INFLUENCE OF VARYING LOW DIETARY ENERGY LEVELS ON CARCASS CHARACTERISTICS OF BROILER CHICKENS

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ABSTRACT

Two hundred and seventy day old Amok Broiler Chicks with an average initial weight of 40.45g were used in a feeding trial to determine the carcass characteristics of the finisher broilers fed low dietary energy levels. Three isonitrogenous (24% CP) diets containing 2 400, 2 600 and 2 800 ME Kcal/Kg were used in a completely randomized design. Results showed that the Live Weight, Slaughtered Weight, Plucked Weight, Carcass Weight and Dressing Percentage of birds fed the three diets were statistically similar.The wing as express in percentage Live Weight was significantly higher ($p<0.05$) for broilers fed 2 400 and 2 600 ME Kcal/Kg. The Drumstick and Liver as expressed in percentage Live Weight Followed similar trend.The study recommended that low energy diets should be formulated for poultry so as to minimize the accumulation of cholesterol in between the muscle fibres and on visceral organs which can consequently affects the physiological and metabolic functions of the birds, organoleptic characteristics, marketability of the products and health status of the consumer.

Keywords: Broiler, diet, energy, carcass, finisher.

INTRODUCTION

There are few published studies concerned with the use of different levels of energy density in diets and their effects on the carcass characteristics of chickens. There is inconsistent information about the optimum dietary energy requirements for use in poultry production. The requirements for energy cannot be stated as precisely as that of protein, minerals and vitamins, this is because good growth can be achieved with a wide range of energy levels.Intake of high dietary energy level, result in the accumulation of fat in the muscle and visceral organs which consequently affects the physiological and metabolic functions of the birds, organoleptic characteristics, marketability of the products and health status of the consumer(Hosseini*et al*., 2010). It is therefore necessary to look into the optimum energy regime that will provide the best carcass composition in broiler chickens.

MATERIALS AND METHODS

Three experimental diets comprising three energy levels of 2400 ME Kcal/Kg (A), 2600 ME Kcal/Kg (B) and 2800 ME Kcal/Kg (C) were formulated and fed to the chickens. The crude protein of the starter and finisher diets were fixed at 24 and 20% respectively. The ingredients and calculated chemical compositions of the finisher diet was presented in Table 1. Two hundred and seventy (270) day old broiler chicks of Amok strain were weighted and randomly allocated to three treatments (A, B and C) of ninety birds per treatment, each treatment having three replications of thirty birds. The birds were managed under deep litter system. Routine management was carried out as and at when due. At the end of the feeding trial, three (3) birds were randomly selected from each of the replicate ie nine (9) birds per treatment and used for carcass and organ measurements. The birds were starved overnight before weighing and slaughtering the next morning. Defeathering was done after immersing the birds in hot water for 2-3 minutes. The birds were then dressed and the dressed weight and dressing percentage (carcass yield) were computed. Cut-up parts were weight and expressed as percentage of live weight. The visceral organs of each bird were also weight and expressed as percentage of live weight. The experiment was laid in a Completely Randomized Design. The differences between the results were tested for Analysis of Variance (ANOVA) using the General Linear Model Univariate Procedure of SPSS 16.0 and significant differences of means were compared using LSD.

