



Research Article

Response of Crude Onion Extract on Carcass Characteristic and Nutrient Digestibility of Broiler Chicken

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ABSTRACT

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The impact of onion extract on the nutritional digestibility and carcass features of broiler chickens was examined in this study. A total of one hundred and fifty (150) (mixed sex) day-old Abor acre strain of broiler chicks were used and the study lasted for eight (8) weeks. The chickens were randomly assigned to five dietary treatment groups with thirty (30) birds per treatment. Each group was replicated three times with ten (10) birds per replicate in a Complete Randomized Design (CRD). The onions extract was supplied to the birds via drinking water at graded levels of 0.00 (control), 0.25, 0.50, 0.75 and 1.00% corresponding to T<sub>1</sub>, T<sub>2</sub>, T<sub>3</sub>, T<sub>4</sub> and T<sub>5</sub> respectively. Carcass characteristics showed that significant (P<0.05) difference were observed for plucked weight, drumstick, abdominal fat and heart while other parameter were not significantly (P>0.05) differs among treatment groups. There were no significant (P>0.05) differences for all the digestibility parameters examined except for ether extract digestibility (EED). Ether extract digestibility of birds on T<sub>3</sub> (0.75%) and T<sub>5</sub> (1.00%) had ether extract digestibility that was considerably (P<0.05) higher than that of the other treatment groups. The study's finding indicate that Broiler chickens fed onion extract at varying levels of supplementation did not experience any negative effects on carcass characteristics and nutrient digestibility of broiler chickens.

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## INTRODUCTION

Despite the importance of animal protein in human diet is out of reach to many Nigerian due to high cost of input especially feed. Feed is the major component which accounts for more than 70-80% of the total cost of production in the poultry industry. To ensure more net return and to minimize high expenditure on feed, many research strategies have been practiced such as introducing feed supplement and feed additives like antibiotic (Javed *et al.*, 2009). Antibiotic have been included in poultry diets to maintain health and production efficiency in the past 80 years. But, continuous and misuses of antibiotics in poultry industry resulted many concerns about development of drug resistant bacteria, drug residues in the body of the birds, and imbalance of normal micro flora (Behrouz *et al.*, 2012), this led to the ban of these products by the European Union in January 2006. (Jimoh *et al.*, 2013). This decision has therefore stimulated a search for alternatives. These alternatives can be found in the use of herbs and spices materials as supplements. According to Manesh *et al.* (2012) natural alternatives to antibiotics, such as herbs and medicinal plants, have attracted attention due to their wide range of potential beneficial effects and one of such is onion.

Onion (*Allium cepa*) belongs to the *Allium* genus as reported by Melvin *et al.* (2009). This plant contains numerous health benefits which have been attributed to the vegetable include antibacterial, antiviral, anti-parasitic and antifungal properties. In addition to use of onion for nutrition it is used for treatment of some illness as herbal medicine.

Furthermore, Aji *et al.* (2011) reported the useful influence of onion bulbs on growth yield of broiler chickens. Goodarzi *et al.* (2013) reported the using of onion bulbs in broiler diet can decrease triglyceride and total cholesterol in blood serum. The results of the study provided useful information on the suitability of onion extract on carcass characteristics and nutrient

digestibility of broiler chickens finished on varying level of onion extracts. The objective of this study is to assess carcass characteristics and nutrient digestibility of broiler chickens and appropriate level of supplementation.

## MATERIALS AND METHODS

### Location of the study

The research was carried out at the Poultry Unit situated in the Teaching and Research Farm of the Department of Animal Science, Faculty of Agriculture, University of Maiduguri in Borno State, Nigeria. Maiduguri is positioned between latitude 11027'30 N and 11033'30 N, longitude 1302'30" and 1309'1''E, and has an elevation of 354m above sea level. The area is recognized for its diverse climate and seasonal changes, with a brief period of 3-4 months. It characterized by short period of rainfall and long dry season of about 8-9 months.

### Procurement and Preparation of onion extract

The test material onion (*Allium cepa*) was purchased from Gaboru Market in Maiduguri Metropolis. The onion was carefully selected to ensure that they are disease free before extraction. After which the outer layer was removed and washed, bulb were weighed, 25% of clean water by weight of the onion bulb was added and blend into paste using electrical blender. The paste was then squeezed out with sieve into a container to obtained the extract, extract were prepared daily and administered to the birds at graded levels of 0.25%, 0.50%, 0.75% and 1.00% in a litre of drinking water for T2, T3, T4 and T5 respectively while T1 was control 0.0mls and were fed to the bird *ad-libitum*. The result is used to determine which supplementation level is more suitable and appropriate to support carcass characteristics and nutrient digestibility of broiler chickens.

