CARCASS AND GUT CHARACTERISTICS OF BROILER CHICKENS FED DIFFERENT COMMERCIAL DIETS

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ABSTRACT
An experiment was conducted to evaluate the response of broiler chickens to five different commercial diets. Two hundred and fifty day-old chicks were randomly allotted to five diets in replicates of three containing 16 birds each in a completely randomized design. Feed and water were supplied ad libitum and the feeding trial lasted for 42 days. Results for Carcass analysis revealed that diet B gave the highest ($P<0.05$) carcass weight of 2.06kg. Dressing percentage was higher on diets A (70.51%) and B (68.52%). It was therefore concluded that diet B gave better carcass yield at reduced feed cost, hence recommended for broiler chicken producers.
Keywords: Commercial diets, Broiler chickens, Carcass and Gut Characteristic

INTRODUCTION
The development of the poultry industry has been identified as the fastest way of bridging the animal protein deficiency gap. Although CBN (2019), has reported that the poultry industry is the most commercialized of all the Nigeria's agricultural subsectors with a current worth of about N1.6 trillion, it is yet to attain its full potentials in the country. The World Data Atlas (2017) revealed that in 2006, Nigeria produced 232,100 mt of poultry meat. However, this quantity decreased to 201,493 mt in 2017. A number of factors might be responsible for this decline. Notable among them is the increasing cost of poultry feed ingredients and that of finished commercial feeds that often contain sub-standard nutrient levels. Energy is a property of energy-yielding nutrients. Basically, it is produced when carbohydrates, lipids and proteins are oxidized during metabolism. According to Carre and Juin (2015) and Emmanuel *et al*. (2018), energy sources form the major single constituent (40 - 50 %.) in broiler chicken diets. Metabolizable energy (ME) which is measured in kilocalories is the standard measure used to describe the energy requirement of poultry (NRC, 1994). Dietary ME plays a central role in metabolic, maintenance and production processes. Poultry feeding programmes are established based on energy requirements to allow for optimization of production and economic targets (Sakomura *et al.*, 2014). Metabolizable energy levels are implicated in broiler feed intake regulation (Leeson and Summers, 2001; Emmanuel *et al.*, 2018). Ghaffari *et al*. (2007) reported that as dietary energy level increases, birds satisfy their energy needs by decreasing feed intake. Therefore, when formulating broiler diets, nutrient requirements have frequently been expressed per unit of dietary metabolizable energy. At the moment, there is limited literature on the response of broiler chickens to different commercial feeds sold in Bauchi metropolis. It is therefore the aim of this study to add to the body of knowledge in that area.

MATERIALS AND METHOD
Experimental Site
The study was carried out at the poultry farm, college of Agriculture, Bauchi, situated on latitude 10018' North, longitude 9050' and at an altitude of 590m 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 which starts from November to April. The mean annual rainfall is 1091mm (World Atlas, 2015).

Experimental Diets

Five different commercial diets available and commonly used by broiler chicken farmers in Bauchi metropolis were used in the study. For convenience, the feeds were designated A, B, C, D, and E.

Table 1: Composition (%) of different commercial starter and finisher diets.

	Diets				
Composition	**A**	**B**	**C**	**D**	**E**
Starter					
(ME Kcal/kg) (min)	2800	2850	2900	2900	2900
Crude Protein (min)	21.0	23.0	20.0	21.0	20.0
Crude Fibre (min)	5.0	3.0	4.5	4.8	5.0
Crude fat (min)	4.0	4.5	5.0	6.0	5.5
Finisher					
ME Kcal/kg) (min)	2900	2850	3000	3000	2900
Crude Protein (min)	18.0	18.5	18.0	18.0	18.0
Crude Fibre (min)	6.0	5.0	6.0	6.0	6.5
Crude fat (min)	5.5	6.0	5.0	6.0	5.8

Experimental Birds and their Management

A total of two hundred and fifty unsexed, day-old Cobb 500 broiler chicks obtained from a reputable hatchery were used for the experiment. Two weeks prior to the birds' arrival, the study pens were cleaned washed, disinfected and fumigated. Similar treatment was also made on the feeders, drinkers and other equipment. A week after, wood shavings were spread on the floor of the experimental pens to a depth of approximately 3 inches. Thereafter, adequate heating/lighting facilities, feeders, and drinkers were provided.

