Asian Research Journal of Agriculture
4(1): 1-6, 2017; Article no.ARJA.31881
ISSN: 2456-561X

SCIENCEDOMAIN *international*
www.sciencedomain.org

Performance of Broiler Chickens Fed Graded Dietary Levels of Rice Milling Residue as a Fibre Source

J. A. Olusiyi[1] and R. J. Wafar[1*]

[1]Department of Animal Production and Health, Federal University, Wukari, P.M.B. 1020, Taraba State, Nigeria.

Authors' contributions

This work was carried out in collaboration between both authors. Both authors designed, supervised data collection, analyzed the data and approved the final manuscript.

Article Information

DOI: 10.9734/ARJA/2017/31881
Editor(s):
(1) Moreira Martine Ramon Felipe, Universidade de Santiago de Compostela, Spain.
Reviewers:
(1) Usama Aftab, AB Vista Asia Pte Ltd, Singapore.
(2) Godfrey Adokiye Kalio, Ignatius Ajuru University of Education, Rumuolumeni, Port Harcourt, Nigeria.
Complete Peer review History: http://www.sciencedomain.org/review-history/18418

Original Research Article

Received 28th January 2017
Accepted 14th March 2017
Published 30th March 2017

ABSTRACT

An experiment was conducted to evaluate the growth performance of broilers fed dietary levels of rice milling residue (RMR) as a replacement of wheat offal (WO), as a fibre source in broiler diet. Three hundred (300) day old chicks were used for the experiment in a completely randomized design (CRD) for eight (8) weeks. The birds were randomly allotted to five (5) dietary treatments of sixty (60) chicks and replicated three (3) times with twenty (20) chicks per replicate. Five (5) treatment diets were formulated in which rice milling residue (RMR) was included to replace wheat offal (WO) at the levels of 0, 25, 50, 75 and 100% representing T1, T2, T3, T4 and T5 respectively. The result of the growth performance showed that, the average daily feed intake (ADFI), average daily weight gained (ADWG) were not significantly different (P>0.05) across treatment groups except feed conversion ratio (FCR). Birds fed T1, T2, T3 and T5 recorded Superior FCR. ADWG ranged from 31.31 g (T1) to 32.82 (T3). Birds on T3 diet recorded higher feed intake of 130.15 g while the least was observed in T1 (116.82 g). It was concluded that rice milling residue (RMR) can completely replace wheat offal without any detrimental effect on growth performance of broilers chickens.

**Corresponding author: E-mail: wafar@fuwukari.edu.ng;*

Keywords: Performance; broilers; rice milling residue; wheat offal.

1. INTRODUCTION

Broiler growth is dependent on optimal feed intake throughout the growing period. An optimal feed intake is dependent on a number of factors such as environmental temperature, diet nutrient density and physical feed characteristics which are considered to have a very significant impact on broiler growth [1]. The poultry industry in Nigeria has undergone a significant transformation since the early fifties, from backyard, peasant and primitive household oriented husbandry to modern and large-scale poultry production which can be found in the country side and urban centers today [2].

Competition between man and livestock over the available grains as a major energy source coupled with high cost of imported feed ingredients have resulted to an increase in the price of commercial feeds by about 200% within the last decade [3]. The effect of this was collaborated by [4] who reported that most Nigeria poultry farmers have abandoned production; others have scaled down operations in order to cope with the rising cost of production. The adverse effect of the above problem is that poultry production has been on the decline with consequent low protein intake among Nigerians.

Efforts should be geared towards looking for cheap and easily available alternative feedstuffs that are of low human preference and of no industrial use, which at the same time could help meet the nutritional requirements of the birds. Such feedstuffs include agricultural by-products known to be dietary fibre sources. Inclusion of these fibre sources in poultry diets according to [4] has the ability to produce lean carcass, lower production cost, promote bowel movement which aid digestion and supply nutrients such as vitamins, minerals and some unidentified factors which improve growth. This study was therefore aimed at investigating the performance of broiler chickens fed graded level of Rice Milling Residue (RMR) as a replacement of wheat offal as a fibre source in broiler diets.

2. MATERIALS AND METHODS

2.1 Study Site

This study was carried out at Taraba State College of Agriculture Jalingo Poultry Units of the Teaching and Practical Farm. The College is in Ardo-Kola Local Government Area of Taraba State in the North-East geo-political zone of Nigeria. It lies between latitude 8°53" North and longitude 11°23" East of the equator in the guinea savannah of northern Nigeria. There are two main seasons existing in the area, the dry and rainy seasons. It has an annual rainfall between 1000 – 15000 mm with a temperature range of 30 – 42°c depending on the seasons [5].

2.2 Experimental Stock and Management

Three hundred (300) day old white mixed sex broiler chicks were used for the experiment. The chicks were brooded on a deep litter management system for one (1) week. Experimental feeds and water were provided *adlibitum*. All required management practices including vaccination were carried out.

