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Carcass Characteristics and Internal Organs of Broilers Fed Roasted Pride of Barbados Seedmeal

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Abstract
A feeding experiment was conducted at the poultry unit of the Teaching and Research Farm of the Oyo State College of Agriculture, Igboora located on latitude $7^{1}34^{0}$ and longitude $3^{1}28^{0}$E to evaluate the effects of dietary roasted pride of barbados seed meal on carcass characteristics and internal organ weights of broiler chickens. Seventy-two day old Marshal broiler chicks obtained from Obasanjo Farms, Igboora, Nigeria were divided into four treatments and each treatment was replicated three times with a total of six birds per replicate. The ripened seeds of pride of barbados obtained within Igboora metropolis were roasted at 100-110^{0}C using open flame for seventeen minutes in an open pan. The seeds were considered roasted when about 75-80% of the seed cracked. The roasted pride of barbados seedmeal was included at different levels 5,10 and 15 percent respectively in broiler rations. The experiment lasted for eight weeks. There were significant variations ($P<0.5$) in the value of all the parameters except in the mean values recorded for lung and empty gizzards in some treatments. Higher values were recorded in 10% inclusion level of roasted pride of barbados seedmeal than all other treatments, while the least values were recorded in 0% inclusion level of roasted pride of barbados seedmeal. From this seedmeal in broiler ration was found to be beneficial at 10%.
Keywords: Anti-nutritional factors; Broiler; Carcass; Internal organs; Proximate analysis, Roasted pride of barbados seedmeal.

1- INTRODUCTION

The need to provide sufficient animal protein for the growing human populace is of paramount concern to animal nutritionist, scientist and agriculturist. Developing the poultry industry has been advocated to be the greatest means of bridging the protein gap prevailing in the tropical countries. (FAO,2000). Poultry meat has a wide acceptance with little or no limitation in terms of traditional and religious taboos as compared to pork which is rejected by Muslim (Afolabi and Oladimeji, 2003). The importance of poultry eggs and meat cannot be over-emphasized because these products have the ability to meet the animal protein needs of the populace. The low level of protein intake is of great concern to developed countries among which Nigeria is one. Unlike plant-protein, animal protein is of high biological value which is important for optimum health of man (World Bank Report, 2007). The objective of this study therefore is to investigate the effect of roasted pride of barbados seed meal on the carcass characteristics and internal organs of broilers.

2 - MATERIALS AND METHODS

2.1 EXPERIMENTAL SITE

The experiment was carried out at the poultry unit of the Teaching and Research Farm of the Oyo State College of Agriculture and Technology, Igboora, Nigeria. the experimental area lies in savannah forest zone on latitude $7^{1}43^{0}$N and longitude $3^{1}28^{0}$E with an elevation of 140m above sea level. The average minimum temperature is about 21.5oC and maximum temperature of about 32.5^{0}C. The average humidity in the study area is about 58.0% and the double maximum rainfall is about 214.3mm in June and 165.2mm in September.

2.2 PROCESSING OF EXPERIMENTAL DIET

Ripened pods of pride of barbados were collected within Igboora metropolis between the months of February and March, 2013. The mature pods were processed to remove the seeds in lateral arrangements. Over 100kg seeds were collected and roasted at 100-110^{0}c using open flame for up to 17minutes in an open pan. During roasting about 1.5-2.0kg of the seeds were added intermittently into the pan set over the burning firewood. A small quantity of sand was added and the content stirred repeatedly to prevent charring. The seeds were considered roasted when about 75-80% of the seeds cracked. The seeds were then spread out to cool after which they were milled into roasted pride of barbados seed meal using a hammer mill with a sieve size of 3mm. The meal produced was used to formulate four isocaloric and isonitrogenous experimental diets. Four experimental diets were formulated for the starter (0-4)weeks and finisher(5-8)weeks and the chicks were fed for the eight weeks duration of the experiment.

2.3 CARCASS EVALUTION

At the end of the eight week of the experiment two birds per treatment were selected and used for the carcass and internal organ evaluation. The birds were slaughtered via neck slit, defeathered, dressed and cut into parts according to the procedure outlined by(Oluyemi and Robbert,2000) each of the parts were weighed and recorded.

