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RESPONSE OF BROILER CHICKEN TO DIETARY LEVEL OF ACHA MILLING WASTE AS AN ENERGY SOURCE

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Abstract

The study was conducted at the poultry farm of the College of Education Gindiri, Plateau State Nigeria, between the months of February and April 2020 to evaluate the response of broiler chicken to dietary levels of acha milling wastes as an energy source on the performance of broiler chickens. Five different graded levels of Acha milling wastes were used in formulating the diets. Ration formulation for broiler starter (23% Crude Protein) and broiler finisher (20% Crude Protein) diets was done using the Pearson Square Method. Two hundred and ten (210) day old chicks were randomly allocated to the five treatment diets T1 (0% Acha milling waste), T2 (25% Acha milling waste), T3 (50% Acha milling waste), T4 (75% Acha milling waste) and T5 (100% Acha milling waste) in a completely randomized design. Birds were managed under the deep litter system for a period of 8 weeks. At the end of the experiment, birds were randomly selected from each treatment for carcass evaluation. The results of the growth performance showed that, there were significant differences in weight at week 4 and daily feed intake at the starter phase. At the finisher phase also, significant differences were observed in the final weight and daily feed intake. The result of the carcass traits showed that, there were significant differences ($p>0.05$) in some of the parameters such as carcass weight, dressing percentage, lungs, liver and wings where birds on the acha milling wastes base diets gave higher carcass yields than the control diet. It was therefore concluded that inclusion of Acha milling wastes as energy supplement in broiler diets at 75% inclusion level produces broilers of better carcass traits compared to those fed under conventional commercial feeds ($p>0.05$). Acha milling wastes was therefore recommended for inclusion in the diet of broiler chickens for up to 75% level for better productivity.

Key words: acha, broiler chickens, wastes, diets, response

Introduction

In Nigeria today meeting the animal protein requirement of Nigerians has been the main goal of our livestock development projects. Animal protein consumption in developing countries is far below the minimum figure recommended by the food and agriculture organization (FAO 2012). One of the major problems hampering the production and supply of livestock products, especially monogastric is feed which account for about 80% of cost of production (Fanimo *et al*. 2007). Maize which is the conventional animal protein source in poultry diet is expensive; this problem has tended to reduce the state of expansion of the poultry industry and has added to the low level of animal protein intake among the Nigerian people. This therefore has created the need for new, cheap and non-conventional animal energy sources, not competed for by humans and easily available and in large quantity for poultry farmers. Waste form Acha processing fit this description. Acha milling waste does not only serve as energy source but also provide some necessary vitamins (Fanimo *et al*., 1998).

Materials and Methods

The experiment was conducted at the Poultry Farm of the College of Education Gindiri Plateau State Nigeria, between the months of February and April, 2020. Two hundred- and ten (210) day old chicks of *Agrictec* were used for the experiment. The chicks were raised/ brooded on deep litter management system for a period of one week. After the brooding, the chicks were then allocated to the various experimental treatments. Four diets were formulated to contain graded levels of Acha milling waste at 0, 3.75, 7.50, 11.25 and 15.00 % for treatments 1, 2, 3, 4 and 5 respectively as presented in Table 1 and 2

Table 1: Ingredients composition and calculated analysis (%) of graded level of Acha (*Digeteiria exilis*) offal in broiler chicken diets (1-4weeks)

Ingredients	0%	25%	50%	75%	100%
Maize	49.00	44.25	39.50	33.50	28.50
FFSB	33.00	34.00	35.00	37.25	38.50
Wheat offal	9.00	9.00	9.00	9.00	9.00
Acha offal	0.00	3.75	7.50	11.25	15.00
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	1.00	1.00	1.00	1.00	1.00
Salt	0.25	0.25	0.25	0.25	0.25
Premix	0.25	0.25	0.25	0.25	0.25
Lysine	0.30	0.30	0.30	0.30	0.30
Methionine	0.20	0.20	0.20	0.20	0.20
Total	100	100	100	100	100
Calculated Analysis					
Crude protein (%)	23	23	23	23	23
Ether extract(%)	8.7	8.7	8.7	8.7	8.7
Crude fibre(%)	3.9	3.9	3.8	3.7	3.7
Calcium(%)	1.4	1.4	1.4	1.4	1.4
Phoshorus(%)	0.9	0.9	0.69	0.9	0.9
ME (kal/kg)	3028	29350	2882	2808	2735

FFSB – full fat soyabean; ME – metabolizable energy

Table 2: Ingredients composition and calculated analysis (%) of graded levels of Acha (*Digeteriaexilis*) milling waste in broiler chickens' diets (5 – 8 weeks)

