PERFORMANCE AND ECONOMICS OF PRODUCTION OF BROILER CHICKS FED DIETS WITH VARYING ENERGY LEVELS

O.F. AKINMOLADUN[1]; G.E. ONIBI[2] AND A.T. LOMUWAGUN[2]

[1]*Department of Environmental Biology and Fisheries, AdekunleAjasin University Akungba-Akoko, Nigeria.*
[2]*Department of Animal Production and Health, Federal University of Technology, Akure, Nigeria.*
E-mails: festykay123@gmail.com; gbengaonibi@yahoo.com Phone No: 07030793908

ABSTRACT

Three hundred and eighty-four unsexed Anak broiler chicks raised from day-old to 28days of age were used to evaluate the effects of different dietary energy levels on their performance. The experiment was of a completely randomized design (CRD). The diets were isonitrogenous. There were 3 dietary energy treatments (2786.80, 3015.40 and 3252.20 kcal/kg) and 4 replicates per treatment with 32 chicks per replicate. Birds were randomly selected for performance evaluation. The feed intake and live weight of the birds were determined weekly. Data were analyzed using descriptive statistics and analysis of variance. The final weight gained, total weight gained, average weight gained and FCR were significantly influenced ($P<0.05$) with chicks fed HES diet showing optimum performance. The results, however, indicated that the cost of feed per unit weight gain was lowest in High energy diet followed by Optimum and Low energy diets respectively.

Key words: Performance, Cost, Broiler Chicks, Energy

INTRODUCTION

Dietary energy-contributing ingredients are a major cost to boiler diets (Leeson and Summer 2001). In addition, dietary energy represents one of the most variable components in poultry ration. This could be attributed to changes in environmental temperature most especially in the tropics (Ghazalah e*t al.*, 2008). In Nigeria, like most other African countries, there is a quest for subsistence chicken production which depends primarily on the procurement of started chicks of 4-5 weeks old. At this age it is expected that the chicks would have been established enough to withstand management at household and peasant levels. Thus, there is a readily available market for the started chicks, hence, the need explore the optimum dietary energy that will optimize growth performance of chicks at this age for enhanced marketability. Studies have been conducted to examine the effects of dietary energy on performance of broiler chickens (Dozier *et al*, 2006, 2007; Ghaffari*et al*., 2007). Some reported that increasing dietary energy significantly decrease feed intake (Dozier *et al.*, 2006) and improve feed conversion (Saleh *et al.*, 2004). However, others have shown that there were no significant effects of varied dietary energy on feed intake (Leeson *et al.*, 1996). The present study was conducted with the aim of assessing the performance of broiler chicks fed diets with varying energy levels.

MATERIALS AND METHODS

A total of 384 unsexed one-day-old Anak broiler chicks were obtained from a commercial hatchery and reared from 1 to 28days of age. Three isonitrogenous diets were formulated comprising Low Energy Starter (LES; 2786.80kcalME/kg, 22.47%CP), Optimum Energy Starter (OES; 3015.40kcalME/kg, 22.45%CP) and High Energy Starter (HES; 3252kcalME/kg, 22.45%CP). The OES was based on acceptable range of ME used in commercial practice and meet the ME requirements for broiler chicks by NRC (1994). The gross and proximate composition of the experimental starter diets are shown in Table 1. After a 5-day pre-experimental period with the optimum energy diets, the chicks were randomly assigned to 3dietary treatments of 4replicates per treatment and 32 chicks per replicate in a completely randomized design. Feed and water were provided *ad libitum*. Other routine management procedures as practiced at the experimental farm (Teaching and Research Farm, Federal University of Technology, Akure) were strictly followed. Proximate analysis of the diets was carried out according to the procedure described by A.O.A.C (2000). Feed intake and weight gain were recorded at weekly intervals during the experimental period.

