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Response of Broiler Chickens to Different Dietary Fibre Source

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***Abstract*— An experiment was conducted to evaluate the performance of broiler chickens fed different fibre sources. Five experimental diets were formulated to contain wheat offal (WO), maize offal (MO) rice offal(RO), sorghum offal (SO) and millet offal (MLO) at 10% (starter) and 15% (finisher) diets represented as T1, T2, T3, T4 and T5 respectively. Three hundred Amor broiler chicks were randomly allotted to the five dietary treatments in a completely randomized design (CRD). Each treatment was replicated five times with 12 birds per replicate. The results showed that feed intake was significantly (P<0.05) different among treatment groups except weight gain and feed conversion ratio at both starter and finisher phases. T1 (WO) had the highest daily weight gain (44.93g/bird) and T4 (SO) recorded the lowest (41.38g/bird). Similarly the feed conversion ratio at the overall phase (2.28 -2.47) did not vary among the dietary treatments. Live weight and carcass analysis showed significant (P<0.05) difference except dressing percentage. However, most of the organs weight were not affected by different fibre sources except liver, pancreas, abdominal fat and large intestine at (P<0.05). The economic analysis showed that feed cost per/kg gain was higher (N319.92/kg gain) in T2 (MO) where as T1 (WO) recorded the lowest (N289.79/kg gain). It was concluded from the results of the study that MO, RO, SO and MLO are good alternatives to wheat offal as dietary fibre source in the diets of broiler chickens.**

Key Words: **Broiler, fibre, wheat offal, maize offal, rice offal, carcass.**

I. INTRODUCTION

The rising cost of poultry feed have continued to be a major problem in developing countries as feed cost accounts for about 70 to 75% [11], of the total cost of poultry production compared to about 50 to 60% in developed countries [14]. These necessitate the use of agro industrial by-products such as maize offal, rice offal, sorghum offal, millet offal etc. in formulating feed for livestock. They are cheaper and always available cereal ingredients which may find place in poultry feeding. Unfortunately, cereal offal are known to be of high fibre content which are capable of reducing nutrient utilization and precipitate metabolic dysfunction when ingested by non ruminant animals [2]. Wheat offal is a major source of fibre in Nigeria and prices of wheat offal has increased at an alarming rate in Nigeria [9]. Other alternative fibre sources such as maize offal, rice offal, sorghum offal, and millet offal can be used in livestock feeding to reduce the cost of production. Similarly, incorporating different fibre sources in the poultry diets according to [10] has the ability to produce lean carcass, lower production cost and promote bowel movement. Therefore, this study aimed at assessing the use of different fibre sources in the diet of broiler chickens.

II. MATERIALS AND METHODS

Experimental Site

This study was conducted at the poultry unit of the Teaching and Research Farm, Aminu Saleh College of Education Azare. Azare is in Katagum local government area of Bauchi state. Katagum local government is situated on the northern part of Bauchi state, Nigeria. It is located between latitudes 110 42ʾ and 11040 0 and longitude 10 031 and 10 011ʾ east It shares common boundary with Itas/Gadau local government in North west, Jammàre to the west, Dambam to the east, Misau to the Southwest [3].

Sources of Experimental Materials

The fibre sources used in this study were wheat offal, maize offal, rice offal, sorghum offal and millet offal which were purchased within Azare market in Katagum Local Government Area of Bauchi state.

Experimental Birds and their management

Three hundred (300) day old Amor breed of broiler chicks were obtained from Amor Limited Ibadan, the chicks were brooded for the period of one week on deep litter. They were fed ad libitum on commercial diet throughout the brooding period. Water and feed were supplied ad libitum during the whole period of the trial. Routine management, vaccines and medications were administered according to the methods of

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[11]. After brooding period of about one week the birds were randomly allotted to five dietary treatments with 60 birds per treatment and each treatment was replicated five times with 12 birds per replicate, in a completely randomized design (CRD). The birds were fed experimental diets for four weeks during the starter phase and four weeks during the finisher phase.