RESULTS AND DISCUSSIONS

The carcass and Organs weight of Broilers fed different low energy levels is presented in Table 2. The Live Weight, Slaughtered Weight, Plucked Weight, Carcass Weight and Dressing Percentage of birds fed 2 400, 2 600 and 2 800 ME Kcal/Kg were statistically similar, even though the dressed and carcass weights of birds fed 2 400 ME Kcal/Kg were higher compared to that recorded for 2 600 and 2 800 ME Kcal/Kg. This result agrees with the report of Dairo *et al.* (2010) who reported statistical similarities in Live and Dressed Weights for Broiler Chickens fed High and Low Dietary Energy Levels slaughtered at weeks 4 and 8. Similarly, Magala *et al.* (2012) reported Dressing percentage and relative organ weights to be similar across all dietary treatments (2 800, 2 900 and 3 000 ME Kcal/Kg). These findings were also in agreement with the result of Nguyen and Bunchasak (2005) who reported that the carcass yield of Chinese Betong native chickens were not affected by varying dietary energy and protein levels from 3 000 to 3 200 ME kcal/kg and 17 to 23% CP. Karman *et al.*(2008) similarly reported that the carcass yield did not differ when broilers were fed diets varying from 2 717 to 3 146 ME kcal/kg and 19 to 22% CP during the finishing phase.On the contrary, Zhuge *et al.* (2009) observed increasing viscera fat deposition when dietary energy was increased from 2 900 to 3 100 ME kcal/kg in the diets of growing broiler chickens. Young*et al.* (2001); Havenstein *et al.* (2003) and Brickett *et al.* (2007) reported that carcass yield is affected by a number of factors including genetic, feed, slaughtering conditions, live weight and sex. The values obtained for Dressing Percentage in this work ranged from 66.14 to 69.84% which were within the range obtained by Ravindran and Savakanenssan (1996), Salami *et al.* (2004), Kwari *et al.* (2014) and Diarra *et al.* (2015) who reported 65.84 to 70.77%, 65-70%, 67.19-73.11% and 67-68%, respectively as the ideal Dressing Percentages for well finished broilers. Leeson *et al.* (1996); Nahashon *et al.* (2006) and Alabi *et al.* (2013) reported that drumstick, thigh and wing differed significantly ($p<0.05$) by increasing dietary energy levels. This might be attributed to the storage of energy in adipose tissues once the requirements for basal metabolic rate and thermogenesis had been met. The wing as express in percentage Live Weight was significantly higher ($p<0.05$) for broilers fed 2400 and 2600 MEKcal/Kg. The Drumstick and Liver as expressed in percentage Live Weight Followed similar trend. The carcass weight and Dressing percentage for broilers fed 2400 MEKcal/Kg was the highest while the Live and Slaughtered weights of broilers fed 2600 MEKcal/Kg was the least. The Crop of broilers fed 2400 MEKcal/Kg was the highest, while that fed 2800 MEKcal/Kg had the least, Breast and Proventriculus followed the same trend. The dietary treatments did not influence the relative weight of breast, gizzard and abdominal fat. These results were in agreement with the reports of some other investigations that did not observe any change in carcass yields of broiler chicken fed diet varying in energy and protein concentration (Nahashon *et* al., 2005,Karman*et* al., 2008 and Hosseini*et al.*, 2010).

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Table 1. Ingredients and chemical composition (%) of Broiler Finisher Diet

Ingredient	Energy Levels(ME Kcal /kg)		
	A	B	C
Maize	30.00	40.00	51.00
SBM	18.00	17.00	24.00
GNC	7.00	10.00	8.00
W/Offal	39.00	27.00	11.00
Bone Meal	3.00	3.00	3.00
Limestone	2.00	2.00	2.00
Salt	0.30	0.30	0.30
Premix	0.25	0.25	0.25
Methionine	0.25	0.25	0.25
Lysine	0.20	0.20	0.20
Total	100.00	100.00	100.00
Calculated Analysis			
ME(Kcal/KgDM)	2430	2602	2816

Table 2. Carcass and Organ Weight of Broiler Chickens (at week 8) fed Different Energy Levels

Parameter	Energy Regimes (MEKcal/Kg)				
	A (2400)	B (2600)	C (2800)	SEM	LS
Live Weight (Kg)	1.89	1.74	1.89	0.106	0.302
Slaughtered Weight (Kg)	1.81	1.70	1.84	0.098	0.392
Plucked weight (Kg)	1.74	1.63	1.74	0.096	0.357
Carcass Weight (Kg)	1.32	1.19	1.28	0.084	0.345
Dressing Percentage	69.84	68.34	66.14	5.407	0.730
Cut up parts as % of Live Weight					
Head	2.65[b]	2.87[b]	3.52[a]	0.037	0.037
Legs	4.23	4.60	4.23	0.007	0.750
Thigh Muscle	9.52[a]	7.00[b]	7.41[b]	0.015	0.001
Wing	8.01[a]	7.59[ab]	6.67[b]	0.096	0.078
Back	6.88	9.36	7.76	0.062	0.129
Neck	4.23	4.60	4.76	0.007	0.470
Breast	11.11	10.92	6.88	0.078	0.116
Drumstick	11.11[a]	10.34[ab]	8.47[b]	0.019	0.107
Shank	0.53	0.57	0.53	0.007	0.584
Organs Weights as % of Live Weight					
Crop	0.03[a]	0.02[b]	0.02[b]	0.003	0.003
Gizzard	3.70	4.02	3.17	0.003	0.004
Liver	2.22[a]	2.13[ab]	1.70[b]	0.004	0.313
Abdominal Fat	0.53	1.72	0.53	0.014	0.457
Caeca	1.56	1.15	1.56	0.005	0.457
Heart	0.53	0.57	1.06	0.005	0.213
Kidney	0.53	0.57	1.06	0.007	0.322
Proventriculus	2.21	1.15	1.06	0.015	0.398
Ornamental Fat	0.03	0.02	0.01	0.009	0.091

[abc]=Means within the same row bearing different superscripts differ significantly LS = Level of Significance (P<0.05) SEM = Standard Error of Mean