Statistical Analysis

Data were analyzed using the one-way ANOVA procedure of SAS software (SAS Institute, 2003). When dietary treatment was significant ($P<0.05$), means were compared using Duncan's multiple comparison procedure of the same statistical package

RESULTS AND DISCUSSION

Performance

Result of the growth performance of broiler chicks is shown in Table 2. There were significant differences ($P<0.05$) in the total weight gain of chicks with the highest weight reported for the HES diet. This is consistent with the findings of Jackson *et al.* (1982), Dozier *et al.*, (2006, 2007), and Ghaffari*et al.* (2007) who reported highest weight gain for broiler chickens fed the highest dietary energy. There were no significant differences ($P>0.05$) in the feed intake of the chicks, though quantity of feed consumed numerically decreased with increasing dietary ME. This result agrees with the findings of Leeson *et al.* (1996) who showed that there is no significant effect of varying dietary energy on feed intake. Inconsistencies abound in some studies as to whether broiler chickens has the ability to adjust caloric intake when fed varying dietary energy levels (Leeson*et al.,* 1996; Dozier *et al.*, 2006) or eat to some levels without recourse to the varying energy levels (Hildago*et al.*,2004; Saleh*et al.*, 2004).Feed conversion improved significantly ($P<0.05$) as the final weight (g/bird) and total weight gain increased significantly with the highest value recorded for chicks fed the HES diet. This result was in agreement with that of Dozier et al. (2007) who reported poorer feed conversion for broilers fed low average metabolizable energy diet. This implies that chicks on HES were better feed converter. This further indicates that broilers are able to adjust their feed intake to compensate for the increased dietary ME concentration.Economics of production analysis (Table 2) indicated that the feed cost per weight gain was lowest (₦327.48) in the HES diet as compared to OES (₦341.55) and LES (₦374.85) diets respectively.

Conclusion

This study showed that performance characteristics as well as cost of raising broiler chicks are affected by the varying dietary energy levels. It was concluded that the optimum performance for enhanced marketability, while minimizing cost, could be attained when the high energy starter diet is used.

REFERENCES

AOAC. Official Methods of Analysis of the Official Analytical Chemists (2000) (W. Horwitzed) 17th Ed, Association of Official Analytical Chemists, Washington DC USA.

Dozier, W.A.III, Price C.J., Kidd M.T., Corzo A., Anderson J. and Branton S.L. (2006). Growth performance, meat yield, and economic responses of broilers fed diets varying in metabolizable energy from 30 to 59 days of age. *J. Appl. Poult. Res.* 15:367–382

Dozier, W.A.III., Kidd, M.T., Corzo A. and Branton S.L. (2007).Dietary apparent metabolizable energy and amino acid density effects on growth and carcass traits of heavy broilers.*J. Appl. Poult. Res.* 16:192-205.

Ghazalah, A.A., Abd.Elsamee, M.O. and Ali, A.M. (2008). Influence of dietary energy and poultry fat on the reponse of broiler chicks to heat stress. International Journal of Poultry Science. 7(4): 355-359

Ghaffari, M., Shivazad M., Zaghari M. and TaherkhaniR., (2007). Effects of different levels of metabolizable energy and formulation of diet based on digestible and total amino acid requirements on performance of male broiler. *Int. J. Poult. Sci.* 6:276–279.

Hildago, M.A., Dozier III, W.A., Davis A.J. and Gordon R.W. (2004). Live performance and meat yield responses to progressive concentrations of dietary energy at a constant metabolizable energy-crude protein ratio. *J. Appl. Poult. Res.* 13:319-327

Jackson, S., Summers J.D. and Lesson S. (1982). Effect of dietary protein and energy on broiler carcass composition and efficiency of nutrient utilization.*Poult. Sci.* 61:2224–2231.

Leeson, S. and Summers, J.D. (2001). Energy.Pages 34-99 In Nutrition of the Chicken.University Books, Guelph, Ontario, Canada.

Leeson, S., Caston, L. and Summers, J.D. (1996). Broiler response to dietary energy.*Poult. Sci.* 75:529–535.