2.4 DETERMINATION OF PROXIMATE ANALYSIS

Proximate analysis was carried out the using the methods recommended(AOAC,1990). The following parameters were determined total ash, crude fibre, crude protein, ether extract, ash and metabolizable energy. All analysis were carried out in two replicates and reported as mean values on a dry matter basis. The following anti-nutritional factors were determined: oxalate, phytate, tannin and saponin.

2.5 QUANTIFICATION OF TOXINS

Quantitative estimation of tannins in the sample was carried out using modified Vanilin-HCL methodl(Prince and Butler,1977) and a standard curve of tannic acid was prepared(AOAC,1990) for measurement of the concentration of tannins in the sample. Phytate was determined according to the method. Oxalate was determined by acid digestion using $15NH_2SO_4$. followed by filteration using a Whatman No.1 Filter paper. The filterate was titrated hot (80-90^{0}c) against a $0.1NKMnO_4$ solution to a faint pink colour that persists for 30 seconds. Saponin were determined by extraction in 50% aqueous methanol, followed by transfer to a test tube with constant vigorous agitation. Formation of persistent foam at the surface was taken as an indication of the presence of saponin.

2.6 DATA COLLECTION

Data collected were subjected to one-way analysis of variance procedure. Significantly different means were separated using Duncan's multiple range test procedure[8]. Significance was accepted at 5% level of probability.

3 - RESULTS AND DISCUSSION

The results of the proximate composition and anti-nutritional content of the roasted pride of barbados seedmeal are shown in Tables 3 and 4 respectively.

Results of the proximate analysis (Table 1) shows that roasted pride of barbados seedmeal has higher dry matter content than that of the raw pride of barbados and this shows that most of the moisture content had been removed during roasting process(Aremu *et al*.,2006). The crude protein content of the roasted pride of barbados seed meal (21.93%) was lower than that of raw pride of barbados seedmeal (23.96%), this might be as a result of the processing method employed to detoxify the enti-nutritional factors. The reduction in crude protein content of the roasted pride of barbados meal is in agreement with earlier reports on jackbean(Udedibie *et al*.,1994) and could possibly be due to damage on the nitrogenous compounds during roasting and also as a result of differences in geographical location. The crude fibre contents of roasted pride of barbados seed meal (5.86%) was lower than that of raw pride of barbados seed meal (6.81%) this reduction in crude fibre contents of roasted pride of barbados seed meal could be attributed to the removal of the seeds hull during roasting(Ahmed *et al*.,2006) The ash contents of roasted pride of barbados seedmeal was lower (4.41%) than that of raw pride barbados seedmeal (4.64%), thus indicating that the roasted pride of barbados seedmeal contained reasonable amount of potash which implies that these seeds are good source of minerals. The either extract of the roasted pride of barbados seed meal were lower than that of raw pride of barbados seedmeal (3.96%) and also lower than the 22.8-23.5% reported by(Salunkhe *et al*.,1985) for soybean. The ether extract content in detoxified pride of barbados seedmeal was significantly reduced as a result of the effect of roasting and possibly due to burning off of lipid related compound[10]. The nutritional importance of a given food depends on the nutrient and anti-nutritonal constituents

(Aletor *et al*.,1994). The values of phytate contents determined(0.06%) were lower than 234.00±3.60mg/100g as reported for raw lima beans and lima beans boiled for 160minutes respectively. The level of oxalate and Zn^{2+} making them unavailable especially in monogastric animals(Aletor and Omodara,1994). Roasting reduced the tannin content to 0.02% this is in agreement with(Bressani and Elias,1980) who reported that about 30-40% of polyphenols can be removed from *Phaseolus vulgaris* by cooking and discarding the cooking water solution and since most tannins are located in the testa, its physical removal reduced tannin content.

