EFFECTS OF DIFFERENT LEVELS OF CAMEL RUMEN CONTENT ON CARCASS CHARACTERISTICS OF BROILER CHICKENS IN THE SEMI – ARID ZONE OF NIGERIA

G. MOHAMMED[1], L. G. ASHEIKH[1], U. M. KOLO[1*], Z. M. CHANA[1], A. A. MUSA[1] AND Y. USMAN[2]

[1]*Department of Animal Science, University of Maiduguri, Maiduguri, Nigeria.*
[2]*Sir Kashem Ibrahim College of Education Maiduguri, Maiduguri, Nigeria*
**Correspondence:08038329041;uskolo220@gmail.com*

ABSTRACT

The effects of feeding different levels of camel rumen content CRC on carcass characteristic of broilers chickens were evaluated. The camel rumen content was included at 0, 5, 10, 15 and 20% levels into diets 1, 2, 3, 4 and 5 respectively as replacements for maize and groundnut cake. One hundred and fifty (150) day-old Hover Marshal breed broiler chicks were randomly assigned to the five diets in a Completely Randomized Design (CRD). Each treatment was replicated three times with10 birds per replicate. The experimental diets and drinkable water supplied *ad libitum* throughout the experimental period of nine weeks. At nine week of the experiment 3 birds per replicate were selected for carcass measurement. The backs, hearts, kidneys, lungs, liver and spleen were not significantly ($P > 0.05$) different among the treatment groups while others parameters were significantly ($P<0.05$) different among the treatment groups. However, all the values recorded were comparable with values of other workers who slaughtered broiler chickens with similar weight and ages. Therefore, the study indicating that can up to 20% CRC can replace with maize and groundnut cake without adverse effect on the carcass parameters of broiler chickens.

Keywords: Broiler chickens, camel rumen content and carcass characteristics.

INTRODUCTION

In Nigeria, the supply of protein from animal origin such as egg, meat and milk had been in short however, demand is increasing as rapid increased in human population. Most Nigeria's are poorly fed and suffer from malnutrition due to lack of protein of animal origin (Ajala and Balogun, 2004). The animal protein shortage is higher among the rural communities which constitute the majority of Nigerian population. The competition that exists between human, industries and monogastric animals is the major limitation of animal protein shortage in Nigerian. The increase in price of the feed ingredients in developing countries as a result of competitions for livestock and other sectors has greatly reduced the role of expansion of the poultry industries in Nigerian. In order to arrest this trend, emphasis has been directed toward the use of non-conventional feed ingredients in order to reduce feed cost and hence cost of production, thus making it possible for people to be able to afford animal protein in their menu (Ojebiyi *et al.*, 2006). Rumen content is one of the non-conventional feed ingredient which is available in abattoir and slaughter houses within Nigeria and could served as good source of protein in livestock diet if properly processed and harness (Adeniji, 2001). This study was therefore, conducted to evaluate the effects of feeding different levels of camel rumen content (CRC) on carcass characteristics of broiler chickens.

MATERIALS AND METHODS

Location of the study

The study was conducted at the Livestock Teaching and Research Farm, Department of Animal Science, University of Maiduguri, Maiduguri, Borno State, Nigeria. Maiduguri is located on latitude 11° 15' North and longitude 30° 05' East and on an altitude of 345 m above sea level (Ugherughe and Ekedolum, 1986).The relative humidity ranges from 30 to 50% (Encarta, 2007). The rainfall is between 500 to 600 mm. It has a short period of rainfall (3 to 4 months) usually from June to September

followed by long period of dry season (8 to 9 months) (Encarta, 2007).

Preparation of the camel rumen content (test ingredient)

The camel rumen contents were collected in a clean container during slaughter from Maiduguri abattoir, Borno State, Nigeria. The camel rumen content was sun-dried for 5 days on a clean dry slab. The dried sample was ground in a hammer mill and analysed for proximate composition (AOAC, 2000).

Experimental diets

The commercial diet was fed for 0- 4 weeks of age and experimental diets for broiler finisher (4-9 weeks) are presented in Table 1. The experimental diets were locally formulated with ingredients including maize, wheat offal, camel rumen content (test ingredient), groundnut cake, fish meal, bone meal, premix, methionine, lysine and salt. The camel rumen content was included at 0, 5, 10, 15, and 20% levels into 1, 2, 3, 4 and 5 diets respectively.

Carcass characteristics

At the end of the experiment, nine chickens (three chickens from each replicate based on average weight of the group) from each treatment, were selected for slaughter. They were deprived of feed for 12 hours as recommended by (Mann, 1960). Drinking water was provided. Withholding feed for 12 hours before slaughter reduced the volume of gut contents and hence bacteria, and therefore reduced the risk of contamination of the carcass during dressing without adversely affecting meat yield and quality. The chickens were weighed in the morning and slaughtered by cutting transversely across the trachea, oesophagus, large carotid arteries and jugular veins to ensure maximum bleeding. Slaughter birds were scalded in hot water (about 50°C) for (1) minute, feathers manually removed. Dressing percentage was obtained as percentage of the dressed weight after removing the feathers. They were then eviscerated for carcass yield and organs weight determination. The carcass yield and organs weight were weighed and calculated as percentage of the dressed weight.