2.3 Experimental Diets and Design

The birds were weighed at the beginning of the experiment and randomly assigned to five (5) dietary treatments of sixty (60) birds per treatments designated as T1, T2, T3, T4 and T5 respectively. Each treatment was replicated three (3) times coded as R1, R2 and R3 with twenty (20) birds per replicate. Diets were formulated in which RMR replaced WO at 0, 25, 50, 75 and 100% for T1, T2, T3, T4 and T5 respectively with T1 serving as the control. The treatments were arranged in a completely randomized design (CRD) and also randomly allocated within the poultry house with three (3) replicates per treatment. Feeding trials lasted for eight (8) weeks. Feed and water were supplied *adlibitum.*

2.4 Experimental Diets

Tables 1 and 2 shows the ingredient compositions of broiler starter and finisher diets. The starter comprises 48.59% of maize across the entire treatment group and 32.01% of soybean, while that of finisher is 55.16% maize and 25.44% soybean. Rice milling residue (RMR) was included to replace wheat offal (WO) at 0, 25, 50, 75 and 100% for T1, T2, T3, T4 and T5. All other ingredients were the same across the entire treatment groups.

Table 1. Ingredient composition of broiler starter diets

Ingredients	Replacement levels of wheat offal with rice milling residue				
	T1	T2	T3	T4	T5
Maize	48.59	48.59	48.59	48.59	48.59
Soybean meal	32.01	32.01	32.01	32.01	32.01
Wheat offal	10.00	7.50	5.00	2.50	0.00
Rice Milling Residue	0.00	2.5	5.00	7.50	10.00
Fish Meal	5.00	5.00	5.00	5.00	5.00
Bone Meal	2.00	2.00	2.00	2.00	2.00
Lime Stone	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	0.20	0.20	0.20	0.20	0.20
Methionine	0.20	0.20	0.20	0.20	0.20
Calculated analysis					
Crude Protein	23.05	22.98	22.91	22.84	22.77
ME/kcal/kg energy	2909.37	2929.37	2949.37	2969.37	2989.37
Crude fibre (%)	3.30	3.63	3.59	3.53	3.68
Calcium (%)	1.55	1.58	1.55	1.55	1.56
Phosphorous (%)	0.90	0.92	0.93	0.95	0.97
Lysine (%)	1.64	1.63	1.62	1.61	1.60
Methionine (%)	0.41	0.52	0.41	0.42	0.42

**Vitamin-mineral premix provider per kg the following: Vit. A 1500 IU; Vit.D_3 3000 IU; Vit.E 30 IU; Vit.K 2.5 mg; Thiamine B_1 3 mg; Riboflavin B_2 6 mg; Pyrodoxine B_6 4mg; Niacin 40 mg; Vit. B_{12} 0.02 mg; Pantothenic acid 10 mg; Folic acid 1 mg; Biotin 0.08 mg; Chloride 0.125 mg; Mn 0.0956 g; Antioxidant 0.125 g; Fe 0.024 g; Cu 0.006 g; 10.0014 g; Se 0.24 g; Co 0.240 g*

Table 2. Ingredient composition of broiler finisher diets

	Replacement levels of wheat offal with Rice milling residue				
	T1	T2	T3	T4	T5
Maize	55.16	55.16	55.16	55.16	55.16
Soya bean	25.44	25.44	25.44	25.44	25.44
Wheat offal	10.00	7.50	5.00	2.50	0.00
Rice Milling Residue	0.00	2.50	5.00	7.50	10.00
Fish Meal	5.0	5.00	5.00	5.00	5.00
Bone Meal	2.00	2.00	2.00	2.00	2.00
Lime Stone	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	0.20	0.20	0.20	0.20	0.20
Methionine	0.20	0.20	0.20	0.20	0.20
Crude Protein	20.00	20.00	20.00	20.00	20.00
ME(kcal/kg) energy	2929.08	2949.08	2969.08	2989.08	3008.08
Crude fibre (%)	3.17	3.22	3.27	3.32	3.37
Calcium (%)	1.54	1.54	1.54	1.53	1.53
Phosphorous (%)	0.87	0.89	0.91	0.92	0.94
Lysine (%)	1.43	1.42	1.41	1.4	1.39
Methionine (%)	0.38	0.39	0.38	0.39	0.39

**Vitamin-mineral premix provider per kg the following: Vit. A 1500 IU; Vit.D_3 3000 IU; Vit.E 30 IU; Vit.K 2.5 mg; Thiamine B_1 3 mg; Riboflavin B_2 6 mg; Pyrodoxine B_6 4 mg; Niacin 40 mg; Vit. B_{12} 0.02 mg; Pantothenic acid 10 mg;Folic acid 1 mg; Biotin 0.08 mg; Chloride 0.125 mg; Mn 0.0956 g; Antioxidant 0.125 g; Fe 0.024 g; Cu 0.006 g; 10.0014 g; Se 0.24 g; Co 0.240 g*

2.5 Data Collection

Performance parameters determined include: average daily feed intake (ADFI), average daily weight gain (ADWG) and feed conversion ratio (FCR). The data were subjected to one way analysis of variance (ANOVA) in a completely randomized design (CRD). Differences between

treatment means were compared using Duncan Multiple Range Test [6].