The data on carcass parameters (Table 5.0) revealed that the dietary treatment had a significant affect ($P<0.05$) on all the parameter recorded this is in accordance with the report of who reported significant affect of enzyme supplemented cassava peel on the carcass parameters of broiler chicks. The percentage weigh of cut parts namely head, neck, shank, drumstick, thigh, breast and back were superior among birds fed roasted pride of barbados based diets. This may be that they utilized the phosphorus and calcium well at this level which reflected in their weighs. Besides, more nutrients were released by the reduction in the contents of anti-

nutritional factors by roasting which might have been used in developing these attribute. The higher weights of carcass yields observed in birds fed 5% and 10% inclusion level of roasted pride of barbados may be as a result on increase digestibility of nutrient due to the processing method employed on the test feedstuffs to reduce the anti-nutritional factors, thus more nutrients might have been used in developing these carcass yield at the expense of muscular tissue formation in order to cope with this extra work. Prolonged stay of digesta in the digestive tract for enzymatic digestion and the detoxification of residual anti-nutritional factors such as phytate are some of the causes of increase weights of organs (Longe,1986). Also increase in size might have been due to the muscular activity which might have also affected these organs and this is in agreement(Abdelsamine *et al*.,1983) that at similar feed intake fibre increases the weight and length of the gastro intestinal tract in broilers values recorded for birds on 15% inclusion level of roasted pride of barbados seedmeal followed no consistent trend and this might be attributed to inclusion level of roasted pride of barbados seedmeal.

The weight of the internal organs (shown in table 6.0) revealed that birds on 10% inclusion level of test ingredient were higher in liver, kidney, heart, Proventriculus, spleen and lungs and intestinal weighs than those on the control diets. However, the weights of these organs increased with the increasing inclusion of roasted pride of barbados seedmeal. The size of gizzard that increased with the levels of roasted pride of barbados seedmeal could be explained by the increase dietary fibre which agreed with the earlier report of(Eggum *et al*.,1982). The non-significant values obtained were not in accordance with the findings of(Adetola *et al*.,2012)s who reported significant difference in the value of liver, gizzard, heart, kidney, Proventriculus when broiler chickens were fed toasted seasame seed based diets.

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Table 1.0 Gross composition of roasted experimental diet (starter phase)

	REPLACEMENT LEVELS			
Percentage	**0%**	**5%**	**10%**	**15%**
Ingredients	**T1**	**T2**	**T3**	**T4**
Maize	48.00	48.00	48.00	48.00
Soya bean meal	33.00	31.35	29.70	28.05
Roasted PBSM	0.00	1.65	3.30	4.95
Fishmeal	3.00	3.00	3.00	3.00
Wheat Offal	11.30	11.30	11.30	11.30
Bone meal	2.00	2.00	2.00	2.00
Limestone	2.00	2.00	2.00	2.00
Broiler Premix	0.25	0.25	0.25	0.25
Salt	0.25	0.25	0.25	0.25
Lysine	0.10	0.10	0.10	0.10
Methionine	0.10	0.10	0.10	0.10
TOTAL	100.00	100.00	100.00	100.00
Determined Analysis				
Dry matter (%)	90.82	90.69	90.85	90.83
Crude protein (%)	22.97	23.28	23.15	23.37
Crude fibre (%)	3.76	3.79	3.88	3.83
Ether extract (%)	3.58	3.65	3.62	3.71
Ash (%)	7.15	6.96	7.24	7.36
Moisture (%)	9.18	9.31	9.15	9.17
NFE	53.36	53.01	52.96	52.56
Energy (MEKcal/kg)	3037.01	3041.79	3032.75	3034.05

Table 2.0 Gross composition of roasted experimental diet (finisher phase)

	REPLACEMENT LEVELS			
Percentage Ingredients	**0% T1**	**5% T2**	**10% T3**	**15% T4**
Maize	50.00	50.00	50.00	50.00
Soya bean meal	27.00	25.65	24.30	24.30
Roasted PBSM	0.00	1.35	2.70	2.70
Fishmeal	2.50	2.50	2.50	2.50
Wheat Offal	15.80	15.80	15.80	15.80
Bone meal	2.00	2.00	2.00	2.00
Limestone	2.00	2.00	2.00	2.00
Broiler Premix	0.25	0.25	0.25	0.25
Salt	0.25	0.25	0.25	0.25
Lysine	0.10	0.10	0.10	0.10
Methionine	0.10	0.10	0.10	0.10
TOTAL	100.00	100.00	100.00	100.00
Determined Analysis				
Dry matter (%)	90.87	90.91	90.78	90.75
Crude protein (%)	19.48	19.59	20.04	20.13
Crude fibre (%)	3.81	3.86	3.92	3.89
Ether extract (%)	3.57	3.59	3.55	3.62
Ash (%)	6.88	6.94	6.92	6.97
Moisture (%)	9.13	9.09	9.22	9.25
Energy(MEKCal/kg)	3040.90	3039.51	3032.26	3033.89
NFE	57.13	56.93	56.35	56.14

