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Full length Research paper

Carcass characteristics and internal organs of Finisher broilers fed raw pride of Barbados (*Caesalpinapulcherrima*) seed meal

Ogunbode AA* and Shittu SO

Department of Animal Production Technology, Oyo State College of Agriculture and Technology, Igboora, Nigeria
Faculty of Animal and Fisheries Technology, Oyo State College of Agriculture and Technology, Igboora, Nigeria

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The carcass characteristic and organ weight of broiler chicken fed raw pride of Barbados seed meal was investigated using seventy-two marshal broiler chicken. The birds were allotted into four dietary treatments having three replicate and eighteen birds per treatment in a completely randomized experiment. Four isocaloric and isonitrogenous diets were formulated. Diet one was soya bean based (control) while diet two, three and four contained graded levels of raw pride of Barbados seed meal at (5%, 10% and 15%) inclusion levels respectively. At the end of the four weeks, two birds per replicate were used for carcass analysis and organ weight expressed as percentage of dressed weight. There were significant variation ($p<0.05$) in the values of all the parameters. Live weight (1860.00-1930.00g), dressed weight (1360.00-1430.00g), plucked weight (73.12-74.60g), dressing percentage (73.12-74.60g), drumstick (5.06-6.14g), thigh (5.57-7.20g), breast (17.20-21.54g), back (12.83-13.80g), head (2.87-3.15g), neck(4.94-6.74g), wing (4.87-5.96g), abdominal fat (1.27-1.22g), liver (1.98-2.49g), kidney (0.68-0.78g),heart (0.53-0.61g) and whole gizzard (3.28-4.26g). Higher values were recorded in diet T2 (5% level of inclusion of raw pride of Barbados seed meal) than all other treatments and the least value was recorded in diet T4 (15% inclusion level of raw pride of Barbados seed meal). From this study, inclusion of raw pride of Barbados seed meal in broiler ration was found to be beneficial at 5%.

Keywords: Carcass, finisher broilers, marshall, organ, pride of barbados, raw.

INTRODUCTION

The primary objective of raising livestock is to provide high nutritional and dietary value of meat, which mainly depends on its chemical composition. Currently emphasisis paid not only to the content of essential nutrients but also to the content of minerals and biological active substances (Al-Yasiry et al.,2017a,b). The quality of final products, like meat quality in large scale poultry production is ensured mainly through appropriate optimization of the composition of poultry diets (Ciurescu et al., 2016). Poultry production accounts for the major parts of all meat produced in many developed countries being an integral component of nearly all rural, peri and urban household (DFID, 2006) Broiler production is unique as it offers the highest turnover rate and quicker returns to investment outlay than in any other livestock agro-business. Fund invested in poultry especially broilers production are recovered faster than in any other poultry or livestock. (Onwumere et al 2011). 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. Poultry is highly prolific and very efficient in converting feed nutrients into high quality animal protein (Smith 2001). However the increasing cost of poultry feeds with the attendant increase in the cost of poultry products such as chicken and eggs is one of the major factors militating against increased animal production in Nigeria. Protein is very crucial in poultry ration formulation because it is the most limiting nutrient, the most expensive nutrient and the best indicator of diet quality (Obioha 1992). It is necessary thereforeto explore the use of cheapand non-conventional feedstuff like raw pride of Barbados. Pride

Corresponding author Email:aaogunbode@gmail.com

of Barbados seed (*Caesalpinapulcherrima*) as a legume belong to the family leguminosae, it is planted as an ornamental tree for shade and to control erosion. The nutrient contents of raw pride of Barbados seed contains 23.96% crude protein, 6.81% crude fibre, 3.96% ether extract, 9.36% moisture, 4.64% ash, 51.27% nitrogen free extract and 3030.54Kcal/kg of metabolizable energy (Ogunbode et al 2014). Pride of Barbados produce large quantities of pods containing seed which are wasted at each production season. The present study was therefore conducted to investigate the carcass characteristics and internal organs of broiler fed raw pride of Barbados seed meal.

MATERIALS AND METHODS

Experimental location

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, Oyo state, Nigeria. The experimental area lies in savannah forest zone on latitude $7^{l}43^{0}$N and longitude $3^{l}28^{0}$E with an elevation of 140m above sea level. The average minimum temperature is about 32.5^{0}C. The average humidity in the study area is 58%.