Experimental diets:

Five diets containing different fibre sources with wheat offal as control were formulated; other diets consist of maize offal, rice offal, sorghum offal and millet offal. The diets were designated as diets 1,2,3,4 and 5, respectively. The diets were formulated to supply approximately 3000 Kcal/kg ME, 23 and 20% crude protein for both starter and finisher phases respectively. The ingredient, chemical composition and calculated analysis of the experimental diets for both starter and finisher phases are shown in Table 1 and 2 respectively.

Data collection

The birds were fed with the experimental diets for 8 weeks (56 days) during which data on several parameters were collected and recorded on daily basis while others were taken on weekly basis. Feed intake and weight gain were determined. Weight leftover feed were also subtracted from the total feed supplied for the week to obtain feed consumption per week for each type of the replicate. The birds were weighted at the beginning of the experiment for their initial weight and thereafter on weekly basis. At the end of the experiment 10 birds from each treatment (2 birds per replicate) were randomly selected based on the average group weight. The selected birds were bled, dressed and eviscerated to determine the carcass characteristics. Each bird was weighted before being slaughtered or bled and weighted again after defeathered to record the plucked weight. The head, legs, neck, wings, breast and thigh for each carcass were removed and the parts were weighted. All the weight taken was recorded and the dressing per cent was calculated from the data recorded as shown below:

	Dietary treatments				
Ingredient	T1 (WO)	T2(MO)	T3(RO)	T4(SO)	T5(MIO)
Maize	46.66	45.32	43.34	45.32	46.34
Soybean	33.84	35.18	37.16	35.18	34.16
Offal type	10	10	10	10	10
Fishmeal	5.0	5.0	5.0	5.0	5.0
Limestone	1.5	1.5	1.5	1.5	1.5
Bonemeal	2.00	2.00	2.00	2.00	2.00
Salt	0.25	0.25	0.25	0.25	0.25
Premix	0.25	0.25	0.25	0.25	0.25
Lysine	0.20	0.20	0.20	0.20	0.20
Methionine	0.30	0.30	0.30	0.30	0.30
Total	100	100	100	100	100
Calculated analysis					
Crude protein	23.00	23.00	23.00	23.00	23.00
ME(Kcal/kg)	2987	3082	2988	3190	3111
Crude fibre	4.02	4.10	3.43	3.25	3.70
Ether Extracts	8.85	8.69	9.36	8.80	8.74
Calcium	1.55	1.54	1.56	1.54	1.53
Phosphorus	0.89	0.78	0.83	0.78	0.78
Lysin	1.23	1.21	1.24	1.21	1.20

The weight of all organs (the heart, lungs, liver, gizzard and abdominal fat) and the Gastro-

*Vitamin-Mineral premix (Bio-mix) provided per Kg the following: Vitamin A, 12,000,000iu, Vitamin D3, 3,000,000iu; Vitamin E, 30,000mg; Vitamin K3, 2,500mg; Vitamin B1, 2,000mg; Vitamin B2, 5,000mg; Vitamin B6, 3,500mg; Vitamin B12, 20mg; Folic acid 1,000mg; Niacin, 40,000mg; Calpan, 10,000mg; Biotin, 80mg; Antioxidant, 125,000mg; Cobalt, 250mg; Selenum, 250mg; Iodine, 1,200mg; Iron, 40,000mg; Manganese, 70,000mg; Copper, 8,000mg; Zinc, 60,000mg; Choline chloride, 200,000mg.

measured using station 461 electric scale. The gut components were expressed as percentage of live weight.

Statistical analysis: All the data generated during the experiment for all the parameters studied were subjected to analysis of variance technique (ANOVA) as outline by[15].The differences between the treatment means were further separated using Duncan's Multiple Range Test [5].