### Experimental stock and Management

In this study, 150 day-old Abor acre broiler chicks of mixed sex were purchased from a reputable hatchery in Nigeria. Before the chicks arrived, the rearing pens and equipment were thoroughly cleaned and disinfected to prevent any

infections. Blue-flamed heating kerosene stoves were used for heat during the brooding period and brown papers were initially used on the cemented floor. Later, wood shavings were added to serve as an insulator and absorb moisture from droppings. The chicks were vaccinated according to the recommended schedule for the North East zones. The bird diets were changed from the broiler starter to finisher at 5th week of age and the study lasted for eight (8) weeks.

### Broiler Starter and Finisher diets

Broiler starter and finisher were compounded using the following ingredients. Maize, soybean, wheat bran, groundnut cake, fish meal, bone meal, limestone, mineral-vitamin premix, methionine, lysine and common salt. The maize were ground and milled coarsely, the soybean were toasted and milled. The diets were fed to all the treatment groups and shown in Table 1 below.

**Table 1:** Ingredients Composition and Calculated Analysis of Broiler Starter and Finisher Diets (%)

Ingredients	Starter	Finisher
Maize	54.00	58.00
Groundnut Cake	20.00	5.00
Soy Bean Meal	10.00	20.50
Wheat offal	7.50	8.50
Fish meal	5.00	4.00
Bone ash	2.00	2.50
Limestone	0.50	0.50
Min-vit premix*	0.40	0.40
Methionine	0.30	0.30
Lysine	0.10	0.10
Salt	0.20	0.20
<b>TOTAL</b>	<b>100.00</b>	<b>100.00</b>
<b>Calculated Analysis (%)</b>		
Crude protein	22.46	20.19
Crude fibre	3.69	3.97
Ash	2.58	3.06
Ether extract	5.11	4.23
Nitrogen-free extract	66.16	68.57
Calcium	1.00	1.10
Phosphorus	0.44	0.50
ME (Kcal/kg)	2839.58	2955.18

\* 2.5kg composition of broiler starter premix supplying the following: VitaminA =12000mg, VitaminD<sub>3</sub>=300000mg, VitaminE= 30000mg, VitaminK<sub>3</sub>=2000mg, VitaminB<sub>1</sub>=2000mg, VitaminB<sub>2</sub>=1,600mg, Niacin=8,000mg, Pantothenic =2,000mg, VitaminB<sub>6</sub>=600, VitaminB<sub>12</sub>=4mg, Folicacid=200mg, BiotinH<sub>2</sub>=300mg, Choline+Chloride=7,0000mg, Cobalt =80mg, Copper=1,200mg, Iodine=400mg, Iron=8000mg, Manganese=1,6000mg, Selenium=80mg, Zinc=1,2000mg and Antioxidant=500m\*composition of broiler finisher premix supplying the following per kg of feed: VitaminA=3,400IU, VitaminD<sub>3</sub>=600IU, VitaminE=4,000IU, VitaminK<sub>3</sub>=600mg, VitaminB<sub>1</sub>=640mg, VitaminB<sub>2</sub>=1,600mg, Niacin=8,000mg, Pantothenic=2,000mg, VitaminB<sub>6</sub>=600, VitaminB<sub>12</sub>=4mg, Folicacid=200mg, BiotinH<sub>2</sub>=300mg, Choline +Chloride=7,0000mg, Cobalt=80mg, Copper=1,200mg, Iodine=400mg, Iron=8000mg, Manganese=1,6000mg, Selenium =80mg, Zinc=1,2000mg and Antioxidant=500m

ME =Metabolisable Energy

### **Data collection**

The measures of response criteria include carcass characteristics and nutrient digestibility of broiler chickens. At the age of seven (7) weeks, three birds were randomly selected from each replicate base on the average weight of the group. Carcass quality were determined by recording the live weight (g) of representative chickens and then slaughtered to drain the blood and reweighed again. De-feathering follows by steeping in hot water at 80°C for 10-15 minutes. Then cut-up parts and visceral organs were weighed individually and the weights recorded. Similarly, three birds from each treatment were selected at random and put individually into metabolism cage and served with finisher diets and drinking water containing onion extract. Measured quantity of feed and water was given to each bird every morning and the leftover weighed the next morning to calculate feed intake and volume of water consumed. Feecal collection lasted for three days, sample collected were dried for proximate analysis. Digestibility is determined by the method of AOAC (2000). Apparent nutrient digestibility coefficient (ADC) was obtained by dividing the difference between nutrient intake and faecal output with the amount of nutrient utilized multiplied by 100%.

