



Performance of Broilers Starter Fed Diets Containing Varying Crude Protein Levels

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Authors' contributions

This work was carried out in collaboration among all authors. Author ISH designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors FAM and AUH managed the analyses of the study. Authors MSR, UZS and II managed the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

Experiment was conducted in the Livestock Research and Teaching Farm Usmanu Danfodiyo University Sokoto. To determine the performance of broiler starter fed diets containing varying crude protein levels (23, 25 and 27% CP) diets tagged T1, T2 and T3 were compounded respectively. Using two hundred and ten (210) Ross 308 day old chicks were used replicated seven times each treatment had 10 chicks per treatment. Feed intake, water intake and body weight of the birds were determined and compared. Result of final body weight, body weight gain, feed intake and feed conversion ratio were significantly different ($P < 0.05$), for all the treatment while water intake and percent mortality showed no significant difference ($P > 0.05$). It could be concluded that in this ecological zone, feeding up to 27% CP to broiler starters promotes live weight gain and feed efficiency.

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1. INTRODUCTION

The traditional system of poultry rearing in the tropics is characterized by small scale operation, low productivity of indigenous breeds with poor feed conversion efficiency, as well as heavy parasitic and disease infections [1]. In Nigeria, a considerable proportion of the population depends on back yard small scale poultry production for the supply of eggs and meat. Under these circumstances the introduction of improved scientific production methods, alongside development of highly productive hybrids will go a long way to encourage and make small scale poultry rearing attractive [1,2]. However, the problem of malnutrition, particularly protein malnutrition is common in most developing countries of the world, where the level of animal protein intake represents only about one tenth of the level of intake in some developed countries. For instance, it has been estimated that egg consumption in Nigeria was 20 – 25 eggs per head per annum, compared with 250 – 300 eggs in some developed countries [2].

Poultry keeping provides a way by which rapid transformation in animal protein consumption can be achieved. However, this can only take place if the production processes is modernized [3]. Modern production methods require that birds are fed appropriately in order to fully exploit their

potentials. It is in this regard that this project was designed to determine the appropriate protein levels in the diets of broiler starter chicks. The main objective of this research work was to evaluate the performance of broiler starter chicks fed diets with varying crude protein levels, in terms of feed intake, water intake, live weight gain and feed conversion efficiency.

2. MATERIALS AND METHODS

2.1 Experimental Site

The experiment was conducted at the Sokoto State Veterinary Centre, Aliyu Jodi road in Sokoto metropolis. Sokoto State is located in the Sudan savannah zone in the extreme North-Western part of Nigeria, between longitudes 4°E and 6°54'E and latitudes 12°0'N and 13°54'N [4]. The mean annual rainfall is 750mm, and mean annual temperature is 34.9°C, with the highest temperature occurring in April (41°C) and the minimum (13.2°C) occurring in January [4,5].

2.2 Experimental Diets

Three isocaloric (3000 kcal/kg ME) diets, but varying in crude protein content (23, 25 and 27% crude protein), designated as T₁, T₂ and T₃ respectively were formulated. The three diets contained same levels of other nutrients as shown in Table 1.

Table 1. Gross and chemical composition of the experimental diets

Ingredients	Treatments		
	T ₁	T ₂	T ₃
Maize	46.65	42.75	38.60
Groundnut cake	35.20	41.00	47.20
Wheat offal	14.15	12.35	10.40
Bone meal	2.50	2.50	2.50
Premix	0.25	0.25	0.25
Salt	0.35	0.35	0.35
Methionine	0.35	0.35	0.35
Lysine	0.50	0.44	0.35
Total	100.0	100.0	100.0
Chemical composition			
ME (kcal/kg)	3000	3000	3000
Crude protein (%)	23	25	27
Lysine (%)	1.2	1.2	1.2
Methionine	0.6	0.6	0.6
Calcium	1.0	1.0	1.0
Available phosphorus	0.6	0.6	0.6
Fibre	4.0	4.0	4.0

2.3 Experimental Birds

Two hundred and ten Ross 308 day old chicks were used in the experiment. They were randomly divided into three treatment groups and replicated seven times. Each replicate had ten (10) chicks, given a total of 70 chicks per treatment. Each treatment was fed one of the experimental diets. The birds were reared on deep litter. Feed and water were provided *ad-libitum*. The experiment lasted for four weeks.

