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Feeding low dietary energy for growth of broiler chickens during finisher period provides least feed conversion ration

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Abstract

Energy is an important component of diets without which animals will not grow. Thus, a study was conducted to investigate the effect of low dietary energy on growth performance of broiler chicken at finisher stage. Two hundred and twenty five Zartech strain day old chicks were raised intensively for four weeks in a completely randomized design. The birds were grouped into three treatments of 75 birds and sub-divided into three replications of 25 birds. Three experimental diets of three energy levels (2,400; 2,600 and 2,800 ME Kcal/Kg designated A, B and C, respectively) with 20% crude protein were formulated and fed to the broiler chickens to assess feed intake, body weight gain, feed conversion ration and feed cost gain ration. The data were subjected to one way analysis of variance and means were separated using least significant difference. Results showed that feed intake decreased as the energy value of the feed increased. There was significant ($p<0.05$) difference in total feed intake between the treatments. No significant ($p>0.05$) difference was recorded in terms of initial live weight, final live weight, feed conversion ratio, feed conversion efficiency, feed cost and cost/gain. Feed cost showed progressive increase as the energy level of the diet increased. Lowest cost/gain ratio was reported from diet C. It was concluded that feed intake decreased as the energy value of the feed increased. It is therefore, recommended that broiler chickens should be fed with diet containing 2 800 ME Kcal/Kg as it provides the least feed conversion ratio.

Keywords: Broiler chicken, Energy diet, Performance and Finisher

Introduction

Energy is the substance that keeps many different body functions operating every time. It is the vital feed component, the most costly and the most wasted of the feed components (Hossain *et al*., 2012). Hence everything has to be done to enhance the utilization of the diet for productive body functions (Oluyemi and Roberts, 2000). Various studies were carried out to determine the nutrient requirements of poultry broilers reared in the tropics with particular reference to Nigeria and various levels of energy and protein have been recommended. Oluyemi and Roberts (2000) recommended 23 and 20% protein with same energy level of 3, 200 ME Kcal/Kg for broilers of ages 0-4 and 5-8 weeks respectively. Ogundipe (2002) recommended protein levels of 20 and 26% and energy levels of 2, 800 and 3, 200 ME Kcal/Kg diets for starter and finisher phases, respectively. Corduk *et al.* (2007) found the energy 2, 800 ME Kcal/Kg and protein requirements in the wet tropics for starter and finisher to be 23 to 24% and 19 to 21% respectively, while Garba *et al.* (2011) recommended protein level of 22% and energy content of 2, 900 ME Kcal/Kg for starter broilers. In the present study, the aim was to examine the effect of feeding low dietary energy levels on growth performance of broiler chickens during the finisher period.

Materials and methods

A feeding trial was conducted at the Poultry Teaching and Research Farm, Department of Animal Health and Production, School of Agriculture, Binyaminu Usman Polytechnic Hadejia, Jigawa State, Nigeria. Hadejia consists of low plains of Chad Basin that developed on sedimentary rock, with mean height of 400 meters above sea level. Occasionally, sand dunes of up to 30 meters high can be seen, the area has no hill or rock out crop of any kind (Olofin, 1987). The area is covered by deposit of silt, sand and clay soils. The soil formation gives the area the great influence on agricultural development. The vegetation consists of various type of trees scattered over wide expense of grassland. the most dominant trees are *Azadrachta indica*, *Adansonia digitata* and *Acacia nilotica*, Hadejia Local Government Area possesses palatable grasses(*Andropogan gayanus* and *Pennisetum pedicelatum*) and legumes (*Cyanodon dactylum* and *Stylosanthes hamata*), also crops residues such as sorghum stover, millet stalks, rice straws, cowpea haulms, ground nut hay and agro-byproducts which include wheat offal, cotton seed cake, ground nut cake and cereal bran were available in the study area, which give a quality land for good grazing of livestock. It has an annual rainfall ranging from 700-800mm accompanied by heavy wind with temperature ranging from 31 to 40^{0}C.

Two hundred and twenty five Zartech broiler chicks of four weeks old were weighed and allotted to three dietary (Table 1) treatments containing 2 400, 2 600 and 2 800 ME Kcal/Kg designated as A, B and C, respectively. Each treatment was replicated three times with twenty-five birds per replicate. Water was served freely to all the treatments. Necessary management practices were carried out and routine vaccinations and drugs were administered.

A Four week feeding trial was conducted to evaluate:

a) Daily Feed Intake (DFI): known quantity of feed offered in the morning and the left over measured the next morning, the differences were determined to compute daily feed intake.

$$DFI = \frac{\text{Quantity of Feed Supplied (g)} - \text{Quantity of feed left over (g)}}{\text{Number of birds}}$$

b) Body Weight Changes (BWC): The actual body weight was subtracted from the weight of the previous week.