Table 3.0: Proximate Composition of Roasted Pride of Barbados Seed meal

Nutrient	**Value**
Crude Protein (%)	21.93
Crude fat (%)	3.72
Crude fibre (%)	5.86
Ash (%)	4.41
Dry matter (%)	92.40
Metabolisable Energy (KCalkg)	3.19
Moisture (%)	7.60

Table 4.0: Anti-nutritional factors in roasted Pride of barbados Seedmeal.

Anti-nutrients	**Value (%)**
Saponin	0.09
Phytate	0.06
Tannin	0.02
Oxalate	0.04

Table 5.0: **Effects of roasted pride of barbados seed meal on the carcass characteristics of broiler**

	REPLACEMENT LEVELS				
Parameters	**0%**	**5%**	**10%**	**15%**	
	T1	**T2**	**T3**	**T4**	**SEM**
Live weight (g)	1980^{c}	2260^{ab}	2350^{a}	2080^{ab}	72.75
Dressed weight (g)	1480^{c}	1760^{ab}	1850^{a}	1580^{b}	72.75
Dressing Percentage (%)	74.75	77.86	78.68	75.82	0.77
Head (g)	2.63^{c}	2.81^{b}	2.71^{b}	3.33^{a}	0.14
Neck (g)	5.36^{a}	5.35^{a}	5.04^{b}	2.85^{c}	0.52
Shank (g)	2.47^{a}	2.37^{b}	2.45^{a}	2.15^{c}	0.06
Drumstick (g)	5.60^{a}	4.95^{b}	5.27^{a}	4.95^{b}	0.13
Thigh (g)	6.20^{a}	5.24^{d}	5.81^{b}	5.68^{c}	0.17
Breast (g)	22.43^{b}	24.35^{a}	17.83^{d}	20.69^{c}	0.12
Wing (g)	8.14^{a}	4.26^{d}	4.47^{bc}	5.10^{b}	0.78
Back (g)	10.90^{a}	10.47^{b}	11.16^{a}	10.05^{b}	0.21

abcd= means on the same row but with different superscripts are statistically (P<0.05) significant.

Table 6.0: Effects of roasted pride of Barbados seedmeal on the organ weight of broiler

	REPLACEMENT LEVELS				
	0%	**5%**	**10%**	**15%**	
Parameters	**T1**	**T2**	**T3**	**T4**	**SEM**
Liver (%)	1.91^{c}	1.89^{c}	2.78^{a}	2.08^{b}	0.18
Kidney (%)	0.56^{c}	0.64^{b}	0.73^{a}	0.68^{b}	0.03
Heart (%)	0.52	0.50	0.52	0.53	0.01
Whole gizzard (%)	2.95^{b}	2.86^{a}	2.85^{c}	3.36^{a}	0.10
Proventriculus (%)	0.60	0.54	0.56	0.54	0.01
Spleen (%)	0.13	0.10	0.14	0.12	0.00
Bile (%)	0.12^{c}	0.24^{a}	0.16^{b}	0.18^{b}	0.02
Small intestine (%)	5.19^{c}	6.10^{b}	4.94^{d}	6.67^{a}	0.35
Lungs (%)	0.54	0.51	0.60	0.57	0.02
Empty gizzard (%)	2.12^{d}	2.16^{bc}	2.20^{b}	2.55^{a}	0.09
Abdominal fat (%)	0.65^{d}	1.43^{a}	1.25^{b}	1.20^{bc}	0.15

abcd= means on the same row but with different superscripts are statistically (P<0.05) significant.