Table 2: Ingredients Composition of the experimental diets fed to broiler at the finisher phase(5-8 weeks)

	Dietary treatments				
Ingredient	T1 (WO)	T2(MO)	T3(RO)	T4(SO)	T5(MIO)
Maize	50.66	49.01	46.01	49.01	50.32
Soybean	26.84	28.49	31.49	28.49	27.18
Offal type	15	15	15	15	15
Fishmeal	3	3	3	3	3
Limestone	1.5	1.5	1.5	1.5	1.5
Bonemeal	2	2	2	2	2
Salt	0.25	0.25	0.25	0.25	0.25
Premix	0.25	0.25	0.25	0.25	0.25
Lysine	0.20	0.20	0.20	0.20	0.20
Methionine	0.30	0.30	0.30	0.30	0.30
Total	100	100	100	100	100
Calculated analysis					
Crude protein	20.05	20.00	20.00	20.00	20.00
ME(Kcal/kg)	2992	3042	2902	3205	3085
Crude fibre	4.25	4.36	3.35	3.08	3.74
Ether Extracts	7.86	7.58	8.58	7.74	7.67
Calcium	1.48	1.46	1.49	1.46	1.46
Phosphorus	0.89	0.71	0.79	0.71	0.71
Lysine	1.02	0.98	1.03	0.95	0.95
Methionine	0.34	0.34	0.33	0.34	0.36

*Vitamin-Mineral premix (Bio-mix) provided per Kg the following: Vitamin A 12,000,000 iu, Vitamin D3 3,000,000iu; Vitamin E, 30,000mg; Vitamin K3, 2,500mg; Vitamin B1, 2,000mg; Vitamin B2, 5,000mg; Vitamin B6, 3,500mg; Vitamin B12, 20mg; Folic acid 1,000mg; Niacin, 40,000mg; Calpan, 10,000mg; Biotin, 80mg; Antioxidant, 125,000mg; Cobalt, 250mg; Selenum, 250mg; Iodine, 1,200mg; Iron, 40,000mg; Manganese, 70,000mg; Copper, 8,000mg; Zinc, 60,000mg; Choline chloride, 200,0

Table 3:Performance of Broiler chickens Fed Different Fibre Sources at starter phase (Age 1–4 Weeks of age)

	Dietary treatments					
Parameters	T1 (WO)	T2 (MO)	T3 (RO)	T4 (SO)	T5 (MIO)	SEM
Initial weight (g)	109.99	119.99	114.00	118.66	120.00	2.69^{NS}
Final weight (g)	898.10	1006.15	964.46	917.08	926.92	13.67^{NS}
Feed intake (g)	62.88^{b}	67.17^{a}	66.76^{a}	65.00^{a}	62.46^{b}	0.64^{*}
Weight gain (g)	28.96	31.65	30.37	28.51	28.82	0.85^{NS}
Total weight gain (g)	810.80	890.15	850.46	798.41	806.92	13.67^{NS}
Feed conversion ratio	2.18	2.14	2.20	2.28	2.17	0.06^{NS}
Mortality (%)	0.00	1.00	0.00	1.00	1.00	NS

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a,b,c = means with different superscripts on the same raw are significantly different.
*= significant (P>0.05), NS = Not significant, SEM = Standard error of Means.

III. RESULT AND DISCUSSION

The energy and crude protein contents of the experimental diets at both the starter and finisher phases met the requirements for broiler chickens under tropical conditions [11]. The results indicated that there were significant (P<0.05) differences in feed intake, whereas there were no significant (P>0.05) differences in weight gain, feed conversion ratio (FCR) in broiler chickens fed experimental diets at both starter and finisher phases implying that these fibre sources could replace wheat offal without affecting growth performance. The results agree with [6], [13], and [1] in their separate studies using wheat offal, maize offal and corn bran respectively.

Table 4. Performance of Broiler chickens Fed Different Fibre Sources at Finisher phase (Age 5-8 weeks)

	Dietary treatments					
Parameters	T1 (WO)	T2 (MO)	T3 (RO)	T4 (SO)	T5 (MIO)	SEM
Initial weight (g)	898.10	1006.15	964.46	917.08	926.92	13.67^{NS}
Final weight (g)	2420.00^{b}	2620.00^{a}	2580.00^{a}	2280.00^{c}	2370.00^{b}	63.68^{*}
Feed intake (g/bird)	144.61^{a}	143.63^{b}	145.26^{a}	141.21^{c}	143.24^{b}	0.91^{*}
Av.weight gain(g/bird)	60.91	60.30	56.41	54.25	60.04	3.45^{NS}
Total weight gain(g/bird	1705.39	1688.46	1579.39	1519.08	1680.00	102.89^{NS}
Feed conversion ratio	2.38	2.42	2.61	2.66	2.42	0.15^{NS}
Mortality (%)	0.00	1.00	2.00	2.00	0.00	-

a,b,c = means with different superscripts on the same raw are significantly different.
*= significant (P>0.05), NS = Not significant, SEM = Standard error of Mean.

