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Effect of Dietary Fermented Groundnut Husk for Wheat offal on Carcass and Hematological Characteristics of Broiler Chickens in Semi-Arid Area of Kebbi State, Nigeria

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Abstract: *This study was conducted to investigate the carcass and some hematological parameters of broiler chickens fed diets containing Fermented Groundnut Husk (FGH) as a replacement for wheat offal. Ninety-six one-day-old chicks Abor-acre strain were randomly divided into four groups of 24 birds each and replicated three times with 8 chicks per replicate in a completely randomized design. The study lasted for 8 weeks. Diet one was the control with (0% FGH), diets 2, 3 and 4 had (10 % FGH, 20% FGH and 30%FGH), respectively. At the end of the eight weeks, birds were slaughtered and weights of carcass primal cuts and organs parts were measured. Blood samples were collected from jugular vein of thee birds per treatment for hematological indices. The carcass measurements showed no significant difference ($p<0.05$) across the treatment means with the exception of wings, breast, drumsticks and chest. The live weight of birds fed 20% FGH (1.90kg/b) and 30% FGH (2.55kg/b) were better ($p<0.05$) than those on 0% FGH (1.80kg/b) and 10% FGH (1.65kg/b). Also there was no significant difference among hematological parameters measured across the treatments. The results suggest that FGH up to 30% could improve carcass yield and maintain normal hematological indices of broiler chickens.*

Keywords: *Broiler chickens, Fermented groundnut husk, Semi-Arid Area, wheat offal*

I. Introduction

Poultry production in Nigeria is a dynamic industry. Over the years, there has been a tremendous improvement in the sector [1]. The development of Poultry industries has been described as the fastest means of solving the problem of low animal protein intake in the country due to its short production cycle [2]. However, this progress is currently being undermined by the escalating cost of feed and poor funding of the agricultural sector by the Government [3].This has led to a low performance of various categories of poultry species that are stocked by some formers. Feed alone accounts for 60-75% of the cost of raising commercial poultry [4]. Apart from the higher cost of feed, unavailability of some feed ingredients all year round is one of the important factors militating against further expansion of the poultry industry in the developing countries.

The use of non conventional feeding-stuffs to poultry nutrition has received considerable attention in West Africa [5][6][7][8][9]. Some of these by-products have different anti- nutritional factors and different processing methods such as fermentation, chemical extraction, boiling, bioconversion etc have been employed in detoxification of these alternative feed materials [10]. The numbers of agro-industrial by-products in Nigeria are increasing in quantity but are either partially used or entirely wasted.

The use of crop residues as non-ruminant feed ingredients would require prior chemical or biological treatment to disrupt the strong association between structural polysaccharides and lignin which restricts the enzymatic degradation of cellulose [11][12].

Nigeria is the third leading producer of groundnut in the world producing 1.92 million tons of it and generating 0.288 million tons of groundnut husk as a by-product of the processing of the groundnut, however, this by-product is poorly utilized [13]. Groundnut husk is a valuable feed resource that can be useful for feeding livestock after further processing. According to [14], the crude protein, crude fiber, calcium and phosphorus in groundnut pod are 10.4, 31.2, 0.93 and 0.87% respectively.

The potential of groundnut husk can be explored in poultry feeding [15][16]. Recent studies [17] have shown that fermented groundnut husk is a possible feed resource for broiler chickens to replace wheat offal meal above 30% inclusion for effective growth performance at reduced cost of production. The present study was therefore carried out to investigate the effects of dietary inclusion of graded levels of fermented groundnut husk on carcass and some hematological indices of broiler chickens.

II. Materials And Methods

2.1 Study Area

The experiment was conducted at the Poultry unit of Kebbi State University of Science and Technology, Aliero. The State is located approximately within latitude 10^{o} and 14N' and longitude 3^{0} and 7'E with a minimum temperature of 23^{0} C which occurs in December during harmattan period. The highest mean daily temperature of 39^{0}C occurs in March and April. Livestock and crop farming are the major occupations in the area.

