	11.19	11.69	11.88	11.76	0.96	
Breast weight (g/b)	21.33 ^{cd}	18.48 ^{de}	21.53 ^{cd}	15.05 ^e	21.79 ^{cd}	24.67 ^{bc}	31.17 ^a	22.64 ^{cd}	28.47 ^{ab}	3.12	
Back weight (g/b)	13.95 ^b	14.60 ^b	15.14 ^b	13.89 ^b	16.30 ^b	17.59 ^{ab}	22.66 ^a	16.13 ^b	19.09 ^{ab}	1.67	

a, b Means with different superscripts across the rows are significantly different at P<0.05

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Table 1 shows the effect of varying protein levels on carcass characteristics of helmet Guinea fowls. Significant differences ($P < 0.05$) were observed in dressed weight, thigh weight and breast weight. The 17% CP recorded the highest ($P < 0.05$) dressed weight 689.44g/b and equally the highest breast weight 24.89g/b. The 16% CP recorded the highest ($P < 0.05$) thigh weight (11.83g/b) whereas the 17%CP diet obtained the least thigh weight (11.69g/b). Non-significant ($P > 0.05$) differences were obtained due to varying protein levels on live weight, wing weight, neck weight, drumstick and back weight. This result indicates that the highest dietary protein level (17% CP) is required for best performance in dressed weight and breast weight. Table 2 shows the effect of varying energy levels on carcass characteristics of helmet Guinea fowls. Significant differences were observed in dressed weight, thigh weight, wing weight, breast weight, back weight and gizzard weight. No significant difference ($P > 0.05$) was observed in live weight, neck weight and drumstick weight. The 2700 kcal/kg recorded was most significant in dressed weight, thigh weight, wing weight, breast weight and back weight. This result showed that 2700 kcal/kg energy level produced better carcass output compared to the lower energy levels of 2500 kcal/kg and 2600 kcal/kg. This result is in agreement with the report of Nahashon *et al.* (2005), which stated that dietary metabolizable energy composition has a major impact on body composition of Guinea fowl.

Table 3 shows the effect of interaction between protein and energy levels on carcass characteristics of helmet Guinea fowls. Significant interaction effects ($P < 0.05$) existed on live weight, wing weight, breast weight and back weight. Non-significant effect of interaction ($P > 0.05$) was observed in dressed weight, thigh

weight, neck weight and drumstick weight. The best interaction effect was obtained by the 2700 kcal/kg $\times$ 15% CP which recorded the most significant ($P < 0.05$) values in live weight, wing weight, breast weight and back weight. This was closely followed by the 2700 kcal/kg $\times$ 17% CP which performed lower than the 2700 kcal/kg $\times$ 15% CP (except in live weight where both were comparable) but higher than the other energy $\times$ protein groups. According to Adeyemi *et al.* (2008); Agunbiade *et al.* (2002) and Fanimu *et al.* (1996) the breast meat, drumstick and thigh are the most expensive commercial cuts of the chicken and also provide the greatest portions of edible meat in broilers. The result generally showed that improvement in thigh weight was separately dependent on individual effects of energy and protein levels rather than interaction which were not significant in this study. The breast weight was the only parameter that was affected significantly by the separate effects of protein, energy and their interaction effects. The live weight, drumstick weight and neck weight were affected significantly only by the interaction effects. Thus, improvement in drumstick will be best obtained by effect of interaction rather than considering individual effects of protein and energy. Adeyemi *et al.* (2008) further noted that dressed weight is more important to poultry meat consumers than the live weight because feathers add more to live weight and dressed weight represents the absolute value of saleable meat. The result of this study showed that improvement in live weight could be obtained best by interaction effect of 2700 kcal/kg $\times$ 15% CP or 2700 kcal/kg $\times$ 17% CP since the individual effects of varying protein and energy levels did not produce significant effect.

Conclusion

The results of this study suggested that

higher carcass performance could be achieved with Guinea fowl by feeding diet containing 15% CP and 2700kcal/kg ME.

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Received: 25th August, 2016

Accepted: 12th March, 2017