Carcass Characteristics of Broiler Chickens Fed different Fibre Sources

Table 5. Carcass yield of Broiler chickens fed different fiber sources

	Dietary treatments					
Parameters	T1 (WO)	T2 (MO)	T3 (RO)	T4 (SO)	T5 (MIO)	SEM
Live weight (g)	2420.00^{b}	2620.00^{a}	2580.00^{a}	2280.00^{c}	2370.00^{b}	63.68^{*}
Slaughter weight (g)	2320.00^{b}	2515.00^{a}	2480.00^{a}	2170.00^{c}	2270.00^{bc}	63.32^{*}
Plucked weight (g)	2180.00^{b}	2375.00^{a}	2370.00^{a}	2035.00^{c}	2140.00^{b}	61.78*
Dressing (%)	71.70	69.89	68.56	70.48	71.11	1.38^{NS}

Carcass Characteristics

The result of the carcass yield of broiler chickens fed dietary fibre is presented in Table 5. There were significant (P<0.05) differences in live weight, slaughter weight and plucked weight. The results agree with [1], [4] and [6] in their separate studies using sorghum dust,wheat offal and,rice offal respectively. Whereas no significant (P>0.05) difference observed in dressed weight of the broiler chickens fed the experimental diets this result agree with the earlier report of [7] on broiler chickens fed millet hulls.

Gut Characteristics

The result of gut characteristics of broiler chickens fed fibre sources is shown in Table 6. There were significant (P<0.05) differences in large intestine, abdominal fat and liver. The values range between 1.67-2.19, 1.21-2.57 and 1.76-2.31% respectively. Whereas no significant (P>0.05) difference observed in gizzard, lungs, small intestine and heart. This can be attributable to proper utilization of these fibre sources. These agree with the report [7] when broiler chickens fed millet hull as fibre sources.

Table 6: Gut characteristics of broiler chickens fed different fibre sources

Parameters	T1 (WO)	T2 (MO)	T3(RO)	T4 (SO)	T5 (MIO)	SEM
Gizzard	1.80	1.64	1.59	1.87	1.72	0.08^{NS}
Lungs	0.47	0.50	0.43	0.47	0.55	0.03^{NS}
Small intestine	0.86	0.88	0.90	0.78	0.98	0.07^{NS}
Large intestine	2.19^{a}	1.67^{c}	1.69^{c}	1.83^{b}	1.96^{a}	0.13^{*}
Abdominal fat	1.30^{c}	1.66^{b}	1.21^{c}	1.71^{ab}	2.57^{a}	0.10^{*}
Heart	0.41	0.41	0.47	0.46	0.47	0.02^{NS}
Liver	2.31^{a}	2.01^{a}	1.76^{c}	2.17^{a}	1.95^{b}	0.09^{*}

SEM = Standard error of means, NS = Not significant

Table 7: Cuts of parts of broiler chickens fed different fibre sources

Parameter	T1 (WO)	T2 (MO)	T3(RO)	T4 (SO)	T5 (MIO)	SEM
Head and shank	6.62^{ab}	6.80^{a}	5.46^{c}	6.96^{a}	6.38^{bc}	0.22^{*}
Back	9.37^{b}	9.75^{ab}	8.54c	10.19^{a}	9.33^{b}	0.37^{*}
Chest	5.97	6.28	6.90	7.43	7.74	0.50^{NS}
Thigh	22.13	22.77	21.21	23.20	22.31	0.66^{NS}
Wings	8.00^{a}	7.28^{c}	7.00^{c}	8.87^{a}	7.58^{b}	0.44^{*}
Breast	26.27	22.01	20.62	19.30	20.20	2.39^{NS}

SEM = Standard error of means, NS = Not significant (P>0.05), * = significant (P<0.05)

The cut of parts of broiler chickens fed dietary fibre were presented in Table 7. The results showed there was significant (P<0.05) difference in head and shank, back, and wings and not significant difference in chest, thigh and breast muscle (P>0.05). Breast muscle is one of the few carcass parameters that determine the quality and yield of carcass [8] but was not affected by different fibre sources. This can be attributed to proper utilization of fibre sources, since dressed weight is the major determinants of carcass yield [8].

