APPRAISAL OF ENERGY AND PROTEIN REQUIREMENTS OF GROWING LOCAL TURKEYS (8 WEEKS TO 12 WEEKS OF AGE) REARED IN HOT HUMID TROPICS.

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ABSTRACT
The feeding trial was conducted to appraise the protein and energy requirement of growing turkeys (8-12 weeks) reared in hot humid tropics. A total of one hundred and thirty-five (135) 8 weeks old turkeys were used and they were randomly divided into nine experimental groups consisting of 15 turkey poults and replicated three times with 5 poults each. Each treatment group was balanced for their sexes. The groups were randomly assigned to 9 formulated diets in a 3 × 3 factorial arrangement involving three crude protein levels (23%, 24% and 26%) and three energy levels (2700kcal/kg ME, 2800 kcal/kg ME and 2900 kcal/kg ME). The diets were designated thus; T1: 20% CP+ 2900 ME; T2: 20% CP+ 3000 ME; T3: 20% CP+ 3100 ME; T4: 21% CP+ 2900 ME; T5: 21% CP+ 3000 ME; T6: 21% CP+ 3100 ME; T7: 22% CP+ 2900 ME; T8: 22% CP+ 3000 ME and T9: 22% CP+ 3100 ME. Data collected were subjected to Analysis of variance (ANOVA) and Duncan's New Multiple Range Test (DNMRT) was used to separate the means. Results showed that there were significant ($p<0.05$) differences in feed cost per kg feed (PPKF) feed cost (FC) and feed cost per kg gain (FCKG). The results showed that interaction of 21%cp and 3000ME had least FCKG (₦359.45). This study therefore recommends energy of 3000kcal/kg and protein of 21% CP for turkeys of 8weeks to 12weeks of age in a hot humid tropic.
Keywords: Turkey**,** Crude protein, Energy, Body weight, Feed intake, Feed cost.

INTRODUCTION

Turkey production is both an important and a profitable agricultural industry, with a rising global demand for its products (Anandh *et al.,* 2012). Local turkeys are about 1.05 million in Nigeria, being the smallest when compared with other poultry species (FAOSTAT, 2010). Improvement in performance of indigenous stock or populations' overtime can arise through improvement in management and feeding conditions and through genetic improvement by use of genetically superior animals (Yakubu *et al.,* 2012). Turkeys, like broiler chickens have a high requirement for protein and other nutrients in their diets. The rapid rate with which turkey poults grow demands an even higher level of nutrients in their feed than those of chickens. Since there is now greater tendency towards rearing turkeys under total confinement on all mash feed from day old to slaughter, it demands that they be fed properly balanced diets. This can be achieved by understanding the reproductive potentials of the local turkey and proper appraisal of their nutritional requirements vis-à-vis their energy and protein requirements at various stages of growth. This research was aimed at appraising the influence of different energy and protein levels on growth performances of local turkeys (8weeks to 12weeks) in a hot humid tropical environment.

MATERIALS AND METHODS

Study location and duration

The 28 days feeding trial was carried out at the Department of Animal Science Teaching and Research Farm, University of Nigeria, Nsukka.

Experimental animals, housing and management

A total of one hundred and thirty-five (135) 8 weeks old turkeys growers of mixed sexes were randomly divided into nine experimental groups consisting of 15 turkey growers each. Each treatment group was balanced for their sexes. Growers in each treatment group were housed in a 2.6m x 3m deep litter brooding pens with of fresh wood shavings that were changed when needed. Heat was provided by the use of kerosene stoves placed under metal hovers. Feed and water were provided to the birds *ad libitum* while additional light was provided at night using solar powered lamps to enable the birds eat at night. Dietary treatments were introduced from the onset of the feeding trial.

Dietary treatments and chemical analysis

The groups were randomly assigned to 9 formulated diets in a 3 × 3 factorial arrangement involving three crude protein levels (20%, 21% and 22%) and three energy levels (2900kcal/kg ME, 3000 kcal/kg ME and 3100 kcal/kg ME). The diets were designated thus; T1: 20% CP+ 2900 ME; T2: 20% CP+ 3000 ME; T3: 20% CP+ 3100 ME;

T4: 21% CP+ 2900 ME; T5: 21% CP+ 3000 ME; T6: 21% CP+ 3100 ME; T7: 22% CP+ 2900 ME; T8: 22% CP+ 3000 ME and T9: 22% CP+ 3100 ME. Representative samples of the diets were analysed to determine the proximate composition of crude protein, ether extract, crude fibre, ash according to the methods described by (AOAC,2000). Table 1 shows the ingredients and nutrient composition of the experimental diets, while the proximate composition of the diets is shown in Table 2.