Brooding, which was done for a period of 7 days, commenced with the arrival of chicks. Two 200W electric bulbs were used to provide the necessary warmth needed in the brooding room while Vital super starter®, a commercial feed, wasted to the birds ad lib. Birds were also given the first dose of IBDV (Gumboro vaccine) at 7 days. Followed by an anti-stress Vitalyte® for two consecutive days. Another vaccine, New Castle Disease Vaccine NDCV (LASOTA) was also administered on the 14th day.

Thereafter, the birds were randomly allotted to five commercial diets in replicates of 3 containing 16 birds each in a Completely Randomized Design (CRD). Diets and clean drinking water were offered ad libitum throughout the 42-day trial period. Birds were also given the second dose of Infectious Bursal Disease vaccine (Gumboro vaccine) (Booster) on the 21st day and another of NCDV a week after. All vaccines and drugs were orally administered.

Experimental Design

The experiment were conducted in a completely randomized design (CRD), (Steel and Torrie, 1980).

Data Collection

Carcass analysis

At the end of the finisher phase, thirty birds, two from each replicate, were randomly selected from the five treatments (15 replicates) and fasted for 12 hours before slaughter. Each bird was weighed and slaughtered. Weights of carcasses and internal organs were immediately measured using an electronic balance calibrated in grams. Dressing percentage (DP) was obtained using the relationship.

$$DP = \frac{CW}{LW}\ X\ 100\%$$

Where DP= Dressing percentage, CW= carcass weight and LW= live weight.

RESULTS AND DISCUSSION

The results for carcass and gut characteristics of broiler chickens fed different commercial diets are presented in Table 2. All the carcass parameters considered in this study showed significant (P<0.05) influence of diet. This agrees with Sanusi *et al.* (2015) but was at variance with the report of Sogunle *et al.* (2009). In terms of dressing percentage, broilers in this research dressed lower than 79.31 – 81.09% reported by Sogunle *et al.*, (2009) but similar to 64.45 – 70.68% (Abdel-Raheem and Abd- Allah, 2011). The significant difference obtained in vital organs; liver, heart, and kidney disagrees with the findings of Sogunle *et al.* (2009) and Sanusi *et al.* (2015) in similar experiments. . Most of the parameters studied showed significant influence of diet. Live weight of birds was significantly (P<0.05) higher on diet B (3.00 kg) and lower on diet A (2.39 kg). However, diet D (2.84 kg) did not differ from diet B. similarly, diets C (2.84 kg and) and E (2.15 kg) were similar to diet A. Plucked weight was highest (P<0.05) on diets B (2.63 kg) and C (2.64 kg) and lowest on diet E (1.81 kg). eviscerated weight was also higher (P<0.05) on diet B (2.26 kg) which was similar to diet D (1.99 kg) and lower on diets A (1.79 kg), C (1.83 kg) and E (1.53 kg). in the same way, carcass weight was higher (P<0.05) on diet B (2.06 kg) which did not differ from diet D (1.77 kg) and lower on diets A (1.69 kg), C (1.68 kg) and E (1.41 kg). In terms of dressing percentage, all diets with the exception of diet D (61.59%) had significantly (P<0.05) higher mean values (65.35 – 70.51%). However, diet D was comparable to diets C and E. Head weight expressed as percentage of live weight did not differ among treatments (1.88 – 2.05%). Birds on diet A (3.76%) had heavier (P<0.05) shanks thank those on other diets (3.27 -3.42%). Lung weights did not show any significant influence of diet (0.48 – 0.60%). The intestines of birds fed diet A (3.97%) were heavier (P<0.05) than that of birds fed other commercial diets (2.81 – 3.05%). However, no significant effect of diet was recorded on intestinal length (243.33 – 273.00%). Kidney weight was higher (P<0.05) on diet E (0.67%) which was similar to diets C (0.62%) and D (0.63%). On the other hand, liver weight was lower on diet E (1.43%) and higher on diet D (2.34%). Birds on diets A (1.93%), B (1.83%) and (1.96%), were similar. Relative weight of abdominal fat was higher (P<0.05) on diet E (0.87%) which compared favourably with diets C (0.74%) and D (0.78%). Birds on diets A (0.72%) and B (0.64%) had lower abdominal fat weights which were similar to diets C and D. Heart weight showed a significant (P<0.05) influence on diet. Diet D (0.50%) was higher than other diets (0.32 – 0.38%). Gizzard weight relative to live weight was significantly (P<0.05) higher on diets C (1.70%), D (1.55%) and E (1.69%) which were similar. Broiler chickens fed diet B (1.34%), had the lowest mean value which was lower than 1.53% recorded on diet A. Caecal weight was higher (P<0.05) on diet A (0.48%) and lower on other diets (0.34 – 0.37%) which did not differ. Pancreas (0.19 – 0.21%) and spleen (0.17 – 0.25%) weights did not differ among diets.

