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RESPONSE OF BROILER CHICKENS TO INDUSTRIAL SOYA BEAN CAKE CONTAINING SPENT SORGHUM RESIDUE AS DIETARY FIBRESOURCE

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ABSTRACT

An experiment was conducted to evaluate the responses of broiler chickens to industrial soya beancake containing spent sorghum residue (SSR) as dietary fibre. Five test diets were formulated with spent sorghum residue included at 0, 15, 25, and 30% levels which were designated diets T_1, T_2, T_3, T_4 and T_5 respectively at both starter(23%CP) and finisher (20%CP) phase. Proximate contents of the diets were determined. A 56-day feeding trial was carried out in a completely randomized design (CRD) with Arbor Acres strain. Day-old broiler chicks were assigned to the five dietary treatments with three hundred broiler chickens were randomly allotted to five treatments with three replications of 20 birds per replicate. Feed and water were supplied adlibitum throughout the experiment period (8 weeks). At the end of the experiment six birds per treatment were randomly selected for carcass yield and internal organs characteristics. The result showed that, there is a highly significant ($P<0.01$) difference in daily feed intake in the starter phases and a significant ($P<0.05$) difference in daily weight gain during the finisher phase. Also, in the overall, daily weight gain shows a significant ($P<0.01$) treatment effect. The feed cost in naira per kilogram gain varied and of highest cost savings of ₦255.60 was recorded on diet T_3. The results obtained from this study showed that spent sorghum residue can be serve as a cheap sources of fibre and protein source. That inclusion of spent sorghum residue at 15 and 20% gave better weight and feed efficiency than others cheap sources of fibre and protein.

Keywords: Broiler chickens, industrial soya bean, residue, spent sorghum, dietary fibre.

INTRODUCTION

Poultry refers to all birds of economic value to man, examples include chickens, pigeon, duck, pheasant, quail, guinea fowl and recently ostrich all which belong to the zoological class avies (Bulus*et al*., 2014). Food and Agricultural Organization (FAO, 1991) recommended that 35g of the required minimum of 65-72g of reference protein should be obtained from animal products. The average animal protein intake per capita per day in Nigeria and other countries in Sub-Sahara Africa fluctuate between (7.6 and 13.26g) and this is widely acknowledged to be inadequate Poultry protein. Because of its enormous potential such as eggs and meats can be explored to bridge the animals protein supply gap (Aduku, 2012). Spent grains are the by-products of mashing grains which is one of the initial operations in brewery in order to solubilise the malt and cereal grains to ensure adequate extraction of the worth (Fillaudeau*et al* 2006). In the Manufacture of beer, various residues and by-products are generated. The most common one are spent grain, spent hops and surplus yeast Mussatto, (2009).Thus, brewer spent grain is readily available in high quantity and low cost by-products of brewing and is a potentially valuable resource for animal's utilization Robertson *et al* (2010). The utilization of this abundantly availably raw materials has found a place in animal nutrition, which not only residues the cost of feeding but also create an outlet for this materials. The use of industrial by-products has continued to be of interest to feed manufacturers and nutritionist in the field of poultry industry.

MATERIALS AND METHODS

Three hundred experimental birds were randomly allotted to five experimental diets that were replicated three times in a completely randomized design of twenty birds per replicate. Feed and water were supplied ad *libitum* during the experiment which lasted for eight weeks. Five experimental diets for both starter (23% CP) and finisher phases (20%CP) were formulated in which spent sorghum residue were included in the diets at 0, 15, 20, 25, and 30% levelled as diet 1 , 2, 3, 4, and 5 respectively. The experimental diets for starter and finisher phase are represented in table 1 and 2 respectively, using industrial soya bean cake as plant protein. Both the starter and finisher diets wee fed for four weeks each. Daily records of feed intake were taken while Body weights were measured on weekly basis, daily weight gain were used to determine the feed conversion ratio. Internal organ, carcass characteristics, dressing percentage and economy of production were measured as the performance indices.