Processing of experimental diet

Ripened pods of pride of Barbados seed were collected within Igboora metropolis. The pods were opened with a knife and the seeds extracted, sundried for five days and hammer mill used to produce the seed meal. Proximate analysis was carried out according to the methods of (AOAC 2005) (Table 1)

Table 1: proximate composition of raw pride of barbados seed meal

Parameters	Values
Dry matter (%)	90.64
Crude protein (%)	23.96
Crude fibre (%)	6.81
Moisture (%)	9.36
Ether extract (%)	3.96
Nitrogen free extract (%)	66.63
Ash content (%)	4.64
Metabolizable energy (MEkcal/kg)	3320

Thereafter, four broiler finisher diet were formulated to contain raw pride of barbados seed meal at 0, 5, 10 and 15% respectively (Table 2)

Table 2: Gross composition of raw experimental diet (Finisher phase)

Ingredients	T1 (0%)	T2 (5%)	T3 (10%)	T4 (15%)
Maize	50.00	50.00	50.00	50.00
Soya bean meal	27.00	25.65	24.30	24.30
Raw pride of Barbados seed meal	0.00	1.35	2.70	2.70
Fish meal	2.50	2.50	2.50	2.50
Wheat meal	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	100	100	100
Determined analysis				
Dry matter (%)	90.84	90.87	90.75	90.72
Moisture (%)	9.16	9.13	9.25	9.28
Crude protein (%)	22.97	23.28	23.15	23.37
Crude fibre (%)	3.76	4.00	6.58	9.01
Ash (%)	6.86	6.91	6.89	6.95
Ether extract	3.58	3.65	3.62	3.71
Metaboliozable energy (Kcal/kg)	2.93	2.92	2.93	2.92

Feeding trial

Seventy-two 4 weeks-old Marshal broiler that had been fed a diet that meet the nutrient requirement during the starter phase were divided into four groups of 18 birds each and randomly assigned to the four treatment diets in a completely randomized design (CRD) experiment. Each treatment group were further divided into 3 replicates of 6 birds each. Feed and water were provided *ad-libitum*. Feed intake was recorded daily and the birds were weighed weekly. The experiment lasted for 28 days.

Carcass and internal organ evaluation

At the end of the eight weeks of the experiment, two birds per treatment were selected and used for the carcass and internal organ evaluation. The selected birds were starved overnight and their live weights recorded. The birds were slaughtered by severing the jugular vein, hung upside down for proper bleeding. Each of the carcasses was thoroughly bled, scalded, defeated and eviscerated according to the procedure outlined by (Oluyemi and Robbert 2000). The carcass and internal offal (gastro intestinal tract, GIT) were weighed and recorded. The plucked, eviscerated and dressed weights were also taken and expressed as percentage of carcass weight.

Statistical analysis

Data obtained were subjected to analysis of variance (ANOVA) using SAS Statistical package, SAS (1999). Where significant treatment effect was detected, means were separated using the Duncan Multiple Range Test as outlined by Obi (1990).

RESULTS

Carcass characteristics and organ weights of Marshal broilers finishers fed the experimental diets are presented in table 3. The result indicated that the live weight, dressed weight, plucked weight and dressing percentage were significantly ($p<0.05$) affected by dietary treatments. The value of the live weight ranges from (2260.00g) in diet T1 (0% level of inclusion of raw pride of Barbados

Table 3: Carcass and internal organ parameters of broilers finisher fed raw pride of Barbados seed meal.

Parameters	T1 (0%)	T2 (5%)	T3 (10%)	T4 (15%)	SEM
Live weight (g)	2260.00^{a}	1930.00^{b}	1900.00^{c}	1860.00^{d}	79.64
Dressed weight(g)	1780.00^{a}	1430.00^{b}	1400.00^{bc}	1360.00^{cd}	83.92
Plucked weight (g)	78.76^{a}	74.60^{b}	73.68^{bc}	73.12^{cd}	1.11
Dressing percentage (g)	78.76^{a}	74.60^{b}	73.68^{bc}	73.12^{cd}	1.11
Drum stick (g)	5.30^{b}	6.14^{a}	6.16^{a}	5.06^{c}	0.25
Thigh (g)	6.32^{c}	7.20^{a}	6.69^{b}	5.57^{d}	0.30
Breast (g)	20.18^{c}	21.54^{b}	23.45^{a}	17.20^{d}	1.14
Back (g)	13.92	13.80	13.93	12.83	0.29
Head (g)	2.65	3.15	2.72	2.87	0.09
Neck (g)	5.50^{b}	6.74^{a}	5.29^{bc}	4.94^{d}	0.34
Wing (g)	4.73	5.96	4.76	4.87	0.26
Shank (g)	2.23	3.13	2.47	2.60	0.16
Abdominal fat (g)	2.17^{a}	1.22^{b}	2.24^{a}	1.27^{b}	0.24
Liver (g)	2.22^{c}	2.49^{a}	2.42^{ab}	1.98^{d}	0.08
Kidney (g)	0.55^{d}	0.78^{a}	0.72^{ab}	0.68^{c}	0.04
Heart (g)	0.53^{b}	0.61^{a}	0.62^{a}	0.53^{b}	0.02
Whole gizzard (g)	3.17^{d}	3.28^{c}	3.58^{b}	4.26^{a}	0.21
Empty gizzard (g)	2.51^{c}	2.72^{ab}	2.97^{a}	2.72^{ab}	0.08
Proventriculus (g)	0.67 ^{b}	0.57^{c}	0.52^{c}	0.84^{a}	0.06
Spleen (g)	0.12	0.18	0.14	0.21	0.02
Bile (g)	0.09	0.16	0.14	0.21	0.02
Lung (g)	0.74^{a}	0.67^{b}	0.75^{a}	0.51^{c}	0.05
Small intestine (g)	5.98^{a}	5.42^{b}	5.36^{b}	5.88^{a}	0.14

