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GROWTH PERFORMANCE AND ECONOMIC CHARACTERISTICS OF TURKEY POULTS FED MILLET-BASED DIETS AS A REPLACEMENT FOR MAIZE

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ABSTRACT

A nine (9) weeks feeding trial was conducted on seventy two (72) day-old turkey poults to determine their growth performance and economic characteristics when fed three dietary treatments (T_1 , T_2 , and T_3) containing 0 %, 25 % and 50 % replacement of maize with millet respectively. Parameters studied included weekly feed intake, weekly body weight gain, feed conversion ratio and certain economic characteristics. The performance of turkey poults fed millet at 25 % replacement showed significant ($P < 0.05$) differences from those of other treatments in terms of body weight gain and feed conversion ratio; T_2 had the highest body weight gain of 807.20g while T_1 and T_3 had 740.20g and 731.25g respectively. There were no significant ($P > 0.05$) differences in terms of feed intake, feed conversion ratio and mortality across the treatments. Also, no significant ($P > 0.05$) difference occurred in total cost of feed consumed per bird, but the treatments were significantly ($P < 0.05$) different in terms of cost of feed per kg live weight gain and in the revenue generated per bird, as T_2 had the lowest cost of feed (₦287.26) per kg live weight gain followed by T_3 (₦308.99) and T_1 (₦314.42) respectively; revenue generated was highest in T_2 (₦401.36) and lowest in T_1 (₦349.35), with T_3 having ₦349.80. Therefore, it can be concluded that millet can be used to replace maize up to 50 % in the diets of turkey poults at the starter phase with good performance; but better results are obtained with 25 % replacement.

KEY WORDS: Turkey poults, growth performance, economic characteristics.

INTRODUCTION

Turkey production in Nigeria has largely remained at the smallholder level due to high cost of feed, inconsistency in feeding programmes, as well as lack of knowledge on the adequate levels of its nutrient requirements (Ojewola *et al.*, 2002). The tremendous increase in human population and high demand for animal feedstuffs, which caused rapid increase in cost of feed, has led to the search for alternative cheap energy sources for livestock animals by farmers. This is as a result of the fact that the increasing cost of feed has led to poor feeding of livestock, as feed cost is estimated to represent over 70% of the total cost of producing poultry intensively (Oguntowora, 1984).

Durunna *et al.* (2000) reported that maize is the major source of energy in poultry feeds and constitutes about 50 % of poultry diets. Unfortunately, the rapid growth of human population has intensified the competition between man and livestock for this cereal grain, resulting in high cost of feeds and consequently high prices of poultry products, leading to very low levels of protein intake in most developing countries (Abdulrashid and Agwunobi, 2009). One important measure that can be taken to alleviate this situation is the use of alternative

energy sources like millet and sorghum which are produced extensively in the semi-arid areas. Singh *et al.* (2000) exonerated millet from the anti-nutritional factors (phytate and tannins) found in sorghum, and that millet is superior to sorghum in protein content, protein efficiency and metabolizable energy. Hence, the main objective of this research study is to determine the most optimum dietary inclusion level of millet in the diets of turkey poults at the starter phase (as a replacement for maize) that will produce the best growth performance with the least cost.

MATERIALS AND METHODS

The Experimental Diets

Three isocaloric and isonitrogenous diets were formulated as treatment T_1 , T_2 and T_3 representing 0 %, 25 % and 50 % replacement of maize with millet, with treatment T_1 being the control diet (Table 1). The feed ingredients used for this experiment were purchased from the Central Market, Minna, and from other commercial feed ingredients depots within Minna, Niger State.

The Experimental Animals and their Management

The experimental design used in the research work was a Completely Randomized Design (CRD) model. Seventy two (72) day-old turkey poults obtained from Animal Care Centre, along Okada road, Minna, were used for this research study. They were purchased from Topmost Chicks, Ibadan, Oyo State. Before the arrival of the birds, the pens were thoroughly washed and disinfected. Hours to arrival, all equipments were put in place (feeders, drinkers, bulbs, heat source etc) and heated to a suitable temperature. On arrival, the birds were weighed and allocated randomly into three dietary treatment groups of twenty four (24) birds per treatment and two replicates per diet consisting of twelve birds per replicate.

The birds were fed *ad libitum* with the experimental diets for nine weeks. Routine management operations such as daily removal of left-over uneaten feed, washing of drinkers, provision of clean drinking water and cleaning of the environment were carried out. A standard vaccination programme was followed strictly, and medications such as antibiotics, coccidiostats and anti-stress were administered appropriately.

Parameters Determined

The following parameters were determined using the procedures of Adesida *et al.* (2010) as follows:

(i) Average daily feed intake: This was obtained by subtracting the quantity of the left-over uneaten feed from the quantity of feed supplied to the birds per day.

(ii) Weekly body weight gain: This was measured by subtracting the body weight of the birds the preceding week from the body weight of the birds the following week.

(iii) Feed conversion ratio (FCR): This was obtained by dividing the average feed intake per bird per week by the body weight gained per bird per week for each treatment.

$$FCR = \frac{\text{Average feed intake per bird per week (g)}}{\text{Average body weight gain per bird per week (g)}}$$

(iv) Total cost of feed consumed per bird (in ₦): This was the cost per kg of feed (₦/kg) multiplied by the total feed intake per bird (kg).

(v) Cost of feed per kg live weight gain (in ₦): This was obtained by dividing the total cost of feed consumed per bird by the total body weight gain (kg).