Ingredients	0%	25%	50%	75%	100%
Maize	56.00	51.25	46.50	41.75	36.00
FFSB	30.00	31.00	32.00	33.00	35.00
Wheat offal	8.00	8.00	8.00	8.00	8.00
Acha milling waste	0.00	3.75	7.5	11.25	15.00
Fish meal	2.00	2.00	2.00	2.00	2.00
Bone meal	1.00	1.00	1.00	1.00	1.00
Limestone	0.25	0.25	0.25	0.25	0.25
Salt	0.25	0.25	0.25	0.25	0.25
Premix	0.30	0.30	0.30	0.30	0.30
Lysine	0.20	0.20	0.20	0.20	0.20
Methionine	2.00	2.00	2.00	2.00	2.00
Total	100	100	100	100	100
Calculated analysis					
Crude protein (%)	20	20	20	20	20
Ether extract(%)	8.2	8.2	8.2	8.3	8.3
Crude fibre(%)	3.8	3.0	3.7	3.6	3.6
Calcium(%)	1.3	1.3	1.3	1.3	1.3
Phosphorus(%)	0.8	0.8	0.8	0.8	0.8
ME (kcal/kg)	3071	2997	2924	2882	2778

FFSB – full fat soybean; ME – metabolizable energy

During the study, data were collected on growth performance which include; feed intake, body weight gain, feed conversion ratio and mortality. Carcass yield and internal Organs Characteristics were measured and expressed as a percentage of live weight. Data generated during the experiment was

subjected to Analysis of Variance (ANOVA) technique as outlined by Steel and Torrie (1990). The treatment means were separated by Duncan's new multiple range test (Duncan, 1995).

Results and Discussions

Table 3: Performance of broiler chickens fed to dietary levels of Acha milling wastes at the starter phase (0-4 weeks)

Parameters	T1	T2	T3	T4	T5	SEM
Initial body weight (g)	100.00	101.19	102.38	100.00	101.19	2.61^{NS}
Weight at 4 weeks (g)	592.86^{a}	497.62^{ab}	580.95^{a}	476.19^{b}	502.38^{ab}	2.82*
Daily feed intake (g/b/d)	43.54^{a}	33.18^{c}	43.80^{a}	30.09^{d}	38.52^{b}	0.17*
Daily weight gain (g/b/d)	17.60	14.16	17.19	13.44	14.33	1.51^{NS}
Feed conversion ratio	2.47	2.34	2.56	2.24	2.69	0.13^{NS}

^{a,bcd}: means within the same row bearing different superscripts are significantly different (P<0.05); NS: No Significant Difference; SEM: Standard Error of Mean

Table 4: Performance of broiler chickens fed to dietary levels of Acha milling wastes as an energy source at the finisher phase (5-8 weeks)

Parameters	T1	T2	T3	T4	T5	SEM
Final weight (g)	2245.24^{a}	2220.24^{a}	2219.05^{a}	2159.52^{ab}	2005.97^{b}	31.97*
Daily feed intake (g/b/d)	142.96^{ab}	131.54^{c}	143.79^{a}	130.14^{c}	141.49^{b}	1.39*
Daily weight gain (g/b/d)	59.01	61.52	58.50	60.12	53.70	3.44^{NS}
Feed conversion ratio	2.42	2.14	2.46	2.16	2.63	0.14^{NS}

^{a,bcd}: means within the same row bearing different superscripts are significantly different (P<0.05); NS: No Significant Difference; SEM: Standard Error of Mean

Table 5: overall Performance of broiler chickens fed to dietary levels of Acha milling wastes as an energy source at the finisher phase (1-8 weeks)

Parameters	T1	T2	T3	T4	T5	SEM
Daily feed intake (g/b/d)	93.25^{a}	82.36^{c}	93.79^{a}	80.12^{d}	90.01^{b}	0.99*
Daily weight gain (g/b/d)	38.31	37.84	37.80	36.78	34.02	2.96^{NS}
Feed conversion ratio	2.43^{ab}	2.18^{b}	2.48^{ab}	2.18^{ab}	2.65^{a}	0.14*

^{a,bcd}: means within the same row bearing different superscripts are significantly different (P<0.05); NS: No Significant Difference; SEM: Standard Error of Mean

Table 6: Carcass characteristics of broiler chickens fed to dietary levels of Acha milling wastes

