



RESPONSE OF BROILER CHICKENS TO FIVE COMMERCIAL DIETS IN BAUCHI METROPOLIS, BAUCHI STATE, NIEGRIA

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ABSTRACT

The study was conducted to evaluate growth performance, carcass characteristics and cost benefit of broiler chickens fed five commercial diets in Bauchi town of Bauchi state. Two hundred and twenty-five (225) day old chicks were assigned to five dietary treatments in replicates of three containing fifteen chicks each in a completely randomized design. Feed and water were supplied ad libitum and the experiment lasted for 35 days. Growth performance parameters include daily feed intake, daily weight gain, final weight gain, total weight gain, feed conversion ratio and feed efficiency were studied. The final weight gain, total weight gain and daily weight gain were significantly ($P < 0.05$) affected by the dietary treatments. The highest values of final weight gain (1522.70 g), total weight gain (1426.30 g) and daily weight gain (50.94 g) were obtained on diet 4, although it did not differ from those fed diet 1. Total feed intake (2077.30-2203.70 g), feed conversion ratio (1.54-1.74) and feed efficiency (0.58-0.66) were not affected by the diets. Most of the carcass characteristics were significantly influenced by the different commercial diets except weights of the head, large intestine, gizzard as well as the length of the small intestine. The highest dressing percentage value of 74.74% was observed in broiler chickens fed diet 4 which did not differ from the value of 71.21% for those fed diet 5. The feed cost per kilogram body weight gain ranged between ₦ 456.90 and ₦ 485.04 with the lowest value obtained in broiler birds fed diet 2. It was concluded that diet 4 gave the best growth performance and carcass yield with lower abdominal fat pad. However, diet 2 was slightly more commercial.

Keywords: Broiler performance, Response, Carcass, Cost benefit, Commercial diets.

INTRODUCTION

The poultry industry is growing rapidly across Sub-Saharan Africa and offers a multitude of potential economic and health benefit to their economies and population (Shaw *et al.*, 2019). Animal protein market trends are rising globally and the sector is expected to be one of the fastest growing agricultural sectors in the coming decade (Adeyemi *et al.*, 2021).

Despite the increase in livestock production Fasuyi and Aletor (2005) reported that per capita consumption of animal protein had been on the decline for the past decades. This was due to inadequate supply of animal products from livestock industry. Available statistics indicated that Nigeria was ranked high amongst countries where the intake of protein is low, it is estimated on the average that Nigerians consumed about 7g of protein per day instead of 28g/head/day as recommended by FAO (Uchegbu *et al.*, 2009). The shortage of animal protein among average Nigerians demands logical solution such as an increase in the production and consumption of poultry products. Although, best logical solution to Nigeria meat scarcity is to increase broiler chicken production (FAO, 2006). However, nutrition is perhaps the most important consideration in livestock management. Inadequate supply of feeds, nutritionally unbalance rations, adulterated ingredients or stale feeds are some of the factors responsible for low productivity of livestock in tropics (Ogundipe and Sanni, 2002). Given the increasing



number of people venturing into poultry business, there is no doubt that there is a high demand for commercial feeds. There is now a tendency for feed manufacturers to produce substandard feeds, especially as the quality control agencies in Nigeria are non-functional as noted by Omede (2008). This appears that the farmers, consumers and the public at large are left at the mercy of commercial feed millers or manufacturers and raw materials producers and processors, the findings of Uchegbu *et al.* (2009) showed variation in the performance of birds fed with different commercial diets. Hence the need for the study to examine the response of feeding some selected commercial diets on the overall performance/carcass yield of broiler chickens periodically.

MATERIALS AND METHODS

The experiment was conducted at the Abubakar Tafawa Balewa University, Teaching and Research Farm situated within the southern savannah on latitude 10°18' 37.2'' North and longitude 9°50' 38.0'' at an altitude of 590 m above sea level. There are two distinct seasons in the area. A rainy season, which starts in May and ends in October and dry season that starts from November to April with mean annual rainfall of 1009mm the highest relative humidity of 94% is around August and lowest of 35% in February. Temperature ranged from 13-17°C in December-February between 36-37°C March and April (World Atlas, 2015).

Two hundred and twenty-five (225) unsexed broiler chicks bought at day old from reputable source in Bauchi were brooded for a period of one week before the commencement of the four-week feeding trial. After which were randomly divided into five treatment groups, each group was further replicated three times with 15 chicks each and were randomly assigned to the five commercial diets in a Completely Randomized Design (CRD). Five commonly available broiler commercial feeds in Bauchi used for the experiments were purchased from recognized feed dealers in Bauchi metropolis coded Diets 1, 2, 3, 4 and 5. The chicks were subjected to the same experimental and management conditions. Feed and water were provided *ad libitum*.

