

GROWTH PERFORMANCE AND CARCASS CHARACTERISTICS OF BROILER CHICKENS FED WITH GRADED LEVELS OF ROSELLE CALYX (*Hibiscus sabdariffa* L.)

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ABSTRACT

The study evaluated the effect of graded levels of the Roselle calyx (*Hibiscus sabdariffa* L.) on growth performance and carcass characteristics of broiler chickens. A total of one hundred and fifty (150) Arbor acre broiler birds were used for the six (6) weeks study, they were randomly assigned to five treatments of thirty birds each, (T₁, T₂, T₃, T₄ and T₅) which had broiler chicks fed with feed incorporated with Roselle calyx as feed additive at 0%, 0.5%, 1%, 1.5%, and 2% respectively. The birds were further randomly sub-divided into three replicates of ten birds each using a Completely Randomized Design. Data were collected on feed intake, weight gain and feed conversion ratio was computed. At the end of the study, two birds were randomly selected from each replicate for the carcass characteristics and evaluation. The data obtained were subjected to ANOVA and means were separated using the Duncan Multiple Range Test. The result of obtained showed that the initial weight, average daily feed intake, total feed intake and carcass characteristics were not significantly different across the treatment means while the final weight, total weight gain and total feed intake value were significantly differed with the highest value of final weight at T₁ (1266.67g/b) and lowest value at T₄ (1133.33g/b). It was therefore concluded that the inclusion level of Roselle calyx at 1% compared favorably with the control.

Keywords: Roselle calyx, growth performance, carcass characteristics, broiler chickens.

INTRODUCTION

Poultry is used to describe any type of domesticated bird kept for meat and eggs production such as domestic fowl and turkey (Akinsanmi, 1994). They are generally bred for rapid growth. Broilers are good converters of feed, the average feed consumption is 5-6kg in eight weeks in which 2kg feed will produce 1kg of body weight at ratio 2:1 (Babatunde and Fetuga, 1976). The production of high quality animal protein has been one of the major problem facing developing countries in which Nigeria is inclusive. This has led to serious malnutrition in people (Solanke, 1989).

Roselle (*Hibiscus sabdariffa* L.) belongs to the family Malvaceae, locally called "karkade", it is an important annual crop grown successfully in tropical and sub-tropical climates (Copley, 2000). Roselle is a multi-use plant, whose outer leaves (calyx), also known as natal sorrel is frequently used in the production of jelly, jam, juice, wine, syrup, gelatin, pudding, cake, ice cream and flavoring. Its brilliant red color and unique flavor make it a valuable food product (Tsai and Ou, 1996). Roselle is an annual crop

used in food, animal feed, nutraceuticals, cosmeceuticals and pharmaceuticals. The juice from the calyces is claimed to be a health-enhancing drink due to its high content of vitamin C, anthocyanins and other antioxidants (Mohamad *et al.*, 2002). The plant is of increasing interest because of its application in health and medicine; therefore it is important to find out the effect of Roselle calyx on growth performance and carcass characteristics of broiler birds.

MATERIALS AND METHODS

Experimental site: The experiment was conducted at Student Research Unit of Federal College of Animal Health and Production Technology Bora, Moor plantation, Ibadan.

Experimental birds and management: A total of one hundred and fifty Arbor acre day old broiler birds were obtained from Federal College of Animal Health and Production Technology Hatchery Moor plantation. The chicks were brooded for seven days on a deep litter system using 200 watts electricity bulbs and coal pots. After which the chicks were randomly assigned

to five treatments (30 birds per treatment), which were further replicated three times and 10 birds were allotted to each replicate. Necessary vaccination programmes were carried out at appropriate times. Anti-stress was also administered to the birds on arrival and after each weighing.

Experimental diet: the birds were fed with commercial feed (Top Feed) with Roselle calyx included at graded levels. The birds were fed starter diet (22.00% Crude protein, 2900 kcal/kg Metabolizable energy) from 1-21 days and finisher diet (18.00% Crude protein and 2900kcal/kg Metabolizable energy) from 22 to 42 days. Table 1 and 2 shows the nutrient composition of the experimental diets (starter and finisher phase). Dried Roselle calyx was purchased at Bodija market also in Ibadan. The calyces were milled and stored in dried polythene bag until needed.

Data Collection: Data was collected on feed intake, weight gain and feed conversion ratio. Six birds were randomly selected from each treatment for slaughter. The slaughtered birds were plucked and eviscerated manually. Dressed carcass and internal organ such as thigh, drumstick, breast, heart, gizzard, liver and lungs weight were recorded as the percentage of the live weight.

Data collected were subjected to analysis of variance using SAS (2011) package and means were further separated using Duncan Multiple Range Test of the same software.

RESULTS

The result of the effects of Roselle calyx on growth performance of broiler chickens is shown in Table 3, the parameters observed; initial weight, average daily feed intake and total feed intake were not significantly different across the treatments while the final weight, total weight gain and total feed intake value were significantly differed with the highest value of final weight at T₁ (1266.67g/b) and lowest value at T₄ (1133.33g/b). However, total weight gain had its highest value in T₁ (1260.67g/b) and lowest value at T₄ (1098.67g/b) and also, average daily weight gain had its highest value at T₁ (29.91g/b/d) and the lowest value at T₂ (25.32g/b/d). Table 4 shows the carcass characteristics of the birds fed graded levels of the Roselle calyx. The results indicated that there

were no significant in the values across the treatment means.