(vi) Revenue generated per bird in ₦ (RG): This was obtained using the formula:

$$RG = (\text{Weight of bird} \times \text{Price /kg live weight}) - (\text{Cost of feed/kg} \times \text{Total feed intake})$$

Chemical Analysis

The experimental diets were analyzed for moisture, crude protein, crude fibre, ether extract, ash and nitrogen free extracts using the procedures of AOAC (2000).

Statistical Analysis

The data obtained from this research study was subjected to a one-way analysis of variance (ANOVA) according to the Completely Randomized Design (CRD) model using the SPSS Package (Statistical Package for the Social Sciences, Version 2000). Where treatment means were significant, they were separated using the Duncan Multiple Range Test using the procedures of Steel and Torrie (1980).

RESULTS AND DISCUSSION

The results obtained from this research study are presented in Table 2.

Feed intake was not significantly ($p>0.05$) different among the different treatment groups but total body weight gain was significantly ($p<0.05$) higher for birds on 25 % replacement of maize (807g) than those on 50 % replacement (731g) as well as those on the control diet (740g). This is contrary to the result obtained by Tornekar *et al.* (2009) when pearl millet was used to replace maize in the diets of broiler chicks from 0-42 days old. The authors found that birds on 50 % replacement grew significantly ($p<0.01$) faster than birds on 25 % and 0 % replacement. Also, from the results obtained above, feed conversion ratio (FCR) was significant ($p<0.05$) among the treatment groups, with T_2 (2.53) being significantly better than T_1 (2.75) and T_3 (2.74). Whereas, in the research work by the same authors above, FCR was significantly ($p<0.01$) superior in T_1 , followed by T_2 and T_3 respectively. Hence, they concluded that pearl millet (Bajra) can replace between 25-50 % maize in broiler ration without affecting their performance; while Davies *et al.* (2003) also found that the performance and carcass yield of broilers fed diets containing up to 50 % pearl millet were equivalent or better than those of broilers fed typical corn-soybean diets.

There were no significant ($p>0.05$) differences in mortality and total cost of feed consumed per bird across the treatments, but significant ($p<0.05$) differences existed in cost of feed per kg live weight gain and revenue generated per bird; with T_2 having the lowest cost per kg live weight gain (₦287/kg) and the highest revenue generated per bird (₦401).

CONCLUSION

The result of this research work shows that turkey poult fed millet at 25 % replacement for maize performed better ($P < 0.05$) than those of other treatments in terms of body weight gain, feed conversion ratio, cost of feed per kg live weight gain and revenue generated per bird. Hence, it can be concluded that though millet can be used to replace up to 50 % maize in the diet of turkey poult at the starter phase, but better results are obtained with 25 % replacement.

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Table 1: Composition of the experimental diets

Ingredients (%)	T ₁ (Control diet)	T ₂ (25 % replacement)	T ₃ (50 % replacement)
Maize	42.00	31.50	21.00
Millet	0.00	10.50	21.00
Groundnut cake	45.00	43.60	43.00
Wheat offal	3.30	4.00	4.00
Fish meal	5.00	5.00	5.00
Palm oil	0.20	0.90	1.50
Lysine	0.50	0.50	0.50
Methionine	0.50	0.50	0.50
Bone meal	3.00	3.00	3.00
Common salt	0.25	0.25	0.25
*Premix	0.25	0.25	0.25
Total	100.00	100.00	100.00
Calculated composition			
Crude protein	28.75	28.50	28.52
Metabolizable energy (Kcal/kg)	2786	2769	2756
Analyzed composition			
Dry matter	97.40	95.20	93.40
Crude protein	28.40	28.35	28.88
Crude fibre	6.00	4.00	3.00
Ash	8.00	10.00	8.50
Ether extract	18.50	17.00	15.50
Nitrogen free extracts	33.80	35.85	37.52

*Each 2.5kg premix contained: Vit. A-10,000IU; Vit.D₃-2,000,000 IU; Vit. K-2.250mg; Thiamine-1,750mg; Riboflavin-5,000mg; Pyridoxine-2,750mg; Niacin-27,500mg; Vit.B₁₂-15mg; Pantothenic acid-7,500mg; Folic Acid-7,500mg; Biotin-50mg; chloride-400g; Magnesium-80g; Zinc-50g; Iron- 20g; copper-5g; Iodine-1.5g, selenium-200g and cobalt-200mg.

Table 2: Growth performance and economic characteristics of turkey poult fed millet as a replacement for maize at the starter phase

Parameters	Diet T ₁ (Control Diet) (25 %	Diet T ₂ (50 %	Diet T ₃ Replacement)	SEM	LS
Initial body weight (g/bird)	35.94	36.98	36.46	0.27	NS
Final body weight (g/bird)	776.14 ^b	844.18 ^a	767.71 ^b	16.70	*
Total body weight gain (g/bird)	740.20 ^b	807.20 ^a	731.25 ^b	16.52	*
Daily body weight gain (g/bird)	11.75 ^b	12.81 ^a	11.61 ^b	0.26	*
Total feed intake (g/bird)	2033.10	2036.36	1998.95	18.69	NS
Feed conversion ratio (FCR)	2.75 ^a	2.53 ^b	2.74 ^a	0.05	*
Mortality (%)	8.30	4.15	16.65	3.35	NS
Cost per kg of feed (₦/kg)	114.48	113.82	113.05	—	—
Total cost of feed consumed per bird (₦)	232.75	231.78	225.98	2.36	NS
Cost of feed per kg live weight gain (₦/kg)	314.42 ^a	287.26 ^b	308.99 ^a	5.45	*
Revenue generated per bird (₦)	349.35 ^b	401.36 ^a	349.80 ^b	11.51	*

*Means with different superscripts were significantly ($p < 0.05$) different

NS = not significant