Table 1: Percentage composition of the experimental Grower Turkeys Diets (8-12weeks)

Protein Level	**20%**			**21%**			**22%**		
Energy Level (Kcal/kg ME	2900	3000	3100	2900	3000	3100	2900	3000	3100
INGREDIENTS(KG)									
MAIZE	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00
WHEAT OFFAL	15.00	15.00	15.00	15.00	15.00	15.00	14.00	14.00	14.00
SOYA BEAN MEAL	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
PALM KERNEL CAKE	15.00	15.00	15.00	13.00	13.00	13.00	12.00	12.00	12.00
GROUNDNUT CAKE	13.00	13.00	13.00	14.00	14.00	14.00	15.00	15.00	15.00
FISH MEAL	3.00	3.00	3.00	4.00	4.00	4.00	5.00	5.00	5.00
PALM OIL	0.25	0.50	0.75	0.25	0.50	0.75	0.25	0.50	0.75
BONE MEAL	3.75	3.50	3.25	3.75	3.50	3.25	3.75	3.50	3.25
METHIONINE	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
LYSINE	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
LIME STONE	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
VIT./MIN PREMIX	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
SALT	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
TOTAL	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Calculated composition									
Crude fibre	5.41	5.41	5.410	5.32	5.32	5.32	5.38	5.38	5.38

VMP * vit A – 10,000.00 iu., D_3-2,000 iu., B_1-0.75g., B_2-5g., Nicotinic acid – 25g., Calcium pantothenate 12.5g., $B_1$2-0.015g., K_3-2.5g., E-25g., Biotin – 0.050g., Folic acid –1g., Manganese 64g., Choline chloride 250g. Cobalt-0.8g., Copper 8g, Manganese 64g, Iron –32G., Zn-40g., Iodine-0.8g., Flavomycin-100g., Spiramycin 5g., Dl-methionie-50g, Selenium 0.6g., Lysine 120g.,.

Measurements

The following parameters were determined: Initial Body Weight (kg), Final Body Weight (kg), feed intake (kg), feed conversion ratio, protein efficiency ratio,.

Statistical Analysis

Data collected were subjected to Analysis of variance (ANOVA) and Mean separation was done using Duncan's New Multiple Range Test option in(SAS, 2010), and differences were declared significant at $p<0.05$.

RESULTS AND DISCUSSION

Table 2 show the proximate composition of the Grower diets. There were significant ($p<0.05$) differences in total feed intake (TFI), feed cost per kg feed (PPKF) feed cost (FC) and feed cost per kg gain (FCKG) . There were no significant ($p>0.05$) differences in initial body weight (IBW), final body weight (FBW), total weight gain (TWG), average daily weight gain (ADWG), average daily feed intake (ADFI), feed conversion ratio (FCR) and protein efficiency ratio (PER). The results showed that grower turkeys in T9(3124.5) was statistical similar ($p>0.05$) with growers turkeys in groups T1(2520), T2(2255.1) T4(2479), T6(2629.1),T7(2287.15)and T8(2133.5) in total feed intake but significantly ($p<0.05$) higher in TFI than groups T3(1972.3) and T5(1868.4). There was a progressive increase in price per kg feed from turkey birds in T1 to T9. Birds under T2(396.76), T3(351.1), T5(355.01) had lower feed cost values than birds under T9(637.42) and these were statistical similar ($p>0.05$) to birds under T1(445.19), T4(468.0),T6(502.19), T7(462.10) and T8(433.12). Turkeys in T5 (359.45) has least value of feed cost per kg gain.

Table 2: Proximate composition of experimental diets for Grower phase feed

Parameters	Dietary treatments								
	T1	T2	T3	T4	T5	T6	T7	T8	T9
Dry matter	93.20	93.59	92.79	95.10	93.10	92.04	93.60	93.43	93.20
Ether extract	5.10	5.20	4.80	3.90	3.78	4.10	4.20	4.30	4.70
Crude protein	20.61	20.4	20.85	21.54	21.30	20.97	22.4	22.62	22.61
Crude fibre	5.875	5.60	5.26	4.70	4.85	5.05	5.73	5.75	5.67
Ash	11.85	11.30	10.62	9.50	9.80	10.20	11.55	11.60	11.43
NFE	49.77	51.09	51.26	52.66	53.37	51.72	49.73	49.16	48.80
Energy	2904.53	3042.66	3102..70	2905.43	3042.85	3102.4	2903.75	3052.13	3103.31

T1=20%CP&2900ME, T2=20%CP&3000ME, T3=20%CP&3100ME, T4=21%CP&2900, T5=21%CP&3000ME, T6=21%CP&3100ME, T7=22%CP&2900ME, T8=22%CP&3000ME, T9=22%CP&3100ME

The interaction effect of dietary inclusion of different protein and energy levels on the growth performances of local turkeys during grower phase 1 is shown in table 3.