National Research Council (NRC) (1994).Nutrient Requirement of Poultry. 9th Rev. Ed. National Academy of Science, Washington D.C.

Saleh, E.A., Watkins, S.E., Waldroup, A.L. and Waldroup, P.W. (2004).Effects of dietary nutrient density on performance and carcass quality of male broilers grown for further processing.*Int. J. Poult. Sci.* 63:1-10

SAS institute 2000. SAS/STAT User's Guide.SAS Institute Inc., Cary, NC.

Table 1: Ingredients and nutrient composition of experimental starter diets

Ingredients	Low Energy	Optimum Energy	High Energy
Maize	38.00	56.00	55.00
Maize offal	15.00	-	-
Soyabean meal	Ĥ12.00 12.00	14.00	14.00
Groundnut cake	14.50	14.85	17.00
Brewers dried grain	6.35	5.00	-
Fish meal	5.00	5.00	5.00
Oyster shell	0.50	0.50	0.50
Rice bran	5.00	-	-
Palm oil	-	1.00	4.85
Bone meal	2.50	2.50	2.50
Salt	0.50	0.50	0.50
Lysine	0.15	0.15	0.15
Methionine	0.25	0.25	0.25
Premix*	0.25	0.25	0.25
Total	100	100	100
Calculated Composition			
Crude Protein%	22.47	22.45	22.42
Metabolizable Energy (Kcal/Kg)	2786.80	3015.40	3252.20
Ether Extract (%)	5.97	5.15	8.79
Crude fibre (%)	5.20	4.22	3.54
Calcium (%)	1.49	1.18	1.48
Phosphorous (%)	0.79	0.69	0.69
Lysine (%)	1.17	1.19	1.19
Methionine (%)	0.62	0.62	0.60
Energy: Protein	124.02	134.32	145.06
Proximate Composition			
Dry Matter%	92.74	93.43	93.00
Crude Protein%	21.48	21.48	21.53
Ether Extract%	4.36	6.06	6.06
Crude Fibre%	6.45	4.26	3.64
Ash%	8.13	8.51	8.97
Nitrogen Free Extract%	52.26	53.12	49.26

* supplied per kg of diet:Vit A, 10,000 IU; Vit D, 2,800 IU; Vit E, 35,000 IU; Vit K, 1,900 mg; Vit B12 19 mg; Riboflavin, 7,000 mg; Pyridoxine, 3,800 mg; Thiamine, 2,200 mg; D-Pantothenic acid, 11,000 mg; Nicotinic acid, 45,000 mg; Folic acid, 1,400 mg; Biotin, 113 mg; Cu, 8,000 mg; Mn, 64,000 mg; Zn, 40,000 mg Fe, 32,000 mg;

Table 2: Growth Performance of broiler chicks fed diets varying in energy levels

Parameters	LES	OES	HES
Initial weight (g/bird)	55.00±5.77	55.00±5.77	57.50±5.00
Final weight (g/bird)	800.00±73.50[b]	885.00±73.50[a]	920.00±46.90[a]
Total weight gained(g/bird)	745.00±70.50[b]	830.00±37.40[a]	862.50±49.20[a]
Total feed intake (g/bird)	1617.50±33.00	1580.00±14.10	1522.50±60.80
Average weight gained (g/bird)	26.61±2.52[b]	29.64±1.34[a]	30.80±1.76[a]
Average feed intake (g/bird/day)	57.77±1.18	56.43±0.50	55.45±2.17
Feed conversion ratio (FCR)	2.19±0.25[a]	1.91±0.81[b]	1.80±0.13[b]
Cost of feed consumed (₦)	172.65	179.42	185.52
Cost of feed/kg weight gain (₦)	374.85	341.55	327.48

LES=low energy starter, OES= optium energy starter, HES= high energy starter. Mean values bearing different superscript in a row differ significantly (P<0.05). Cost of feed: LES = ₦106.74/kg; OES= ₦113.56/kg; HES= ₦121.85/kg.