Statistical analysis

All the data collected were subjected to analysis of variance (ANOVA) using the Complete Randomized Design (Steel and Torrie, 1980; Mann, 1960). Means were separated where applicable using the Duncan's multiple range tests (Duncan, 1955).

RESULTS AND DISCUSSIONS

Proximate analysis of the experimental diets and camel rumen content

The proximate composition of the experimental diets and camel rumen content are presented in Table 1. The camel rumen content had the dry matter 93.70%, crude protein 23.70%, crude fibre 28.10%, ether extract 3.0%, ash 12.0% and nitrogen free extract 33.70% which was similar to the values reported by (Mohammed *et al.*, 2008) who analyses camel rumen content. The crude protein (CP) values ranges from 19.50 to 20.80% in 20% CRC diet and 10% CRC diet which was similar to the result of (Gwayo *et al.*, 2006) who fed analyses diet contained goat rumen content and report the values 19.70% to 20.00%. The crude fibre levels increased linearly as the level of CRC increase in the diets with highest value of 8.69% in 20% CRC diet while the lowest value (3.71) was obtained in control (0% CRC) diet, which was agreed with the report by (Gwayo *et al.*, 2006) with the ranges of 4.42 to 9.50%. The ether extract decreased with increased levels of CRC in the diets. The highest value was recorded in control (0% CRC) diet and lowest value was obtained in 20% CRC diet. The highest ash value (9.00) was recorded in 5% CRC diet and the lowest value (3.0) was revealed in 15% CRC diet. The NFE values were numerically similar in all the treatments. The Metabolizable energy (kcal/kg) was higher in the control (0% CRC) diet compared to CRC-based diets. This may be attributed to lower energy content of CRC compared to maize and groundnut cake. However, all the values were adequate as reported by (Onu *et al.*, 2011) for broiler finisher diets in Nigeria.

Carcass characteristics

The carcass characteristics are presented in Table 2. The back, heart, kidneys, lungs, liver and spleen were not significantly ($P>0.05$) different among the treatment groups. The result indicated that there were no effects on these organs, even at higher levels of 20% CRC inclusion in the diets of broilers at finisher stage. The live weight, dressing percentage, thighs, breast, drumstick, head, neck, intestine weight, proventiculus and gizzard were significantly ($P<0.05$) different among the treatment groups.

The live weights of broilers chickens fed control (0%) and 5% CRC diets were heavier compared to other treatments. The broilers chickens fed 15% CRC diet had better dressing percentage than those on 20% CRC diet but were similar (P>0.05) to other treatment groups. The thighs of broilers chickens fed 15% CRC diet was significantly (P<0.05) heavier weight than those fed 20% CRC diet but did not differ from those fed control (0%) and 5% CRC diets. However, the lowest thighs weight value was obtained in broiler chickens fed 20% CRC diet. The breast of broiler chickens fed control (0%), 10% and 15% CRC diets were heavier (P<0.05) weight than those fed 20% CRC diet but were similar to those broiler chicken fed 5% diet. The drumstick and head were heavier in weight at 15% CRC compared to those fed other treatment groups. The neck of broiler chicken fed 15% CRC diet was superior compared to broiler chicken fed 10 and 20% CRC diets but were not significantly (P>0.05) different from those fed control (0%) and 5% CRC diets.

The intestine of broiler chickens fed 20 % CRC diet was heavier weight compared to those fed control (0%) and 5% CRC diets but were similar to broiler chickens fed 10% and 15% CRC diets. The heavier weight of the intestine of broiler chickens on CRC – based diets may be attributed to higher fibre of these diets. Esonu *et al.* (2008) reported increase in weight and length of the various segments of the gastro-intestinal tract in rabbits fed high fibre diets. He explained this as an adaptation to accommodate more feed to compensate for the reduced energy density of high fibre diets. Also the proventiculus of broiler chickens fed 20% CRC diet was heavier weight than those fed 15% CRC diet but did not differ from other treatment diets. The gizzard of broiler chickens fed 20% CRC diet heavier in weight than control (0%) CRC diet but did not differ from other treatments diets. The pattern of gizzard weights could be linked to the slightly higher feed intake of the groups on CRC-based diets. All the parameters measured were similar to results obtained by (Esonu,*et al.*, 2008) who slaughtered broiler chickens with similar weight and ages. As protein quality is an important factor in muscle deposition, the similarity in the yield of carcass and organs weight with other workers may indicate the protein utilization was not significantly affected by the different levels of camel rumen content.