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Table 3: The interaction effect of dietary inclusion of different protein and energy levels on the growth performances of local turkeys during grower phase 1

Protein and energy levels	T1	T2	T3	T4	T5	T6	T7	T8	T9	SEM
IBW(g)	469.50	470.00	471.92	472.50	469.92	478.17	472.17	524.83	487.42	17.25
FBW(g)	1514.00	1301.80	1275.91	1371.80	1461.42	1455.17	1350.80	1473.59	1638.00	77.89
TWG(g)	1044.50	831.15	804.00	899.30	991.50	977.00	878.63	948.75	1150.58	75.97
ADWG(g)	37.30	29.68	28.71	32.12	35.41	34.89	31.38	33.88	41.09	2.71
TFI(g)	2520.75^{ab}	2235.13^{ab}	1972.38^{b}	2479.00^{ab}	1868.4^{b}	2629.15^{ab}	2287.75^{ab}	2133.50^{ab}	3124.5^{a}	227.92
ADFI(g)	90.03	79.83	70.44	88.54	66.73	93.90	81.71	76.20	89.27	7.49
FCR	2.5176	2.69	2.47	2.76	1.89	2.69	2.61	2.24	2.19	0.22
PER	1.87	1.48	1.44	1.53	1.69	1.66	1.43	1.54	1.87	0.13
FEEDCOST/KG(₦)	176.61^{i}	177.51^{h}	178.01^{g}	189.01^{f}	190.01^{e}	191.01^{d}	202.01^{c}	203.01^{b}	204.01^{a}	0.01
FEEDCOST(₦)	445.19^{ab}	396.76^{b}	351.10^{b}	468.50^{ab}	355.0^{b}	502.19^{ab}	462.15^{ab}	433.12^{ab}	637.42^{a}	44.64
FEEDCST /KG GAIN(₦)	444.63^{ab}	477.60^{ab}	439.94^{b}	521.43^{a}	359.45^{c}	514.08^{a}	526.45^{a}	455.29^{ab}	447.17^{ab}	32.44

T1=20%CP&2900ME, T2=20%CP&3000ME, T3=20%CP&3100ME, T4=21%CP&2900, T5=21%CP&3000ME, T6=21%CP&3100ME, T7=22%CP&2900ME, T8=22%CP&3000ME, T9=22%CP&3100ME.

The present study showed that there were not much significant differences in energy and protein interaction. However, in feed cost per kg gain, turkeys on diet T5 (₦359.45) had least value. It is therefore recommended that a combination of 21%cp and energy 3000kca/kg will be cost effective in improving the growth performance of growing turkeys from ages of eight to twelve weeks. This finding is in agreement with NRC (1994) that recommended standard energy and protein requirement for growing turkey at 3000kcalkg and 22%cp for 8-12weeks of age. TNAU (2009) recommended 3000kcal//kg and 22%cp for growing turkeys. This study also supports the nutrient requirement standard for organic growing turkey with energy between 3150-3250kcal/ kg and 20-25%cp for protein of commercial Nicholas Turkeys (Jacquire 2010). The present study differs from Lesson and Summers (1997) that recommended energy 3050kcal/kg and 23% cp. The lower energy and protein requirements that favoured the present study are an indication that the nutrient requirements for temperate breeds cannot be used to judge our tropical turkeys. Meremikwu (2009) stated that nutritional standards such as NRC (1994) may over-specify diets in many low-income, resource-poor countries (particularly those in the humid tropics) because of environmental constraints.

CONCLUSION

The results showed that at interaction of 21%cp and 3000ME, a least cost per kg gain (₦359.45) were achieved using the above protein and energy combinations. This study therefore recommends energy of 3000kcal/kg and protein of 21% CP for grower turkeys of 8weeks to 12weeks of age in a hot humid tropic.

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