### **Cut up parts**

Each carcass was divided in to the following anatomical part: head, neck, wings, thorax, back, breast, thighs, drumstick and shanks. Cut were made according to Adamu *et al.* (2001). Then the weights of individual parts from each chicken were weighed using electronic digital scale (SF-400, Exclusive sensor disc technology. Japan) and were expressed as percentage (%) of the slaughter weight.

### **Organs measurement**

The visceral organs which include abdominal fat, liver, gizzard, proventriculus, heart, crop,

intestine, spleen and lungs were ablated from individual carcass in all the treatment groups. They were weighed using electronic sensitive balance and weight recorded to the nearest whole number. The weight so recorded will then be expressed as percentage of the slaughter weight.

### **Statistical Analysis**

All data obtained were subjected to analysis of variance (ANOVA) using completely randomized design (Steel and Torrie, 1980). Differences between the means were separated using least significant difference (LSD) at 95% confidence level ( $p < 0.05$ ) with the aid of Statistix 10.0.

## **RESULTS AND DISCUSSION**

### **Carcass Characteristics of Broiler Chickens as influence by Crude Onion Extracts**

Table 3 Presented carcass parameters and percentages of slaughter weights of organs. Significant ( $P < 0.05$ ) difference were observed among all treatment groups for plucked weight, bled weight and drumstick while other parameter were not significant ( $P > 0.05$ ) difference among treatment groups. The live weight, dressed weight and dressing percentage as slaughter weight ranged 1120.00 to 1533.00 g, 964 to 1087.30 g and 66.53 to 71.05%, respectively. The values obtained in this study were slightly lower than the values 1331.70 to 1627.70g and 1037.00 to 1357.10 g for live weight and dressed weight respectively as reported by Shettima (2018) but similar dressing percentage of 68.32 to 71.20 as reported by Grema (2014). The variation in most of the parameters may be due to different strain, final body weight as well as age of the chickens slaughter for carcass analysis.

Significant ( $P < 0.05$ ) difference were observed among treatment group for bled weight. T 3 recorded the highest weight (1512.70 g) while the least was observed in T2 but did not differ ( $P > 0.05$ ) with T1. The value obtained in this study was similar to the values (1523.90 g) as reported by Shettima (2018).

**Table 3:** Carcass Characteristics of Broiler Chickens fed Graded Level of Onion Extracts

Parameters	T1	T2	T3	T4	T5	SEM
Live weight(g)	1450.00	1483.30	1620.00	1416.70	1533.30	220.03 <sup>NS</sup>
Bled weight (g)	1350.00 <sup>b</sup>	1399.00 <sup>b</sup>	1512.70 <sup>a</sup>	1285.70 <sup>c</sup>	1446.70 <sup>ab</sup>	53.56*
Plucked weight(g)	1221.70 <sup>b</sup>	1298.30 <sup>b</sup>	1434.30 <sup>a</sup>	1239.00 <sup>b</sup>	1345.00 <sup>ab</sup>	42.58*
Dressed weight(g)	964.30	1048.30	1087.30	980.00	1032.00	28.93 <sup>NS</sup>
Dressing percentage (%)	66.53	71.05	67.96	69.14	67.26	1.87 <sup>NS</sup>
<b>Cut-up Parts</b>	<b>Expressed</b>	<b>as % of</b>	<b>Slaughter</b>	<b>Weight</b>		
Drumstick	9.20 <sup>bc</sup>	8.34 <sup>c</sup>	10.52 <sup>a</sup>	9.76 <sup>ab</sup>	9.11 <sup>bc</sup>	0.31*
Thigh	11.17	11.56	10.88	10.18	11.19	0.59 <sup>NS</sup>
Breast weight	16.62	18.19	17.81	18.93	18.81	0.81 <sup>NS</sup>
Back weight	14.73	15.55	16.44	14.37	14.70	0.70 <sup>NS</sup>
Wings	8.10	7.69	7.31	8.07	8.05	0.43 <sup>NS</sup>
Neck	5.33	5.44	4.94	5.62	5.68	0.32 <sup>NS</sup>
Head	2.55	2.59	2.40	2.57	2.57	0.13 <sup>NS</sup>
Shanks	4.07	4.02	3.58	4.59	3.73	0.39 <sup>NS</sup>
Gizzard	2.85	2.81	2.61	3.18	2.92	0.34 <sup>NS</sup>
Lungs	0.30	0.25	0.33	0.45	0.56	0.07 <sup>NS</sup>
Abdominal fat	0.83	1.48	1.65	1.88	1.94	0.39 <sup>NS</sup>
Heart	0.35	0.45	0.33	0.40	0.52	0.04 <sup>NS</sup>
Intestine	5.28	5.23	5.93	5.25	5.32	0.45 <sup>NS</sup>
Liver	1.57	1.36	1.75	1.44	1.89	0.20 <sup>NS</sup>