The parameters measured were feed intake, weight gain, feed conversion ratio, feed efficiency, mortality, carcass characteristics and cost benefit at weekly interval. At the end of the feeding trial, a total of 45 birds, three from each replicate, were randomly selected from the five treatments, fasted for 12 hours before they were slaughtered. Each bird was weighed and the carcass characteristics were immediately measured using an electronic weighing balance calibrated in grammes.

Data generated were subjected to one-way analysis of variance (ANOVA) as described by Steel and Torrie (1980) using the computer software package Minitab version 17 and significant differences between treatment means were separated using Least Significant Difference (LSD). The cost benefit analysis of the broiler chickens fed different commercial diets were calculated based on the price of feed as at the period of the experiment.

RESULTS AND DISCUSSION

The growth performance of broiler chickens fed five commercial diets is presented in Table 1. The final weight (1348.30 – 1522.70 g), total weight gain (1250.70 – 1426.30g), daily weight gain (44.67 – 50.94 g) were significantly ($P < 0.05$) affected by the commercial diets with the highest values obtained on diet 4. However, initial weight (93.02 – 97.62 g), total feed intake (2077.30-2203.70 g), daily feed intake (74.19–78.70 g), feed conversion ratio (1.54 – 1.74) and feed efficiency (0.58 – 0.66) were not influenced by the diets. Only two birds died during the feeding trial. These observations were comparable the values reported by Sanusi *et al.* (2015) in broiler chickens fed self-formulated and four commercial diets. The authors



reported highest values of 77.55 g, 43.36 g and 2.29 for daily feed intake, daily weight gain and feed conversion ratio respectively.

Table 1: Growth performance of Broiler Chicken Fed Different Commercial Diets

Parameters	Diets					SEM
	1	2	3	4	5	
Initial weight(g)	95.40	97.62	93.02	96.43	94.45	2.82 ^{NS}
Final weight (g)	1366.30 ^{ab}	1348.30 ^b	1357.10 ^b	1522.70 ^a	1356.20 ^b	26.93*
Total weight gain (g)	1270.90 ^{ab}	1250.70 ^b	1263.90 ^b	1426.30 ^a	1261.70 ^b	26.88*
Daily weight gain (g)	45.39 ^{ab}	44.67 ^b	45.15 ^b	50.94 ^a	45.06 ^b	0.96*
Total feed intake (g)	2203.70	2100.30	2077.30	2184.20	2114.30	52.18 ^{NS}
Daily feed intake (g)	78.70	74.94	74.19	78.01	75.51	1.85 ^{NS}
Feed conversion ratio	1.74	1.68	1.65	1.54	1.66	0.05 ^{NS}
Feed efficiency	0.58	0.59	0.61	0.66	0.60	0.02 ^{NS}
Mortality	0	1	0	1	0	—

^{abc} means within row with different superscripts differed significantly * = (P<0.05), SEM = Standard Error of Mean, NS = Not Significant.

The carcass characteristics of broiler chickens fed five commercial diets are presented in Table 2. Most of the carcass parameters measured were significantly affected by the commercial diets except the weights of the head, large intestine, gizzard and length of small intestine. The live weight (1491.10 – 1733.30 g), plucked weight (1330.00 - 1655.60 g), eviscerated weight (1126.70 – 1420.00 g), carcass weight (1007.80 – 1292.20 g) and dressing percentage (67.57 – 74.74%) were significantly (P<0.001) influenced by the diets with highest values obtained on diet 4 which was also similar to diet 1 except the carcass yield where diet 4 and 5 were similar. These observations were similar to the values reported by Sanusi *et al.* (2015) and Uchegbu *et al.* (2009) in broiler chickens fed different commercial diets under tropical environment. Sanusi *et al.* (2015) reported the range of dressing percentage values of 68.99 – 71.09% for broiler chickens fed self-formulated and commercial diets. Most of the organs and chicken offals were similar to the values of Sanusi *et al.* (2015) and lowest abdominal fat pad was found on diets 5, 4 and 2.