IV. CONCLUSION

The results obtained on growth performance, carcass yield, organ weights and cut up parts indicated that MO, RO, SO and MLO are good alternatives to wheat offal as dietary fibre

source in the diets of broiler chickens. Also these offals can be obtained at a cheaper price than wheat offal which may lead to reduction in feed cost.

REFERENCES

1. Ajaja, K., Agbede, J.O. and Aletor, V.A. "Replacement Value of sorghum dust for maize in diets for broiler-chicks." In processing of 2nd Annual Conference of Nigeria Society for Animal Production, pp. 286-288:17-21, March, 2002.

2. Awoniyi, T.A.M and Aletor, V. A. "The effect of equi- protien replacement of fish meal with maggot meal in broiler chicken diet on their performance characteristics, organ weights and protein utilization," Proceedings of the 24th Annual Conference of the Nigerian Society for Animal Production, Pp. 91-94, 1999.

3. Azare, I. M. Evaluation of farmer's response strategies to climate change in Katagum Local government area of Bauchi State," Journal of Environmental Technology and Sustainable Agriculture 2(10):26-33, 2003.

4. Dafwang, I.I.and Shwarmen, E.B.N. Utilization of rice offal in practical rations for broiler chicks.Nigerian Journal of Animal Production, 23(1):21-23, 1996.

5. Duncan, D. B. "Multiple Range and Multiple F-tests.Biometrics," 11:1-142, 1955.

6. Grace, I. C, Samuel, O. and Idiong, C.I. "Effect of replacement of Maize with Wheat offal in Broiler finisher diets on Growth Performance and feed cost," Journal of Centra European Agriculture. 8(1): 33-38, 2007.

7. Maidala, A. and Bakoji, S. "Nutritional Evaluation of Millet Hulls as a source of Fibre in the diets of Broiler Chickens,".IARD International Journal of Biology and Medical Research. 2(1):1-9, 2016.

8. Medugu, C. I. Kwari, I. D. Nkama, J. U. Mohammed, I., Hamaker,, I. D. "Carcass and blood components of broiler chickens fed sorghum or millet as replacement for maize," Agriculture and Biology Journal of North America, 1(3):326-329, 2010.

9. Mohammed, G. Igwebuike, J.O.,Adamu, S.R. Kolo, U.M. Asheikh, G. and Sabo, A. Effect of different fibre sources on growth and economic performance of broiler chickens in Semi arid zone of Nigeria. Proceedings of 21st Annual conference of Animal Science Association of Nigeria, Pp 598-602:18-22, 2016.

10. Ojomola, G. S. Abasiekong, S.F. and Ukachukwu, S. N. "Methioninie supplementation in the productive, carcass characteristics and economies of growing indigenous turkey". Tropical Journal of Animal Science 4(2):161-170, 2001.

11. Oluyemi, J. A. and Robert, F.A "Poultry production in the warm wet climate," 2nd Edition, 2007,

12. Onifade, A. A. and Babatunde, G. M. "Comparison of the utilization of palm kernel meal brewers dried grains and maize offal by broiler chicks," British Poultry Science. 39:245-250, 1998.

13. Onu, P. N. Nwakpu, P. E. and Chukwu, L. O., Performance of broiler chicks (Gallus domesticus) fed Maize offal-based diets supplemented with Roxazyme G Enzyme. Journal of Poultry Sciences (7): 607-610, 2006.

14. Gonzalez-Alvarado, J. M. Jimenez-Moreno, E. Lazan, R. and Mateos G.G.," Effect of type of cereal, heat processing of the cereal and inclusion of fibre in the diet on productive performance and digestive traits of broilers." Poult. Sci. 86: 1705-1715, 2007.

15. Steel, R. D and Torrie, J. H "Principle and procedures of Statistics," 2nd Edition. McGraw Hill books Co.New York, USA, 1980.