a,b,c,d means on the same row but with different superscripts are statistically ($p<0.05$) significant

seed meal) to (1860.00g) in diet T4 (15% level of inclusion of raw pride of Barbados seed mal). For the dressed weight, broilers in the control diet T1with the value of (1780.00g) had the highest dressed weight while the least value were recorded in diet T4. The control diet T1 has the highest (78.76g) dressing percentage while the least value (73.12g) were obtained in diet T4. The result of the carcass analysis also showed that there were significant ($p<0.05$) effects of the test feed stuffs on the thigh, breast, back, head, neck, wing and shank. As the level of inclusion of raw pride of Barbados seed meal increases, the values of parameters measured decreases. The highest value of liver (2.49g) was obtained in diet T2 while the least value (1.98g). For kidney, bird on diet T2 (5% level of raw pride of Barbados seed meal) had the highest value (0.78g) while broilers on diet T1 the control diet had the lowest (0.55g). The value of heart ranges from (0.53g) in the control diet to (0.62g) in diet T3 (10% inclusion level of raw pride of Barbados seed meal). The result revealed that the value of whole gizzard increases as the level of raw pride of Barbados seed meal increases. No consistent trend was observed in the value of empty gizzard, proventriculus, spleen, bile and lung.

DISCUSSION

The result of this study showed that live body weight and dressed weight decreased significantly as the level of raw pride of Barbados seed meal increased across the dietary treatment. This reduction in carcass yield might have been attributed to the presence of anti-nutritional factors such as tannins, phytate, saponin and oxalate present in raw pride of Barbados seed meal. This result confirmed the finding of Emenalonet al (2004) who reported that reduction in carcass weight was due to the presence of anti-nutritional factors in raw velvet bean (*Mucunapruriens*). Iyayi and Yahaya, (1999) documented the roles of anti-nutritional factor in growth depression and carcass weight reduction in broiler bird due to low metabolizable energy in the feed. The carcass dressing percentage value (73.12-78.76%) obtained in this study are higher than the values (65.9-69.4%) and (69.1-72.6%) reported by (Omojola and Fagbuaro, 2005). Drumstick, thigh, breast and neck as percentage of live weight were significantly ($p<0.05$) difference across the dietary treatments. This result confirmed the findings of Oso (2007) who reported significant ($p<0.05$) difference in drumstick, thigh, breast and neck of turkey as percentage of live weight. However, back, head, lung and shank as percentage of live weight of broiler showed no significant ($p<0.05$) difference across the dietary treatment. This result negate the finding of Oso (2007) who reported significant ($p<0.05$) difference in the back, head, wing and shank of turkey as percentage of live weight. The result of this study showed that the relative weight of small intestine as percentage of live weight fluctuate across the dietary treatments. The result confirmed the finding of Wang et al (1995) who reported that anti-nutrient exert their deleterious effect through reduced nutrient absorption following extensive structural and functional disruption of the intestinal microvilli. The result is in agreement with the finding of Lorrenzon and Olsen, 1982 who reported that extensive structural and functional disruption of microvilli could lead to the shedding of brush-border membrane and decreased vilum length with consequent reduction as the level of inclusion of raw pride of Barbados increased across the dietary treatments.

This result is in agreement with the finding of Carew et.al (2000)who reported an increase in the relative gizzard weight due to extra muscular work required to digest the raw pride of Barbados seed meal which had higher fibre levels than the control diet. It could be concluded that raw pride of Barbados seed meal could effectively replace soyabean at 5% level of inclusion in broiler ration without any negative effect on carcass yield.

CONCLUSION

From this study, it would appear that 5% inclusion level of raw pride of Barbados seed meal could be used in finisher broiler diets without any deleterious effect on carcass and organ quality. Further research is necessary to determine the methods of detoxifying the toxins in pride of Barbados so as to increase its nutritive value for monogastric animals.

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