Table 2: Carcass and Organs Characteristics of Broiler Chickens Fed Five Commercial Diet

Parameters	Diets					SEM
	1	2	3	4	5	
Live Weight (g)	1638.90 ^{ab}	1516.70 ^b	1491.10 ^b	1733.30 ^a	1514.40 ^b	40.80***
Pluck weight (g)	1508.90 ^{ab}	1391.10 ^b	1330.00 ^b	1655.60 ^a	1416.70 ^b	35.90***
Eviscerated weight (g)	1244.70 ^{ab}	1173.30 ^b	1126.70 ^b	1420.00 ^a	1180.00 ^b	31.40***
Carcass weight (g)	1151.10 ^{ab}	1032.20 ^c	1007.80 ^c	1292.20 ^a	1077.80 ^{bc}	24.18***
Dressing percentage	70.11 ^{bc}	68.07 ^c	67.57 ^c	74.74 ^a	71.21 ^{ab}	0.94***
As a percentage of live weight						
Head	2.84	2.70	2.96	2.88	2.78	0.092 ^{NS}
Legs	4.09 ^a	3.51 ^b	3.44 ^b	3.71 ^{ab}	3.41 ^b	0.11***
Liver	3.42 ^a	3.29 ^{ab}	2.99 ^b	3.09 ^b	3.60 ^a	0.11*
Proventriculus	0.54 ^a	0.54 ^a	0.48 ^{ab}	0.48 ^{ab}	0.47 ^b	0.022**
Heart	0.50 ^b	0.63 ^a	0.61 ^a	0.56 ^{ab}	0.42 ^b	0.025***
Lungs	0.57 ^b	0.69 ^{ab}	0.74 ^a	0.78 ^a	0.66 ^b	0.031***
Kidneys	0.30 ^{ab}	0.23 ^b	0.27 ^b	0.37 ^a	0.37 ^a	0.018***
Pancreases	0.39 ^{ab}	0.37 ^b	0.42 ^a	0.28 ^{bc}	0.26 ^c	0.024***
Caecum	0.73	0.73	0.74	0.70	0.78	0.060 ^{NS}
Spleen	0.12 ^{cd}	0.17 ^c	0.19 ^{bc}	0.28 ^b	0.45 ^a	0.021***
Abdominal fat	0.75 ^a	0.70 ^b	0.71 ^{ab}	0.70 ^b	0.53 ^b	0.036***
Large Intestine (g)	0.16	0.17	0.24	0.19	0.19	0.020 ^{NS}
Small Intestine (g)	4.65 ^a	4.88 ^a	4.27 ^{ab}	3.91 ^b	4.15 ^b	0.21*
Large Intestine (cm)	8.43 ^{cd}	9.12 ^c	10.00 ^{ab}	10.11 ^a	9.17 ^{bc}	0.20***
Small Intestine (cm)	192.83	186.56	195.89	190.11	197.67	3.77 ^{NS}
Crop	1.16 ^a	0.76 ^{ab}	0.58 ^b	0.63 ^b	0.92 ^a	0.10*
Gizzard	3.00	3.00	3.00	2.67	3.23	0.13 ^{NS}

^{abc} means within row with different superscripts differed significantly * = (P<0.05), SEM = Standard Error of Mean, NS = Not Significant.

The cost benefit analysis is shown in Table 3. The highest feed cost per kilogram of ₦ 320.00 was observed on diet 4, while the lowest was obtained on diet 2 (₦ 272.00). The feed cost per kilogram body weight gain was highest on diet 4 (₦ 487.83) whereas the lowest value of ₦ 456.96 was found on diet 2. The variation observed is a reflection of the nutrient density, nutrient availability and prices of finished feed as well as final body weight of the bird. This trend is in agreement with the reports of Sanusi *et al.* (2015), Uchegbu *et al.* (2009), Ogundipe (2002) and Mubarak and Ahmed (2019) in broiler chickens' production.

Table 3: Cost Benefit of Broiler Chickens Fed Five Commercial Diets

Parameters	Diets				
	1	2	3	4	5
Total feed intake (kg)	2.20	2.10	2.08	2.18	2.11
Feed cost per kg (₦)	280.00	272.00	284.00	320.00	280.00
Total feed cost (₦)	616.00	571.20	590.72	697.60	590.80
Total weight gain (kg)	1.27	1.25	1.26	1.43	1.26
Feed cost per kg gain (₦)	485.04	456.96	468.83	487.83	468.89



CONCLUSION AND RECOMMENDATIONS

The growth performance and carcass yield showed that broiler chickens fed diet 4 performed better than those on the other diets. However, diet 2 was slightly more economical. Further study should be conducted with other poultry species to evaluate their productive performance, carcass yield, haematology, serum biochemical indices and financial benefit.

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