BWC = actual body weight (g) – Previous weight (week)

c) Feed Conversion Ratio (FCR) = Quantity of feed consumed to effect a unit weight gain

FCR = Feed Intake ÷ Body Weight Changes

d) Feed Cost (FC) =

$$\frac{\text{Feed Intake x Unit Price of the feed}}{\text{Number of birds}}$$

e) Cost/gain = Unit Cost x Feed Conversion Ratio

Table 1: Composition (%) of broiler finisher diets with varying energy contents

Ingredient	Energy Levels (MEKcal/Kg)		
	A	B	C
Maize	30.00	40.00	41.00
Soybean Meal	18.00	17.00	24.00
Groundnut Cake	7.00	10.00	8.00
Wheat 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
Crude Protein	19.8	19.7	20.2
Lysine	1.2	1.1	1.2
Methionine	0.5	0.5	0.5
Calcium	1.6	1.6	1.6
Phosphorus	0.7	0.6	0.6
Crude Fibre	5.4	4.7	3.9
Ether Extract	3.6	3.7	3.7

Finisher Premix provided per Kg diet: Vitamin A 8,500iu, Vitamin D3 1,500iu, Vitamin E 10,000mg, Vitamin K3 1,500m g, Vitamin B1 1,600mg, Vitamin B2 4,000mg, Niocin 20,000mg, Pantothenic Acid 5000mg, Vitamin B6 1,500mg, Vitamin B12 1000mg, Folic Acid 500mg, Biotin H2 750mg, Choline Cloride 175,000mg, Cobalt 200mg, Copper 3000mg, Iodine 1000mg, Iron 20,000mg, Manganese 40,000mg, Selenium 200mg, Zinc 30,000mg, Antioxidant 1,250mg.

Results

Table 1 showed the growth performance of broiler chickens (at finisher phase) fed low energy diets. Feed intake showed significant ($p<0.05$) difference across the treatments. No significant ($p>0.05$) difference was observed in initial live weight, final live weight, feed conversion ratio, feed conversion efficiency, feed cost and cost/gain. Highest final live weight, total feed intake, body weight gain and feed conversion ratio were recorded for birds fed 2,400 MEKcal/Kg, while birds fed 2,800 ME Kcal/Kg recorded the least. Thus, as the energy density increased, the total live weight, total feed intake, body weight gain and feed conversion ratio decreased. There was progressive increase in feed cost as the energy density of the diet increased. Lowest cost/gain ratio was reported from diet B.

Discussion

The feed intake showed statistical significance ($p<0.05$) among treatments. This agrees with the report of Dairo *et al.* (2010) who reported significant differences in feed intake when broiler chickens were fed high and low energy diets. Mona and Osman (2009) and Fafiolu *et al.* (2015) also reported apparent variations in feed intake among treatments when broiler birds were fed high dietary energy levels and palm-kernel extraction by-products, respectively. The significantly high feed intake recorded from birds fed the least energy diet (A) could be attributed to the fact that birds under normal circumstances eat to satisfy their energy needs, thus confirming the report of Akinola and Sese (2011) that feed intake in birds fed diet containing low energy concentration was higher. This is

Table 2: Growth performance and economic of production of broiler chickens (at finisher phase) fed diets with low energy levels

Parameters	Energy Levels (ME kcal/kg) 2,400 (A)	2,600 (B)	2,800 (C)	S.E (±)
Initial Live Weight (g/b)	738.64	724.28	686.38	57.14
Final Live Weight (g/b)	2493.67	2416.70	2480.50	53.63
Total Feed Intake (g/b)	3600.68[a]	3095.77[b]	2819.88[c]	56.00
Body Weight Gain (g/b)	1755.03[a]	1692.42[b]	1794.12[a]	10.98
Feed Conversion Ratio	2.05	1.83	1.40	0.52
Feed Conversion Efficiency (%)	0.49	0.55	0.89	0.00
Feed Cost (₦/Kg)	72.42	73.36	78.08	0.03
Cost/Gain	165.84	151.12	153.82	1.08

g/b = gram per body weight; [abc] Means along the same row having different superscripts are significantly (p<0.05) different

also in agreement with the findings of Mc Donald *et al*. (2002) who reported that most animals consumed the quantity of feed needed to satisfy their energy requirement.

The range for feed intake values in present study agrees with that reported (2, 800g/b to 3, 800g/b) by Jegede *et al*. (2016), who reported final live weight range of 1, 800g/b to 2, 500g/b which is similar to that found in the current study. The finding of Oloruntola *et al*., (2016) that the final live weight of broiler chickens ranged between 2, 081.38g/b to 2, 476.28g/b is similar to what was obtained in the present investigation. Al-Athari and Watkins (1988); Abu *et al*. (2011); Fafiola *et al*. (2015) and Shittu *et al*., (2016) reported no statistical difference in feed conversion ratio of broilers, while Mona and Osman (2009); Summers (2010); Fafiolu *et al*. (2015) reported no significant difference ($p>0.05$) in final body weight.

Owen *et al*. (2011) reported that feed accounts for about 70-80% of the total variable cost of chicken production in Nigeria and other developing countries. The high cost of feed has been largely traced to increasing cost of maize, soya bean and ground nut cake which are the main conventional sources of energy and protein (Faniyi, 2002). The work of Ademola *et al*. (2012) and Akinmoladin *et al*. (2015) who reported non significant difference in feed cost at finisher phase, is similar to this work. Cost of feed increases with increase in energy levels (Akinmoladin *et al*., 2015).

Conclusion

The study showed that feed intake decreased as the energy value of the feed increased, suggesting a low inclusion of energy level in the diet of broilers at finisher stage.

Recommendation

The study recommended that poultry chickens should be fed with diet containing 2 800 ME Kcal/Kg as it provides the least feed conversion ratio.

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