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INTERNAL ORGANS CHARACTERISTICS OF BROILER CHICKENS FED DIETS CONTAINING COCOA SEED POWDER DURING DRY SEASON

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Abstract

Heat stress is one of the major stressors affecting the production of broiler during dry season, which could trigger changes in intestinal organs of broilers. This study was conducted to determine the internal organ characteristics of broiler chickens fed diets containing cocoa seed powder. One hundred and ninety-two (192) Cobb-500, two week old broilers were randomly allotted into four dietary treatments with three (3) replicates of sixteen (16) birds each. At eighth week of the experiment, two birds were randomly selected, slaughtered, processed and eviscerated. Weights of liver, heart, gizzard with and without content, kidney, lung, proventriculus, spleen and bile were taken. Intestinal weight and length were also determined. The results of internal organ characteristics revealed no significantly ($P>0.05$) effects across the treatments. The values recorded for all the parameters varied among the treatments except the gastro-intestinal track length that showed slight numerical increase with increased levels of cocoa powder in the diets. The ranges for liver, kidney, lung, spleen and GIT length were 1.21 – 1.41g, 0.27 – 0.31, 0.36 – 0.95g, 0.04 – 0.05g and 183 – 215.00cm, respectively. It was concluded that dietary supplementation of cocoa seed powder up to 15g per kilogramme in commercial diets was not detrimental to internal organs of broiler chickens.

Keywords: Diets; Broilers; Cocoa seed powder; internal Organs; dry season

Introduction

Cocoa is an excellent source of most essential minerals and vitamins, the minerals include calcium, copper, iron, manganese, magnesium, phosphorus, potassium, zinc. It also contains vitamins A, E, B1, B6, riboflavin, niacin and essential amino acid. It is very rich in polyphenol compound (DRI, 2003). Donkoh (1989) stated that antioxidants alleviate heat stress in poultry. Vitamin E is a fat soluble vitamin which plays a biological chain-breaking antioxidative role that protects cells and tissues from lipoperoxidative damage, induced by free radicals (Mcdowell, 1989). Sahin *et al.* (2001) stated that body weight in heat-stressed broilers was significantly lower than in birds administered with antioxidant vitamins A and E. Heat exposure also impairs survival rate (Deaton *et al.*, 1986), weight gain, and feed conversion ratio of broiler flocks (Geraert *et al.*, 1993; Faria Filho, 2006). Thus optimal broiler production in the hot season therefore requires an adequate and appropriate management system that can reduce the effects of heat stress to the minimum (Abioja *et al.*, 2011).

In the tropics, heat stress leads to huge losses due to the negative effect on feed consumption, growth performance, organ weight, immunosuppression and mortality (Wan *et al.*, 2017). Adeyeye *et al.* (2019) reported non-significant difference in internal organs when diets were supplemented with two sources of antioxidants. The strain generated by heat stress triggered changes in intestinal development by reducing the small intestine weight, the number of villi and the proliferation rate of enterocytes (Uni *et al.*, 2001). This study evaluated internal organs of broilers fed diets containing cocoa seed powder as anti-oxidant.



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Materials and methods

Experimental site

The experiment was carried out at the Poultry Unit of Teaching and Research farm of Oyo State College of Agriculture and Technology, Igbo-ora. (Latitude 7°13'49.46" N; Longitude 3°26'11.98"E and altitude 76 metre above sea level) with average ambient temperature of 30°C and relative humidity of 65%

Experimental design and management of birds

The experiment lasted eight (8) weeks between November 4 and December 29. Two hundred broiler chickens (Cobb-500) were purchased from a reputable hatchery in Ibadan. After two weeks of brooding and acclimatization, 192 birds were randomly allotted into four (4) treatments of varying levels of cocoa powder with three (3) replicates having sixteen (16) birds each in a Completely Randomized Design (CRD). All management practices inclusive of vaccination and medication were administered. Cocoa powder used was source from reliable supermarket in Ibadan.

Experimental diets

The birds were fed with commercial feeds (Broiler starter and finisher feed) throughout the period of the experiment. Cocoa powder which was used for the experiment was purchased from a reliable store in Ibadan and supplemented in the commercial feed at 0g, 5g, 10g and 15g constituting the four experimental diets, respectively.

Determination of parameters post the finisher phase

At the 8th week, two (2) birds per replicate were slaughtered for carcass analysis. The birds were scalded by immersion in hot water for one minute. They were then eviscerated and the internal organs (liver, heart, empty and full gizzard, kidney, lungs, proventriculus, spleen and bile) were carefully removed and weighed. The intestinal weight and length were also taken using sensitive scale and measuring tape rule respectively.

Data analysis

All data obtained in the study were analyzed using the general linear model procedure of Statistical Analysis System (SAS, 2008). Differences among the means were subjected to Duncan's Multiple Range Test (DMRT, 1955) of the statistical package.

Results

The results of the characteristics of internal organs of broilers fed the experimental diets is presented in Table 1. All parameters did not show significant ($P>0.05$) difference across the treatments. Broilers fed the control diet had the highest numerical values in gizzard weight (with and without content), lung and proventriculus (2.33, 1.84, 0.95 and 0.33g, respectively). While treatment 3 had highest numerical values for liver, heart and gastro intestinal length (1.41, 0.51 and 110g, respectively) The values recorded in all parameters varied among the treatments except the gastro-intestinal tract length that tends to slightly increased with increased levels of cocoa powder in the diets. The ranges for liver, kidney, lung, spleen and intestinal weight and length were 1.27 – 1.41g, 0.27 – 0.31, 0.36 – 0.95g, 0.04 – 0.05g and 183 – 215.00cm, respectively.

Table 1: Internal organs weight of broilers fed supplemented diet containing cocoa powder

Parameters	T1(0g)	T2 (5g)	T3 (10g)	T4 (15g)	SEM
Liver (g)	1.34	1.35	1.41	1.27	0.02



Heart (g)	0.32	0.43	0.51	0.33	0.04
Gizzard with content (g)	2.33	2.31	2.29	2.19	0.03
Kidney (g)	0.27	0.31	0.31	0.28	0.00
Lung (g)	0.95	0.40	0.54	0.36	0.12
Empty gizzard (g)	1.84	1.78	1.75	1.66	0.03
Proventriculus (g)	0.33	0.17	0.31	0.30	0.04
Spleen (g)	0.04	0.05	0.04	0.04	0.00
Bile (g)	0.08	0.12	0.15	0.10	0.00
Gastro intestinal weight (g)	75.30	81.60	110.00	79.00	6.88
Gastro intestinal Length (cm)	183.00	214.60	214.00	215.00	42.79

Discussion

It is a common practice in feeding studies to use the weight of some internal organs like kidney and liver as indicator of toxicity and spleen and liver to measure immune system cause by heat stress (Moeinet *et al.*, 2012). The weight of organs (kidney, liver, gizzard with and without content, heart and spleen) were not influenced by the dietary treatments. This established the safety of the diets and that the experimental birds were able to effectively combat the anti-nutrients in cocoa powder. The result agrees with the study of Adeyeye *et al.* (2019) who reported non-significant difference among internal organs measured when diets were supplemented with processed cocoa pod husk on carcass characteristics of broiler chicken. The results of intestinal weight of birds fed 10g supplementation might be due to the fact that strain generated by heat stress might have triggered changes in intestinal development by increasing the small intestine.

Conclusion

Results of this study revealed that dietary supplementation of cocoa seed powder up to 15g per kg in commercial feeds did not affect internal organs of broiler chickens.

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