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

Parameter	A	B	C	D	E	SEM
Live weight (kg)	2.39[cd]	3.00[a]	2.57[bc]	2.84[ab]	2.15[d]	0.13*
Plucked weight (kg)	2.18[b]	2.63[a]	2.22[b]	2.64[a]	1.81[c]	0.12*
Eviscerated weight (kg)	1.79[bc]	2.26[a]	1.83[bc]	1.99[ab]	1.53[c]	0.11*
Carcass weight (kg)	1.69[b]	2.06[a]	1.68[b]	1.77[ab]	1.41[b]	0.11*
Dressing percentage (%)	70.51[a]	68.52[a]	65.66[ab]	61.59[b]	65.35[ab]	2.17*
Head, shank and visceral organs expressed as a percentage of live weight						
Head	2.03	1.88	2.05	2.02	1.93	0.06[NS]
Shanks	3.76[a]	3.42[b]	3.32[b]	3.31[b]	3,27[b]	0.09*
Lungs	0.60	0.60	0.55	0.53	0.48	0.04 [NS]
Intestinal weight	3.97[a]	3.05[b]	2.95[b]	2.95[b]	2.81[b]	0.24*
Intestinal length (cm)	273.00	258.33	250.33	264.17	243.33	10.65 [NS]
Kidney	0.57[b]	0.55[b]	0.62[ab]	0.63[ab]	0.67[a]	0.03*
Liver	1.93[b]	1.83[b]	1.96[b]	2.34[a]	1.43[c]	0.13*
Abdominal fat	0.72[b]	0.64[b]	0.74[ab]	0.78[ab]	0.87[a]	0.05*
Heart	0.34[b]	0.37[b]	0.38[b]	0.50[a]	0.32[b]	0.03*
Gizzard	1.53[b]	1.34[c]	1.70[a]	1.55[ab]	1.69[a]	0.05*
Caeca	0.48[a]	0.36[b]	0.37[b]	0.34[b]	0.36[b]	0.03*
Pancreas	0.19	0.21	0.21	0.21	0.20	0.01 [NS]
Spleen	**0.21**	**0.17**	**0.19**	**0.25**	**0.19**	**0.03** [NS]

[b a, c, d] Means bearing different super scripts within the same row differ; * = ($P<0.05$); NS= Not significant; SEM = standard error of mean.

CONCLUSION AND RECOMMENDATION

Carcass analysis revealed a significant influence ($p<0.05$) of diet in favour of diet B due to Higher carcass yield that was obtained on diet B than other diets (A, C, D and E), therefore diet B is recommended for broiler chickens feeding

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