2.4 Data Collection

Feed intake was measured as the difference between the amount of feed offered and the amount of left over. Body weight gain was monitored weekly. Daily water intake was determined as the difference between the amount of water given and the amount of left over. Mortality was also recorded as it occurred.

2.5 Statistical Analysis

Data collected from the experiment were subjected to analysis of variance (ANOVA) using Statview Statistical Package [6], and means were separated using Duncan's Multiple Range Test. All statements of significance were based on probability level of 0.05%.

3. RESULTS AND DISCUSSION

Performance characteristics of the experimental birds are presented in Table 2. The initial body weights of the birds were similar ($P>0.05$) for all the treatments.

The final live weights were significantly ($P=0.05$) affected by the protein levels. Thus live weight increased significantly from 494 g/b for T1 (23% CP) to 611 g/b for T3 (27% CP) Similarly, live

weight gain significantly ($P=0.05$) increased from 429 g/b for T1 to 547 g/b for T3 Feed intake was also significantly higher ($P=0.05$) for T3 (37.5 g/b/d) compared to T1 (32.4 g/b/d). The value recorded for T2 (35 g/b/d) (25% CP) did not differ significantly between the treatments).

These results are in agreement with the earlier work of Smith [7] who observed that an increase in protein level of the diet from 15 to 23 percent increased feed intake by broilers.

On the other hand, [8], observed no significant effects of dietary protein levels on feed consumption when they increased the protein content of the diets from 17 to 23 percent. This study shows better utilization of available nutrients in the feed with increased protein concentration. Bookholt [9], postulated that weight gain is mainly deposition of fat, protein and water. There have not been consistent reports on the effects of CP levels on the performance of broilers. [10], reported that reducing dietary CP down to 19% did not have a significant effect on broiler performance when compared with birds fed on higher protein diets. Babu et al. [11] also reported comparable feed intake, weight gain and feed: gain ratio for broilers subjected to low CP diets compared with those on higher CP diets. On the other hand, Plavnik and Hurwitz [12] reported that broilers fed low CP diets gained the least body weight compared to those fed higher CP levels. Morris [13] also reported 25% growth retardation by feeding low CP diets.

Water intake did not differ significantly between the treatments, even though it increased from (84 mls/b/d) for T1 to (89 mls/b/d) for T3. These values are in line with the observation that broilers would drink 2g of water for each 1g of feed consumed [14]. Broilers in the

Table 2. Performance of broiler starter fed experimental diets from day old to 4 weeks of age

Parameters	Treatments			
	T1	T2	T3	SEM
Initial body weight (g/b)	65.571	64.857	64.000	1.325
Final body weight (g/b)	494.143 ^b	542.286 ^a	611.429 ^c	13.085
Weight gain (g/b)	428.571 ^a	477.429 ^b	547.429 ^c	12.942
Total Feed intake (g/b)	906.825 ^b	977.778 ^{ab}	1048.810 ^a	28.392
Feed intake (g/b/d)	32.387 ^b	34.921 ^{ab}	37.457 ^a	1.014
Water intake (ml/b)	2349.048	2413.016	2482.790	57.263
Water intake (ml/b/d)	83.895	86.179	88.671	2.045
Feed conversion ratio	0.183 ^b	0.196 ^a	0.199 ^a	0.004
Mortality percentage	4.286	4.286	4.286	2.020

^{abc}: Means in the same row with different superscripts are significantly different ($P < 0.05$)

different groups had comparable water intake, which is an indication that none of the dietary protein levels investigated in this study predisposed the birds to water stress. Besides, birds were raised under the same environmental conditions, thus, eliminating the effect of environment on water consumption.

Mortality averaged 4.3% across the treatments ($P=0.05$), indicating that the various protein levels used did not affect livability of the birds. [15] also reported that varying CP levels in the diets of broilers did not affect livability.

4. CONCLUSION

It could be concluded that in this ecological zone, feeding up to 27% CP to broiler starters promotes live weight gain and feed efficiency.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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