DISCUSSION

The growth performance as shown in Table 4 revealed significant ($P>0.05$) difference on average daily weight gain of the chickens. Chickens that were not fed Roselle calyx T₁ (Control) had the highest daily weight gain and average daily weight gain. However, there was no significant effect of Roselle calyx on initial weight, final weight gain, total daily feed intake and average daily feed intake of the chicken. This observation was similar to the report of Unigwe (2011) who reported highest average daily weight gain of chicken when graded level of *Hibiscus sabdariffa* L. extract were administered to broiler chicken.

Feed conversion ratio is a measure of feed utilization or the efficiency of converting unit feed into unit gain. Result obtained for feed conversion ratio showed that T₁ has the least value than any other treatment. The result in Table 5 indicated that there was no significant ($P>0.05$) difference in the values obtained for all the carcass characteristics parameters examined across the treatments. The observed similarities in carcass characteristics were as a result of nutrient balance in the experimental feeds which were within recommended range for broilers NRC (1994) and the nutrient constituents (Shaheen *et al.*, 2012). Organ weights in the different dietary treatment group were similar to those earlier reported by Zhou *et al.*, (2009).

CONCLUSION

Based on the results of this work, it was concluded from this study that inclusion level of Roselle calyx up to 1% compared favorably with the control.

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Table 1: Nutrient Composition of Experimental Diet for starter broiler chicken

INGREDIENTS	T ₁ (0%) RC	T ₂ (0.5%) RC	T ₃ (1%) RC	T ₄ (1.5%) RC	T ₅ (2%) RC
Crude protein (%)	22.00	22.00	22.00	22.00	22.00
Fats and oil (%)	6.00	6.00	6.00	6.00	6.00
Crude fibre (%)	5.00	5.00	5.00	5.00	5.00
Calcium (%)	1.00	1.00	1.00	1.00	1.00
Phosphorus (%)	0.40	0.40	0.40	0.40	0.40
Lysine (%)	1.20	1.20	1.20	1.20	1.20
Methionine (%)	0.50	0.50	0.50	0.50	0.50
Salt (%)	0.30	0.30	0.30	0.30	0.30
Metabolizable Energy (Kcal/kg)	2900	2900	2900	2900	2900

RC: Roselle calyx

Table 2: Nutrient Composition of Experimental Diet for Finisher broiler chicken

INGREDIENTS	T ₁ (0%) RC	T ₂ (0.5%) RC	T ₃ (1%) RC	T ₄ (1.5%) RC	T ₅ (2%) RC
Crude protein (%)	18.00	18.00	18.00	18.00	18.00
Fats and oil (%)	6.00	6.00	6.00	6.00	6.00
Crude fibre (%)	5.00	5.00	5.00	5.00	5.00
Calcium (%)	1.00	1.00	1.00	1.00	1.00
Phosphorus (%)	0.40	0.40	0.40	0.40	0.40
Lysine (%)	0.85	0.85	0.85	0.85	0.85
Methionine (%)	0.34	0.34	0.34	0.34	0.34
Salt (%)	0.30	0.30	0.30	0.30	0.30
Metabolizable Energy (Kcal/kg)	2900	2900	2900	2900	2900

RC: Roselle calyx

Table 3: Effects of Roselle Calyx on Growth Performance of Broiler

Variables	T ₁ (0%Rc)	T ₂ (0.5%Rc)	T ₃ (1%Rc)	T ₄ (1.5%Rc)	T ₅ (2%Rc)	SEM±
Initial weight(g/b)	172.67	182.00	165.67	168.00	166.33	3.43
Final weight gain (g/b)	1266.67	1233.34	1200.00	1133.33	1200.00	20.63
Total weight gain (g/b)	1260.67 ^a	1151.33 ^{ab}	1201 ^{ab}	1098.67 ^b	1133.67 ^b	20.70
Average daily weight gain (g/b/d)	29.91 ^a	25.32 ^b	28.26 ^{ab}	27.61 ^{ab}	27.42 ^{ab}	0.56
Total feed intake (g/d)	555.67	510.67	519.67	514.67	517.00	8.38
Average daily feed intake (g/b/d)	92.61	85.11	86.61	85.77	86.16	1.40
Feed conversion ratio	2.83 ^b	3.69 ^a	3.06 ^{ab}	3.12 ^{ab}	3.15 ^{ab}	0.11

^{a,ab,b} means of different superscripts along the same row are significantly different ($p < 0.05$)

Rc = Roselle calyx

g/b = gram per bird

g/b/d = gram per bird per/day.

Table 4: The Effect of Roselle Calyx on the Carcass Characteristics and internal organs of Broiler Chickens

PARAMETERS	T ₁	T ₂	T ₃	T ₄	T ₅	SEM ±
Live Weight (g)	1365.67	1594.00	1297.33	1283.00	1210.67	50.46
Bled Weight (g)	97.70	98.27	97.80	97.98	97.99	0.13
Plucked Weight (g)	92.71	93.96	92.26	92.68	92.42	0.40
Eviscerated Weight (g)	84.38	77.71	77.73	78.46	77.26	1.00
Dressed Weight (g)	64.56	66.67	65.74	65.21	63.76	0.59
Thigh (%)	10.78	11.64	10.67	10.98	10.75	0.20
Drumstick (%)	11.37	11.09	11.57	11.42	11.06	0.14
Breast (%)	20.79	21.70	21.18	21.79	20.94	0.39
Heart (%)	0.54	0.53	0.49	0.47	0.44	0.03
Gizzard (%)	3.34	3.52	3.80	3.75	3.76	0.13
Empty gizzard (%)	2.39	2.52	2.63	2.61	2.59	0.07
Liver (%)	2.21	2.14	1.98	2.10	2.04	0.07
Lungs (%)	0.61	0.71	0.64	0.47	0.50	0.04

SEM: Standard Error Mean

T: Treatment