EFFECT OF PALM OIL TREATED WITH VITAMIN E IN DIET FOR BROILERS

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Abstract
A sixty-three day feeding trial was conducted to determine the effect of 12% inclusion level of palm oil treated with 0.13g of vitamin E/kg of feed for forty-eight day old Anak broiler chicks at starter and finisher phases. The diets each were formulated at the starter and finisher phases such that one diet (control) is without palm oil and vitamin E while another (test) had palm oil and vitamin E. the birds were allocated to the diets (treatments) using completely randomized design. Each treatment had 24 birds divided into 3 replicates. Energy and protein levels of the diet at the starter phase were 0.68MJ ME/kg and 23% crude protein (CP). At the finisher phase, energy and protein levels 0.71MJ ME/kg and 19.50% CP, respectively. The results of the experiment showed that average body weight (ABW) for birds in the test diet at the starter phase increased and was significantly ($P<0.05$) different. Also averages of feed intake (AFI) and body weight gain (ABG) were significant ($P<0.05$) and higher than that of the birds on control diet. Averages of efficiency of feed utilization (EFU) and metabolizable energy intake (MEI) for body maintenance had numerical increases but were not significant. At the finisher phase, ABW, AFI and ABG were significantly, ($P<0.05$) increased for birds on the test diet while EFU and MEI had numerical increases and were not significant. The carcass analysis revealed that the average weights of the gizzard, intestine, wing, kidney, heart, proventriculus, breast, drum stick, thigh, plucked, eviscerated and live were significantly ($P<0.05$) increased of the birds on the test diet. Parts of the neck and lung were significantly ($P<0.05$) different for birds on the control and higher than those on the test diet. The results of the experiment showed that birds on the test diets performed better than those on the control. Therefore the test diets enhanced growth of the broilers at starter and finisher phases, respectively.
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Introduction

Developing the poultry industry is the fastest means of bridging protein deficiency gap prevailing in most tropical countries (Anonymous a, 1990). At the present animal protein intake in Nigeria is below the recommended daily allowance (Shaibu *et al.*, 1997). Therefore, the current effort is geared towards boosting meat production to meet protein needs of average Nigerians living in the southeast part of Nigeria.

Maize form the bulk feed, therefore the main source of energy in ration formulation for birds. It is also consumed by humans as a staple food and used in industries exposing the product to undue competition. This has led to high cost of maize as energy source in broiler's diet. In order to solve the problem, in the study, palm oil is included to partly replace maize since oil has relatively 2.3 times more energy than maize per unit value (Lehninger, 2001).

Palm oil is readily available and cost effective in the southeastern part of Nigeria (Anonymous b, 2001). Oil reduces dustiness, enhances smell and taste and in turn intake of feed by animals (Crespo and Garcia, 2000). Chickens fed with diets containing oil showed better performance than those fed without oil (Moura, 2003). Pigs and chickens are able to incorporate dietary fatty acids directly into adipose and muscle tissue lipid, which may be a strategy for increasing human intake of unsaturated fatty acids (UFA) through the consumption of UFA-rich meat (Onibi, 1997).

Oxidation is the most common problem encountered in the use of high amount of oil inclusion, which may lead to rancidity of the broiler's diet. Blanch *et al.* (1995) recommended optimum inclusion level of 5% oil in ration for monogastrics. But oxidation can be controlled by the use of vitamin E as an antioxidant (MacDonald and Edwards, 1995).

Vitamin E is recognized as effective inhibition of lipid oxidation in food and biological system (Kamal Eldin and Appelqvist, 1996). It is an effective natural antioxidant, which is deposited in the cellular and sub-cellular fraction of muscle and adipose tissue (Onibi, 2000). There has been increased interest in the role of antioxidant nutrients due to their health benefits in disease conditions such as cancer, coronary heart disease and immune functions (Bendich, 1990; Diplock, 1991).

In the study, palm oil and vitamin E will be used to enhance growth of broilers at starter and finisher phases. Vitamin E is recommended as antioxidant at a level of 56mg/kg body weight of the bird (Anonymous c, 1980).

Materials and Methods

The experiment was conducted at the Teaching and Research Farm of Federal University of Technology, Owerri. Forty-eight day old Anak broiler chicks (females and males) were used in the study. The birds were distributed to treatments using completely randomized design. There were two treatments and each of the treatments had three replicates of eight birds per replicate.

Diets were prepared using 12% palm oil inclusion plus 0.13 g of vitamin E per kg of feed for

test diets (2 and 4) at starter and finisher phases. The control diets (1 and 3) had no palm oil and vitamin E. Diets were offered at the starter phase (1-5 wks) having energy and protein levels of 0.68 MJME/kg and 23% crude protein (CP) while at the finisher phase (6-9 wks) the energy and protein levels were 0.71 MJME/kg and 19. 5 % CP, respectively. Feed and water were given *ad libitum*. The gross composition of the feeds is as shown in Table 1.

All the necessary vaccines were administered to the chicks to build up immunity against diseases. At day one, intraocular vaccine was given while gumboro came on the 13th day and then again on 23rd day. Lasota was given on the 18th day. Administration of the vaccines was through the drinking water. The birds were given coccidiostats at the appropriate time at a recommended level specified by the manufacturer of the drug. The daily feed intake of birds was recorded. Also the birds were weighted every week for body weight gain. The prediction equation $0.35W^{0.75}$ MJ/d (Rose, 1997) was used to obtain the metabolizable energy intake for body maintenance. Where W represented the body weight of the bird in kg. At the end of the finisher phase, three birds per treatment were randomly selected, starved for twelve hours then slaughtered by using a knife to severe the vein at the neck region. Blood was allowed to drain then scalded and hand-plucked to remove the feathers and prepare birds for carcass analysis.