CONCLUSION

Based on the carcass characteristics, up to 20% CRC can be included in the diets of broiler chickens. This is a good indication that this level of camel rumen content (CRC) can be fed to broiler chickens carcass yield of the broiler chickens. However, there is need investigates different processing methods that could enhance the utilization of the camel rumen content by poultry.

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Table 1: Proximate composition of experimental diets.

Nutrient (%)	Levels of different camel rumen content in the diets (%)					
	0	5	10	15	20	CRC
Dry matter	90.90	94.10	93.80	91.8	92.70	93.70
Crude protein	20.00	19.90	20.80	19.7	19.50	23.70
Crude fibre	3.71	4.98	6.20	7.45	8.69	28.10
Ether extract	7.50	6.00	3.70	2.00	2.00	3.00
Total Ash	4.60	9.00	4.90	3.00	4.50	12.00
Nitrogen-free extract	54.19	54.22	54.54	59.65	58.01	56.90
ME(Kcal/kg)	3271.25	3147.11	3004.05	3008.48	3001.08	2070.85

ME = Metabolizable energy calculated according to the formula of Pauzenga, U. (1985).: ME = 37x% CP+81x%EE+35.5% x NFE

Table 2: Carcass characteristic of broilers chicken fed graded levels of camel rumen

	Levels of different camel rumen content in the diets					
Parameters	0% CRC	5% CRC	10% CRC	15% CRC	20% CRC	SEM
Live weight	2782.10^{a}	2657.10^{a}	2494.60^{b}	2369.00^{b}	2346.70^{b}	72.55*
Dressing percentage (%)	69.21^{ab}	70.23^{ab}	68.94^{ab}	76.14^{a}	64.54^{b}	4.07*
As % of slaughter weight						
Thighs	11.61^{ab}	11.67^{ab}	10.91^{bc}	12.50^{a}	10.21^{c}	0.06*
Back	16.95	17.72	16.28	17.64	15.28	1.40^{NS}
Breast	17.15^{a}	16.09^{ab}	17.10^{a}	17.36^{a}	14.86^{b}	0.98*
Drumstick	9.53^{b}	9.50^{b}	9.08^{b}	10.85^{a}	9.08^{b}	0.46*
Head	3.20^{b}	2.88^{b}	3.16^{b}	3.84^{a}	3.26^{b}	0.24*
Neck	4.94^{ab}	4.72^{ab}	4.36^{b}	5.88^{a}	4.36^{b}	0.62*
Heart	0.43	0.57	0.53	0.51	0.51	0.09^{NS}
Kidney	0.61	0.55	0.45	0.52	0.56	0.17^{NS}
Liver	2.77	3.39	3.06	3.41	2.93	0.36^{NS}
Lungs	0.70	0.62	0.74	0.68	0.56	0.14^{NS}
Intestine weight	8.13^{b}	7.95^{b}	9.66^{ab}	10.39^{ab}	11.23^{a}	1.19*
Proventiculus	0.55^{ab}	0.74^{ab}	0.60^{ab}	0.41^{b}	0.56^{a}	0.13*
Gizzard	4.00^{b}	4.51^{ab}	4.69^{ab}	5.04^{ab}	5.52^{a}	0.53*
Spleen	0.15	0.22	0.22	0.14	0.22	0.06^{NS}

NS = Not significant (P>0.05); * = Significant; a, b, c = Means within the rows bearing different superscripts differ significantly (P<0.05); SEM = Standard error of mean

Table 3: Ingredients composition of broiler finisher diets

	Levels of camel rumen content in the Diets (%)				
Ingredients	0%CRC	5%CRC	10%CRC	15%CRC	20%CRC
Maize	56.29	53.67	51.04	48.40	45.78
Groundnut cake	24.96	22.58	20.21	17.85	15.47
Camel rumen content	0.00	5.00	10.00	15.00	20.00
Wheat offal	12.00	12.00	12.00	12.00	12.00
Fish meal	3.00	3.00	3.00	3.00	3.00
Bone meal	3.00	3.00	3.00	3.00	3.00
Premix*	0.25	0.25	0.25	0.25	0.25
Methionine	0.10	0.10	0.10	0.10	0.10
Lysine	0.10	0.10	0.10	0.10	0.10
Salt	0.30	0.30	0.30	0.30	0.30
Total	100.00	100.00	100.00	100.00	100.00

*Premix supplied the following per 100kg of diet. Vit.A -15,00IU; Vit. D3 –300,000IU; Vit. E-3000IU; Vit. K- 2.50mg; Thiamine –2005mg; Riboflavin(B_2) -600mg; Pyriodoxine(B_6) -600mg; Niacin -40mg; Vit.B_{12} -2mg; Pantothenic acid -10mg; Folic acid -100mg; Biotin -8mg; Choline chloride -50 g; Antioxidant -12.5g; Manganese -96g; Zinc -6g; Iron -24g; Copper -0.6g; Iodine -0.14g; Selenium-24mg and Cobalt-214mg