Short communication

Effect of dietary protein levels on the performance and carcass characteristics of cockerel finishers

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Abstract

A study was carried out to investigate the effect of dietary crude protein (CP) levels in diets of 2650Kcal/kg metabolisable energy content on the performance and carcass characteristics of cockerel finishers. The experimental diets A, B, C, D and E contained CP levels of 140, 160, 180, 200 and 220g/kg and they were produced by modified diet dilution technique. Response criteria such as weight gain and feed conversion ratio, among others, and carcass characteristics were measured. Results on performance and carcass characteristics, with the exception of the neck, intestinal weights and other visceral offals, revealed that these response criteria were optimized in the birds fed on 180g/kg dietary CP level. Beyond this level, it was not beneficial to feed higher CP levels. It is therefore, concluded that the CP requirement of finisher cockerels is 18% on the bases of their performance and carcass characteristics.

Keywords: Cockerel finishers, Dietary crude protein levels, performance, carcass characteristics.

Introduction

Studies on the nutrition of different classes of domestic fowls have neglected that of the cockerels. Consequently, the nutritional specifications used for the broilers and pullets have been adopted for the cockerels. According to Ogbonna and Adebowale (1993), the use of feeds meant for the other classes of poultry for feeding cockerels is unprofitable, thereby indicating the need to generate nutritional data for the cockerels. The few studies undertaken in Nigeria are exemplified by those of Okosun (1987) and Salami and Boorman (1999). Okosun (1987) reported that feed conversion ratio was optimized when cockerels were fed diets containing 21% protein and between 2450 to

2650 Kcal/kg ME at the starter phase and finishing with a 16% dietary protein and 2250Kcal/kg ME. On the bases of weight gain and feed conversion ratio, Salami and Boorman (1999) reported that the dietary crude protein requirement of growing cockerels (9 to 13 weeks of age) would be satisfied by 18% and a 2600 Kcal/kgME. Both performance and carcass characteristics evaluation data are of paramount commercial importance to cockerel producers. However, there are fewer reports wherein the performance and carcass characteristics of the cockerel finishers (unlike the broilers and rabbits) are used as criteria for measuring their nutritional requirements. A report by Eshiett *et al*; (1979) revealed that weight gain and feed conversion ratio of grower rabbits were

improved significantly as dietary protein level increased but carcass yield and pelt weight were not affected by dietary protein level. It is against this background information that this study was designed to verify the findings of Salami and Boorman (1999) on the crude protein requirement of cockerel finishers measured on the bases of their performance and carcass characteristics.

Materials and Methods

Five isocaloric treatment diets A,B,C,D and E containing 140, 160, 180, 200 and 220g/kg

graded levels of crude protein, respectively and 2600Kcal/kgME (Table 1) were formulated by the diet dilution technique (Salami and Boorman, 1999). The composition of the summit diet (SD) and dilution mixture (DM) used for designing the treatment diets is given in Table 1 after Salami and Boorman (1999). The treatment diets also had similar proximate compositions while the crude fibre varied slightly but was within the tolerance range ($\geq 15\%$) for the normal functioning of the gastro – intestinal tract (Sainsbury, 1980; Akinnusi, 1999).

Table 1 : *Composition of experimental (g/kg) diets.*

Treatment Diets	CP (g/kg)	ME(Kcal/kg)	Proportion of	
			SD ¹	DM ¹
A	140	2607.34	449.70	550.30
B	160	2607.58	528.30	471.70
C	180	2607.82	606.90	393.10
D	200	2608.05	685.50	314.50
E	220	2608.29	764.20	235.80

¹See Table 1 in Salami and Boorman (1999) for their formulae and chemical composition.

Birds and their management:

Seventy-five birds of 13 weeks old, were selected from a flock of one hundred Black Olympia cockerels. The birds raised from day – old on the deep litter pens and had received necessary vaccinations and medications as described by Salami (1999). They were fed commercial chick starter and grower mash from

day – old to 10 and 10 to 13 weeks of age, respectively before the study commenced. The birds were weighed individually before they were randomly allotted into 5 treatments of 15 birds each with similar initial mean body weight (Table 2). The treatment diets (Table 1) were fed *ad libitum* to the birds housed in the battery cages. Each treatment consisted of three replicates.

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Table 2 : Performance and carcass characteristics of experimental finishing cockerels.