SEM = Standard Error of Mean, NS = Not Significant ( $P > 0.05$ ) \* = Significant ( $P < 0.05$ )  
a,b,c, = Mean in the same row bearing different superscripts differ significantly ( $P < 0.05$ )

Treatments 3 and 4 were statistically similar and superior ( $P < 0.05$ ) to other treatment groups. The highest drumstick was recorded in treatment 3 but similar ( $P > 0.05$ ) to those fed T4 while least was observed in treatment 5. The result obtained is similar to the value 10.02 g reported by Siska *et al.* (2017).

The visceral organs which include gizzard, lungs, abdominal fat, heart, intestine and liver weight ranged 2.61 to 3.18; 0.45 to 0.56; 0.83 to 1.94; 0.33 to 0.52; 5.23 to 5.93 and 1.36 to 1.89% respectively were not significantly ( $P > 0.05$ ) differs among all treatment groups.

#### Nutrient Digestibility of Broiler Chickens fed onion Extract

Table 4. Shows the nutrient digestibility of broiler chickens fed onion extract. The results indicated that the digestibility of dry matter, crude protein, crude fibre, ash, and nitrogen-free extract were

not significantly ( $P > 0.05$ ) differs across all treatment groups, except for the ether extract which was impacted ( $P < 0.05$ ) by the addition of onion extract. The values ranged from 69.26 to 71.63; 73.09 to 79.12%; 49.65 to 54.42%; 37.91 to 37.05 and 66.43 to 70.96% for Dry Matter, Crude Protein, Crude Fibre, Ash and Nitrogen Free-Extract, respectively. It implies that, the test material did not exert any significant effect ( $P > 0.05$ ) between treatment 1 (control) and other treatment groups.

The ether extract digestibility was significantly ( $P < 0.05$ ) affected by the inclusion of onion extract. Birds fed T5 digested ether extract better than those on T1, T2 and T4 but did not differ ( $P > 0.05$ ) from those fed T3. These results were in agreement with the finding of Goodarzi *et al.* (2014), who reported better utilization of fat by broiler chickens fed onion extract in drinking

water and similar to the values (99.98 %) also reported by Gaius (2015) who fed 4% garlic extract to broiler chickens. It therefore implies that, onion extract influence better digestion of fat

by broiler chickens. In other words feeding onion extract to broiler chickens facilitates digestion of ether extract.

**Table 4:** Nutrient Digestibility of Broiler Chickens fed Graded Level of Onion Extract

Parameters (%)	T1 (0%)	T2 (0.25%)	T3 (0.50%)	T4 (0.75%)	T5 (1.00%)	SEM
Dry matter	71.23	69.26	71.58	71.63	70.04	2.76 <sup>NS</sup>
Crude protein	79.12	73.09	76.61	76.77	74.23	2.29 <sup>NS</sup>
Crude fibre	52.51	49.65	54.42	52.97	53.28	3.42 <sup>NS</sup>
Ether extract	78.58 <sup>c</sup>	78.73 <sup>bc</sup>	90.54 <sup>ab</sup>	82.04 <sup>c</sup>	95.20 <sup>a</sup>	0.12*
Ash	32.27	37.05	37.91	34.26	34.42	5.41 <sup>NS</sup>
Nitrogen free-extract	68.47	70.96	67.79	69.69	66.43	3.47 <sup>NS</sup>

SEM = Standard Error of Means, NS = Not Significant (P>0.05), \* = Significant (P<0.05), a, b, c = Mean in the same row bearing different superscripts differ significantly (P<0.05).

## CONCLUSION

The study concluded that Broiler chickens supplemented with up to 1% onion extract showed no adverse effects on carcass

characteristics and nutrient digestibility, with improved fat digestibility observed at higher supplementation levels and 1% is recommended.

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