2.2 Preparation of the experimental diets

Freshly dehulled pod husks were collected from groundnut processing center in Aliero Local Government Area of Kebbi State. The fresh groundnut husk was packed in to a plastic bucket and soaked in ordinary water at room temperature for six days. It was then drained and sundried for one week until a constant weight was obtained. Three samples were taken from different positions in the milled bag of fermented groundnut husk for chemical analysis.

The milled fermented husk was then incorporated in graded levels at the expense of wheat offal in the experimental diets as follows: Diet one was the control with (0% FGH), diets 2, 3 and 4 had (10 % FGH, 20% FGH and 30%FGH, respectivey). The gross compositions of the experimental diets are presented in Table 1.

2.3 Management of birds and experimental layout

Ninety-six one-day-old chicks Abor acre strain were randomly divided into 4 groups of 24 birds each and replicated three times with 8 chicks per replicate in a completely randomized design in an experiment that lasted 8 weeks. Data on feed intake, bodyweight gain, feed conversion ration and mortality were recorded. At week 8, one bird per replicate was randomly selected from each group, blood samples were collected from the bird s through their jugular vein puncture using a 5ml disposable syringe and needle before slaughtering for some hematology parameters. The blood were stored in sample bottles containing anti-coagulant EDTA (Ethylene Diamine Tetra Acetic Acid) and then analyzed for Parked Cell Volume (PCV), Red Blood Cell (RBC), White Blood Cell (WBC) and Total Protein (TP) concentration in the blood [18].

2.4 Statistical Analysis

All data were subjected to analysis of variance using [19] computer software package and means separation by Duncan multiple range test as outlined by [20].

III. Results And Discussion

The results of the proximate composition of the FGH (Table 2) indicated crude protein (16.59%), carbohydrate (74.50%), low ash (3.50%), ether extract (3.50%) and fiber content (2.60% CF). This is in agreements with the findings of [21] who reported a significant reduction in the crude fiber and non starch polysaccharides with a corresponding increase in the levels of soluble sugars and crude protein when groundnut pods was treated with fungal extract. Reports by [16] indicate a fairly high amount of energy in fermented groundnut husk and the fiber can be utilized by poultry birds to provide a certain amount of energy not only as a filler to provide bulk for the feed, but also for the normal integrity of poultry gastro intestinal tract.

The results of carcass characteristics and some hematological parameters of broiler chickens fed experimental diets are presented in Table 3 and 4. The live weight of birds fed 20% (1.90kg/b) FGH and 30% (2.55kg/b) FGH were better ($p<0.05$) than those on 0% (1.80kg/b) FGH and 10% (1.65kg/b) FGH. The live weight increases as the inclusion levels of FGH increases in the diets. The dressing percentage of birds feed 0% (91.67%) FGH was higher than birds fed 10% (90.91%), 20% (88.42%) and 30% (74.51%) FGH. However, the dressing percentage was significantly ($P<0.05$) better in birds feed 30% FGH than 10% and 20% FGH (Table 3). The carcass yields were significantly different among the wings, breasts, drumsticks and chest weight. Birds in diet 4 had the highest wings (14.50g), breast (14.38g), drumsticks (25.52g) and chest (9.95g) weight values while birds in diet 2 had the least weight values of wings (12.32g), breast (13.23g), drumsticks (23.02g) and chest (8.07g). The weights of back, small and large intestines, abdominal fat, heart, liver gizzards, lungs, crop and spleen were not significantly ($P<0.05$) different from those of the control group. This attest to the efficient feed utilization and it agreed with the reports of [22] that broiler chickens fed cassava diets up to 20% did not significantly vary in terms of carcass weight and dressing percentage. Similar report [17] indicated that FGH supplemented diets compete favorably with wheat offal in the diet of broiler chickens. Numerous studies [23][24][25][26][27] have also demonstrated the presence of cellulolytic bacteria in the distal part of small intestine and in the ceacum of monogastrics. Therefore, there is convincing, but largely over looked evidence in support of the ability of monogastricts to utilize cellulose a major constituents of crop residues [28].

There was no significant difference ($p>0.05$) among the hematological parameters measured across the treatments. According to [29], blood parameters are important in assessing the quality and stability of feed

ingredients for farm animals. There is no evidence of malnourishment among the birds as a result of the inclusion of FGH in their diets.