Performance Parameters	Treatment Diets				E	±SEM
	A	B	C	D		
Initial mean body weight (g/bird)	857.5	860.0	850.0	852.5	852.5	5.42
Final mean body weight (kg/bird)	1.55 ^d	1.60 ^c	1.67 ^b	1.69 ^{ab}	1.71 ^a	0.0039
Mean daily weight gain (g/bird)	16.55 ^b	17.55 ^b	19.50 ^{ab}	19.88 ^a	20.12 ^a	0.57
Mean daily feed intake (g/bird)	111.20 ^b	113.00 ^b	115.67 ^a	113.18 ^b	110.08 ^b	0.50
Mean feed conversion ratio (FCR)	6.73 ^b	6.44 ^b	5.94 ^a	5.64 ^a	5.41 ^a	0.079
Pre – slaughter weight of bird (kg/ bird)	1.54 ^b	1.54 ^b	1.71 ^a	1.72 ^a	1.75 ^a	0.027
Post- slaughter weight of bird (kg/bird)	1.49 ^c	1.50 ^c	1.65 ^b	1.65 ^b	1.70 ^a	0.24
Plucked weight (dressed weight, (kg/bird)	1.28 ^b	1.33 ^b	1.51 ^a	1.51 ^a	1.55 ^a	0.016
Dressing – out percentage	83.77 ^b	86.31 ^a	88.01 ^a	87.66 ^a	88.54 ^a	0.51
Eviscerated carcass percentage	64.93 ^b	65.15 ^b	68.12 ^a	68.50 ^a	69.92 ^a	0.37
Eviscerated carcass weight (kg)(EW)	1.00 ^b	1.00 ^b	1.17 ^a	1.18 ^a	1.22 ^a	0.014
Weight of cut – up parts (% EW)						
Back	18.95 ^b	18.70 ^b	21.95 ^a	22.05 ^a	22.10 ^a	0.60
Breast	18.20 ^b	18.10 ^b	22.10 ^a	22.15 ^a	22.40 ^a	0.22
Drumstick	12.70 ^b	13.00 ^b	15.25 ^a	15.10 ^a	15.20 ^a	0.37
Thigh	16.30 ^b	16.10 ^b	17.90 ^a	18.20 ^a	18.40 ^a	0.22
Wings	10.50 ^b	11.28 ^b	12.95 ^a	13.10 ^a	13.10 ^a	0.41
Neck	9.40	9.20	10.25	10.25	10.25	0.43
Organ weights (g)						
Gizzard (uncleaned)	57.50	57.00	57.00	55.50	55.50	0.82
Gizzard (cleaned)	47.50	47.00	46.50	45.50	45.50	0.67
Heart	10.00	10.50	10.00	10.50	10.50	0.42
Intestines	81.00 ^a	72.00 ^{ab}	61.00 ^{bc}	55.00 ^c	56.00 ^c	2.83
Liver + spleen + bile	29.00	29.50	29.00	29.50	29.00	0.94
Head	48.50 ^b	48.00 ^b	49.50 ^a	50.00 ^a	49.50 ^a	1.39

^{a,b,c,d} Means with unidentical superscript differ ($p < 0.05$).

Measurements:

Live body weights and feed intake of the birds were measured on weekly basis from which the mean weight gains, feed intake and feed conversion ratio (FCR) for the entire 6 weeks period of study (Table 2) were computed for the respective treatment diets. At 19 weeks of age, one bird per replicate/ treatment was picked and slaughtered after starving for 4 hours. The procedure for carcass measurements as described by Oyewole and Salami (1997) was followed (Table 2).

Chemical and statistical analyses:

Samples of SD and DM were analysed for their proximate compositions according to the

standard methods of AOAC (1990). Performance and carcass evaluation data collected were subjected to analysis of variance and Duncan's multiple Range Test was also used to compare the treatment means (Steel and Torrie, 1980).

Results and discussion

The effects of graded levels of dietary protein on the performance and carcass characteristics of finishing cockerels are presented in Table 2. Performances parameters such as the daily weight gain and feed conversion ratio were improved ($P < 0.05$) up to the 18% dietary CP level (diet C), beyond which there was no

significant ($P>0.05$) improvement. These results suggested that the CP requirement of the birds was met by the 18% CP diet of 2600 Kcal/KgME. This shows that the performance of growing/finishing cockerels would not be optimised when they are offered a 14 or 16%CP grower mash which is usually fed to grower pullets to delay attainment of sexual maturity (Oluyemi and Roberts, 1979). It will also be unprofitable to use broiler finisher diet to feed cockerel finishers since it is richer in calorie and CP contents (see review by Ojewola and Longe, 1999) and therefore expected to be costlier than the grower mash for cockerels and pullets. This corroborates the strain effect (light versus heavy) of the domestic fowl on their nutritional requirements. The value of 18% dietary CP obtained in the present study is in agreement with the finding of Salami and Boorman (1999). However, this is at variance with the 16% dietary CP level recommended for the finishing cockerels by Okosun (1987). The mean daily weight gain of 19.5g/bird recorded for birds on the 18% CP diet (diet C) is comparable with the values of 19.7, 19.4 and 19.50g/bird recorded for finishing cockerels (Nwokoro and Tewe 1998; Salami and Boorman, 1999 and Salami 1999), respectively and the daily weight gain of 18.64g recorded for the grower rabbits by Eshiett *et al.* (1979).

While the carcass characteristics were improved up to the 18% CP levels, the intestinal weight tended to decrease as the dietary crude protein level increased. The weights of carcasses, retail cuts and heads of the birds were optimised at 18% dietary CP. On the other hand, the weights of gizzard (clean and uncleared), heart, liver, spleen and bile were uniform across diets thereby indicating no effect of CP level on them. The results on carcass characteristics in this study are similar to the observations of Nwokoro and Tewe (1998). The eviscerated carcass percentage of 68.12 for the 18% crude protein diet (diet C) is within the range of 65 to 70% reported as optimum for the table birds (Oluyemi and Roberts 1979 and Nwokoro and Tewe 1998 among others).

Conclusion

This study confirms the earlier recommendation of 18% dietary CP by Salami and Boorman (1999). Both performance parameters and carcass evaluation data are reliable indices for evaluating the CP requirement of cockerels.

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