All data collected were subjected to analysis of variance while least significant differences method (Njoku *et al*. 1998) was used in separation of means.

Table 1 Gross Composition of Feeds (Percent)

	Experimental Diets			
	Starter Phase	**Finisher Phase**		
Parameters	1	2	3	4
Maize	50.40	9.23	69.01	28.83
Groundnut cake	26.43	7.32	21.21	13.33
Brewers' dried grain	11.17	42.64	0.26	31.77
Soybean meal	2.30	19.31	0.02	4.57
Palm oil	nil	12.00	nil	12.00
Fish meal	5.00	5.00	5.00	5.00
Bane meal	2.50	2.50	2.50	2.50
Salt	0.25	0.25	0.25	0.25
*Premix	1.00	1.00	1.00	1.00
Lysine	0.50	0.50	0.50	0.50
Methionine	0.25	0.25	0.25	0.25
Total	**100.00**	**100.00**	**100.00**	**100.00**
Cost of feed per kg (N)	57.20	62.40	58.50	62.40

*Vitamin-mineral premix contain per 2.5t of the product as follows: vitamin A 15,000,000 IU, vitamin D3 3,000,000 IU, vitamin E 30,000 IU, vitamin K 2,500mg, vitamin B1 2,000mg, vitamin B2 200mg, pantothenic acid 10,000mg, biotin 80mg, choline chloride 500g, antioxidant 125g, selenium 240mg, manganese 96g, zinc 60g, iron 24g, copper 6g, iodine 4g, cobalt 240mg.

Results and Discussion

Table 2, 3 and 4 showed the performance of the birds at the starter and finisher phases.

Table 2: Performance of birds on experimental diets at the starter phase.

	Experimental diets			
Parameters	**1**	**2**	**S.E.M**	
Initial body weight (g)	45.52	39.38		±4.34
Average body weights (g/5wks)	915.42^a	1172.92^b		±26.08
Average body weight gain (g/d)	42.83^a	53.07^b		±2.34
Average feed intake (g/5wk)	100.72^a	115.08^b		±4.69
Efficiency of feed utilize (gain/feed)	0.42	0.46	0.22	±0.03
Metabolizable energy intake (MJ/d)	0.19			±0.02

Note: superscript in a row with different alphabets are significantly ($p<0.05$) different.
S.E.M. = Standard Error of Mean.

Table 3: performance of birds on experimental diets at the finisher phase

Parameters	Experimental diets 3	4	S.E.M
Average body weights (g/9wks)	2011.11[a]	2229.17[b]	±46.84
Average body weight gain (g/d)	34.03[a]	41.96[b]	±2.61
Average feed intake (g/9wk)	142.80[a]	152.18[b]	±2.95
Efficiency of feed utilize (gain/feed)	0.24	0.28	±0.03
Metabolizable energy intake (MJ/d)	0.16	0.18	±0.02

Note: superscript in a row with different alphabets are significantly ($p<0.05$) different.
S.E.M. = Standard Error of Mean.

Table 4: Weights (g) of different parts of the birds at the finisher phase

Parameters	Experimental diets 3	4	S.E.M
Back	410.00	470.00	±28.09
Breast	200.00[a]	300.00[b]	±29.31
Crop	13.82[a]	14.26[b]	±1.69
Drum stick	390.00[a]	450.00[b]	±30.42
Eviscerated	1500.00[a]	2050.00[b]	±47.06
Gizzard	35.83[a]	69.85[b]	±9.40
Head	50.00	60.00	±3.50
Heart	6.82[a]	25.45[b]	±5.30
Intestine	62.39[a]	84.70[b]	±7.86
Kidney	1.33[a]	2.57[b]	±0.37
Liver	30.75	32.95	±1.52
Live	1525.00[a]	2100.00[b]	±160.44
Lungs	11.66[b]	9.46[a]	±0.57
Neck	100.00[b]	50.00[a]	±12.62
Plucked	1210.00[a]	1750.00[b]	±42.26
Proventriculus	9.70[a]	13.54[b]	±1.39
Shank	100.00	110.00	±7.45
Thigh	350.00[a]	470.00[b]	±25.74
Wing	110.00	140.00	±13.19

Note: superscript in a row with different alphabets are significantly ($p<0.05$) different.
S.E.M. = Standard Error of Mean.

The result of the experiment showed that average weight of body weight (ABW), body weight gain (ABG) and daily feed intake (AFI) were significantly ($p<0.05$) increased and were higher than those of bird on control diet at the starter phase. Averages of efficiency of feed utilization (EFU) and metabolized energy intake (MEI) for body maintenance had numerical increases but were not significant.

At the finisher phase, ABW, ABG and AFI were significant ($p<0.05$) increased for birds on the test diet while EFU and MEI had numerical increases and were not significant. The carcass analysis revealed that average weights of breast , drum stick, eviscerated, gizzard, heart, intestine, kidney, liver, plucked, proventriculus and thigh were significantly ($p<0.05$) increased for birds on the test diets. Parts of the neck and lungs were significantly ($p<0.05$) increased for birds on the control diets.

Thus most of the parameter measured increased significantly ($p<0.05$) with increased level of palm oil. This trend supported the work by Moura (2003) that chick fed with diets containing oil had enhanced growth than those on diets without oil. The metabolic function of vitamin E as a antioxidant (MacDonald and Edwards, 1995) sustained feed quality with improved smell and taste guaranteeing increased intake and absorption of feed (Crespo and Garcia, 2002) culminating in better performance of birds.

Conclusion

12 % inclusion level of palm oil 0.13g of vitamin E per kg of feed improved growth performance of broilers at birth starter and finisher

phases. Therefore, the test diets are recommended for use in poultry production.

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