IV. Conclusion

The results obtained in this work shows that FGH if properly treated could serve as a suitable feed ingredient for non-ruminants as it does not have any adverse effect on the carcass yield and the hematological indices of broiler chickens. Therefore, feeding broiler chickens with diets containing FGH up to 30% replacement level for wheat offal encouraged better output.

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Table 1: Percentage Composition of Experimental Diets (Finisher)

	Treatments			
	1	2	3	4
Parameters (%)	(0%)	(10%)	(20%)	(30%)
Maize	56.10	56.10	56.10	56.10
Groundnut cake	15.00	15.00	15.00	15.00
Wheat offal	19.50	17.55	15.60	13.65
Groundnut husk	0.00	1.95	3.95	5.85
Fish meal	2.00	2.00	2.00	2.00
Blood meal	1.50	1.50	1.50	1.50
Bone meal	0.80	0.80	0.80	0.80
Limestone	2.50	2.50	2.50	2.50
Salt	0.30	0.30	0.30	0.30
Premix	0.30	0.30	0.30	0.30
Total Calculated (%)	**100.00**	**100.00**	**100.00**	**100.00**
Crude protein (%)	16.18	16.09	16.07	16.02
Crude fiber (%)	3.60	3.43	3.37	3.25
M E (Kcal/Kg)	2854.30	2817.80	2781.40	2744.90
Feed cost (₦/Kg)	62.00	58.11	56.01	43.18

Table 2: Proximate analysis of fermented groundnut husk

Parameters	Proportion (%)
Crude Protein	16.59
Ether Extract	3.50
Ash	3.50
Crude Fibre	2.60
Carbohydrate	74.50

Table 3: Carcass characteristics of Broiler chickens fed Experimental Diets

		Treatments			
Parameters	1 (0%)	2 (10%)	3 (20%)	4 (30%)	CV (%)
Live weight (Kg/b)	1.80^{b}	1.65^{c}	1.90^{b}	2.55^{a}	20.09
Dressed weight (Kg/b)	1.65^{b}	1.50^{c}	1.68^{b}	1.90^{a}	9.81
Dressing percentage (%)	91.67^{a}	90.91^{a}	88.42^{b}	74.51^{c}	9.30
Wings (g)	12.34^{b}	12.32^{b}	13.36^{a}	14.50^{a}	7.88
Breast (g)	13.29^{b}	13.23^{b}	12.36^{b}	14.38^{a}	6.21
Back (g)	12.65	12.44	12.92	12.69	1.55
Drumstick (g)	24.43^{b}	23.02^{b}	24.92^{a}	25.52^{a}	4.36
Chest (g)	8.15^{b}	8.07^{b}	9.23^{c}	9.95^{a}	10.22
Large intestine (g)	3.46	3.39	3.44	3.39	1.04
Small intestine (g)	4.03	4.50	4.60	4.00	7.28
Abdominal fat (g)	1.31	1.01	1.35	1.40	13.85
Heart (g)	1.70	1.59	1.59	1.70	3.86
Liver (g)	1.70	1.47	1.43	1.69	9.06
Gizzard (g)	3.75	3.80	3.90	3.75	1.86
Lungs (g)	1.59	1.51	1.50	1.55	2.67
Crop (g)	0.76	0.68	0.72	0.65	6.81
Spleen (g)	0.60	0.55	0.65	0.75	13.39

abc:means on the same row with different superscripts are significantly difference ($P<0.05$)
CV: Coefficient of Variations

Table 4: Hematological measurements of Broiler chickens fed Experimental Diets

		Treatments		
Parameters	1 (0%)	2 (10%)	3 (20%)	4 (30%)
PCV (%)	36.30	35.55	36.30	30.80
TP (g/l)	0.55	1.09	0.58	0.67
WBC (10^{9}/l)	213.50	205	199.4	185.9
RBC (10^{12}/l)	2.49	2.23	1.79	2.34

PCV (Pack Cell Volume), TP (Total Protein), WBC (White Blood Cell), RBC (Red Blood Cell)