Table 1: Composition and Calculated Analysis of Broiler Chickens fed diets Containing Spent Sorghum Residue at the Starter Phase (1-4) 23%CP

	Treatments				
Ingredients	**T_1 (0%)**	**T_2 (15%)**	**T_3 (20%)**	**T_4 (25%)**	**T_5 (30%)**
Maize	49.70	40.70	37.70	34.80	31.70
SSR	0.00	15.0	20.0	25.0	30.0
ISBC	38.10	30.10	28.10	26.00	24.10
W/0	5.00	5.00	5.00	5.00	5.00
Fish meal	5.00	5.00	5.00	5.00	5.00
Bone meal	2.00	2.00	2.00	2.00	2.00
Limestone	1.50	1.50	1.50	1.50	1.50
Salt	0.25	0.25	0.25	0.25	0.25
Premix	0.25	0.25	0.25	0.25	0.25
Lysine	0.10	0.10	0.10	0.10	0.10
Methionine	0.10	0.10	0.10	0.10	0.10
Total	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**
Calculated analysis					
CP	23.00	23.00	23.00	23.00	23.00
ME	2958.40	2821.90	2776.40	2731.30	2685.40
EE	5.50	5.80	5.90	6.10	6.30
CF	4.90	6.30	6.70	7.20	7.70

*Vitamin-Mineral. Premix (Bio-mix) provided per Kg the following: Vitamin A 12,000,000in, Vitamin D_3, 3,000, W/O - Wheat offal, CP- Crude protein, ME -Metabolizable energy, EE - Ether extract CF - Crude fibre

Table 2: Composition and Calculated Analysis of Broiler Chicken fed diets Containing Spent Sorghum Residue at Finisher phase (5-8) 20% CP

	Treatments				
Ingredients	**T_1 (0%)**	**T_2 (15%)**	**T_3 (20%)**	**T_4 (25%)**	**T_5 (30%)**
Maize	59.07	49.4	46.93	43.93	40.93
SSR	0.00	15.00	20.00	25.00	30.00
ISBC	26.23	20.9	18.33	16.37	14.37
W/0	5.00	5.00	5.00	5.00	5.00
Fish meal	5.00	5.00	5.00	5.00	5.00
Bone meal	3.00	3.00	3.00	3.00	3.00
Limestone	1.00	1.00	1.00	1.00	1.00
Salt	0.25	0.25	0.25	0.25	0.25
Premix	0.10	0.10	0.10	0.10	0.10
Lysine	0.10	0.10	0.10	0.10	0.10
Total	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**
Calculated analysis					
CP	20.00	20.00	20.00	20.00	20.00
EE	5.10	5.50	5.60	5.70	5.70

CF	5.90	6.30	6.70	6.70	7.10
ME	2981.10	2841.90	2798.50	2752.90	2707.30

*Vitamin-Mineral. Premix (Bio-mix) provided per Kg the following: Vitamin A 12,000,000in, Vitamin D_3, 3,000, 000iu, Vitamin E, 30,000mg, Vitamin K_3, 2,500mg, VitaminB_1, 2,000mg, VitaminB_2, 5,000mg, VitaminB_6, 3500mg, VitaminB_{12}, 20mg Folic acid 1,000mg,Nacin, 40,000mg, Calpan, 10,000mg, Biotin, 80mg, Antioxidant, 25,000mg, Cobalt, 250mg, selenium, 250mg, Iodine, 1,200mg, Iron, 40,000mg, Manganese, 70,000mg, Copper, 8,000mg, Zinc, 60,000mg. Choline chloride, 2000, 000mg. SSR - Spent sorghum residue, ISBC- Industrial soya bean cake, W/O - Wheat offal, CP - Crude protein, ME -Metabolizable energy, EE - Ether extract, CF - Crude fibre.