Parameters	T1	T2	T3	T4	T5	SEM
Live weight (g)	3333.33	3404.17	3350.00	3325.17	3258.33	62.15^{NS}
Pluck weight (g)	3125.00	3208.33	3162.50	3083.33	3056.67	63.20^{NS}
Eviscerated weight (g)	2933.33	3016.67	279.17	2900.00	3154.17	236.44^{NS}
Carcass weight (g)	2500.00^{ab}	2618.33^{a}	2579.17^{a}	2500.00^{ab}	2420.83^{b}	64.82*
Dressing %	75.98^{ab}	76.87^{a}	76.98^{a}	75.13^{ab}	74.29^{b}	0.99*
Head	2.24	2.20	2.03	2.33	2.24	0.16^{NS}
Legs	3.79	4.02	3.44	3.99	3.79	0.74^{NS}
Back	14.43	14.22	12.34	14.11	12.47	1.26^{NS}
Drum stick	9.86	10.89	10.44	10.46	9.81	0.78^{NS}
Thigh	11.80	12.27	11.48	13.47	10.54	1.37^{NS}
Wings	8.03^{ab}	8.21^{ab}	7.96^{ab}	8.82^{a}	7.61^{b}	0.46*
Breast	24.11	23.15	22.33	22.66	21.37	2.60^{NS}
Neck	4.90	5.11	5.12	5.15	4.85	0.34^{NS}

^{a,bcd}: means within the same row bearing different superscripts are significantly different (P<0.05); NS: No Significant Difference; SEM: Standard Error of Mean

Table 7: Internal organs characteristics of broiler chickens fed to dietary levels of Acha milling wastes

Parameters	T1	T2	T3	T4	T5	SEM
Heart	0.41	0.39	0.38	0.42	0.37	0.02 ^{NS}
Lungs	0.53^{ab}	0.60^{a}	0.59^{a}	0.47^{b}	0.53^{ab}	0.04*
Spleen	0.13	0.14	0.11	0.12	0.13	0.01 ^{NS}
Gizzard	2.80	2.68	1.84	2.01	2.78	0.74
Intestinal length	958.67	933.00	996.00	1005.00	1004.00	36.41 ^{NS}
Liver	1.43^{ab}	1.31^{b}	1.43^{ab}	1.53^{a}	1.43^{ab}	0.08*
Pancreas	0.25	0.24	0.19	0.22	0.26	0.04 ^{NS}
Ceacal length	88.33	81.00	79.67	88.00	94.67	7.24 ^{NS}
Abdominal fat	0.84	0.68	0.69	1.29	1.53	0.37 ^{NS}

^{a,bcd}: means within the same row bearing different superscripts are significantly different (P<0.05); NS: No Significant Difference; SEM: Standard Error of Mean

Table 8: Economic analysis of broiler chickens fed Acha milling waste (0-8 weeks)

Parameters	Diet 1	Diet 2	Diet 3	Diet 4	Diet 5
Total feed intake (kg)	5.22	4.61	5.25	4.89	5.04
Feed cost (N/kg)	166.49	171.67	170.27	169.77	168.55
Total feed cost (N/kg)	869.08	781.40	893.18	762.26	849.49
Initial weight (g)	100.00	101.19	102.38	100.00	101.19
Final weight	2245.24	2220.24	2219.05	2159.52	2005.97
Total weight gain (kg)	404.22	368.58	421.31	370.03	444.76
Feed cost (N/kg gain)	-	35.64	-17.07	34.19	-40.54

The overall phase was significantly (p<0.05) influenced by diets. The birds on diet 4 were more efficient in converting feeds to gain. This agree with the findings of Igwebuike *et al* (2001) and Nsa *et al* (2009) in their separate studies reported no significant difference in feed intake when vegetable waste and moringa leaves were fed to broiler chickens. They reported that birds will consume vital nutrient, resulting in better growth. This observation agreed with Ezieshi and Olomo (2003; 2004). The result of carcass yield however, agreed with the carcass yield of 68 to 78 and 65 to 73% reported by Emiola *et al* (2007) for broiler chicken. The feed cost per Naira Kg (166.49 Naira to 171.6 Naira) decrease with increasing level of AMW in the diet. This was due to feed intake value and the total weight gain of the birds which was higher than the values obtained in treatment 3 (75%) and 1 (control). The lowest feed cost naira per Kg observed on the AMW diet 4 (75%) showed that AMW is cheaper and locally available and better returns were found that maize.

Conclusion and Recommendations

From the study conducted, it may be concluded that, Acha milling waste can be include in the diets of broiler chickens at up to T5.00% to replace maize as a source of energy without any adverse effects of productive performance of the birds. It may be recommended from the result of this study, that, based on the reduced feed cost per kg gain of N368.58 and a corresponding feed cost saving of N35.64, for diet 2, this diet is recommended for broiler chicken

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