DATA ANALYSIS

DATA COLLECTION WAS subjected to analysis of variance (ANOVA) techniques as outlined by Steel and Torrie (1990). Using the statistical software of Minitab, 17.3.1., (Minitab 2014) significant differences between treatments means were compared using turkey hub mean separation methods.

RESULTS AND DISCUSSION

Brewers spent sorghum, a brewery by-product that may offer a suitable cheap replacer for traditional feedstuffs. A variety of essential nutrients are present in which are required in feed formulation for poultry. It is composed of 7.19% crude proteins, 1.9% ether extract, 13.59% crude fibre and 1.23% ash. Besides, it is fairly rich in essential amino acids; 0.9% lysine, 0.4% methionine, 0.4% tryptophan, 1.2% phenylalanine, 1.1% threonine as well as 1.6% valineThe performance of broiler chickens at the fed diets containing spent sorghum residue are shown on table 3: the daily feed intake values (74.23 – 70.84g; 66.54 – 62.97; and 58..54g) showed significant difference ($P<0.05$) among the treatment mean at the starter, finisher phase and overall phase. The daily weight gain values obtained (31.97 – 27.97g; 29.16 – 30.41g and 26.23g) also showed significant difference between treatment group at starter and finisher phase.However, the result was in agreement with the findings of Anyanwo *et al*. (2008).observed similar trends on final body weights and daily weight gains of broiler chickens. Feed conversion ratio results also showed significant difference at both starter and finisher phase and overall performance.Report from different findings indicated significant difference in feed conversion ratio (FCR) when spent sorghum residues were fed to broiler chickens. In this study, there was significant difference across all the dietary treatment observed at both phases and when the performance was pooled. At starter phase, the superior range of 2.54 to 2.07g in treatment 2and 1 were higher than 2.48 values recorded by Ezieshi and Olomu (2008)

Table 3: Performance of broiler chickens fed diets containing spent sorghum residue.

Parameters	T_1 (0%)	T_2 (15%)	T_3 (20%)	T_4 (25%)	T_5 (30%)	SEM
Starter Phase (1-4 weeks)						
Daily feed intake(g)	74.23^{a}	70.84^{ab}	66.54^{bc}	62.97^{c}	58.54^{d}	3.39**
Daily weight gain(g)	31.97^{a}	27.97^{b}	29.16^{ab}	30.41^{ab}	26.23^{b}	1.**
Feed conversion ratio	2.34^{b}	2.54^{a}	2.28^{b}	2.07^{b}	2.23^{c}	1.28**
Finisher Phase(5-8 weeks)						
Daily weight gain (g)	44.15^{b}	56.83^{a}	47.10^{a}	43.10^{a}	35.07^{c}	3.45*
Feed conversion ratio	4.17^{c}	2.36^{a}	2.98^{ab}	3.52^{b}	3.72^{bc}	0.48*
Overall Phase (1-8 weeks)						
Daily feed intake(g)	171.03	134.36	140.38	150.06	130.23	1.04**
Daily weight gain (g)	38.06^{b}	42.41^{a}	38.13^{b}	36.76^{b}	30.65^{c}	1.10***
Feed conversion ratio	3.27^{c}	2.42^{a}	2.71^{ab}	2.90^{b}	3.08^{b}	0.23**
Mortality (%)	10	10	40	40	40	

Note*P<0.05, NS= Not significant, *SEM= Standard error of mean

CONCLUSION

The results obtained from this study showed that spent sorghum residue can be serve as a cheap sources of fibre and protein source. That inclusion of spent sorghum residue at 15 and 20% gave better weight and feed efficiency than others cheap sources of fibre and protein.

RECOMMENDATION

The sole aim of venturing into animal production by producers is to make profit with a reduced cost.Spent sorghum residue is abundant in supply and cheap, and therefore, is recommended for use in broiler chicken diets at inclusion levels of 20% to replace wheat offal without any adverse effect on the performance of the animal

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