3. RESULTS AND DISCUSSION

3.1 Proximate Composition of Rice Milling Residue (RMR)

Proximate composition of rice milling residue (RMR) is presented on Table 3. It comprises 8.75% crude protein (CP), the value is higher than 6.20% reported by [7] and lower than 10.03% reported by [8]. The 36.99% crude fibre (CF) value agreed with 36.43% reported by [9]. It has 20.12% Ash, in agreement with 20.20% reported by [10], 5.14% Ether Extract (EE) also in line with 5.01% reported by [11] and 25.66% Nitrogen Free Extract (NFE) lower than 30.54% reported by [10] and higher than 23.38% reported by [11]. Studies have attributed variations in nutrient composition to climatic conditions, edaphic factors as well as methods of processing and laboratory analysis [12].

Table 3. Proximate composition (%) rice milling residue (RMR)

Nutrient	Composition (%)
Dry Matter (DM)	93.65
Crude Protein (CP)	8.75
Crude Fibre (CF)	36.99
Ash	20.12
Ether Extract (EE)	5.14
Nitrogen Free Extract (NFE)	25.66

3.2 Proximate Analysis of Experimental Diets (Starter and Finisher)

The proximate composition of the experimental diets (starter and finisher) as presented on Table 4. The crude protein (CP) values for the experimental diets ranged between 23.25 – 23.81% and 20.02 – 20.31% for starter and finisher respectively. The crude fibre (CF) has a range of 2.80 – 5.05% for both starter and finisher. The CP level was higher in the starter and lower in the finisher, while the energy level was lower in the starter than in the finisher. This agreed with the report of [13] that young growing poultry requires greater amount of protein than the adults, while the adults requires less protein and more energy sources in their diets. The CP values ranged between 20.02 – 23.81% which was found to be within the recommended values of 22 – 24% by [14]. The crude fibre (CF) range between 2.80 – 5.05%, in consonance with 2.70% recommended by [15] and also agreed with the report of [16] who stated that, it is necessary to maintain fibre level at 3.5 – 5% in the diet of poultry. The Ether Extract (EE) ranged from 7.59 – 13.71% which is within the range of 10.66 – 14.69 reported by [17].

3.3 Performance of Broiler Chicken Fed Experimental Diets

Results of the performance of broiler fed experimental diets are shown in Table 5. The average daily feed intake (ADFI), was not significantly different (P>0.05). This agrees with the report by [17]. T3 recorded the highest daily feed intake followed by T4. This may be attributed to the fact that birds eat to meet their energy requirements irrespective of other nutrients. T3 had dilution of 50% WO and 50% RMR, two different sources of fibre and therefore recorded the highest feed intake. The increased intake in T3 diet was probably due to the diluting effect of WO and RMR on the metabolisable energy of the diet [18] since birds are known to eat to satisfy their energy requirement [19]. Lower feed intake was observed in T5 with feed intake of 123.67 g/bird compare with 124.27 – 156.89 g reported by [20] that could be traceable to high fibre content of the diet.

Table 4. Proximate composition of the experimental broiler starter and finisher diets

Ingredient	Broiler starter					Broiler finisher				
(%)	T1	T2	T3	T4	T5	T1	T2	T3	T4	T5
DM	95.45	95.18	95.26	95.11	95.99	95.03	94.99	94.99	95.00	95.07
CP	23.36	23.81	23.63	23.25	23.30	20.25	20.16	20.02	20.10	20.31
CF	2.8	3.63	3.92	4.58	5.05	2.81	3.39	3.60	3.64	3.50
Ash	4.06	2.97	3.00	3.03	3.18	3.46	3.28	3.44	3.26	2.74
EE	10.40	10.40	9.45	8.52	13.71	7.59	8.79	9.10	9.02	9.82
NFE	54.83	55.84	55.26	55.73	50.7	60.92	59.12	58.83	59.27	58.70

DM= Dry matter, CP= crude protein, CF= Crude fibre, EE= Ether extracts, NFE=Nitrogen free extracts

Table 5. Growth performance of broiler chicken fed replacement levels of wheat offals

Parameters	Replacement levels of wheat offal with rice milling residue					
	T1	T2	T3	T4	T5	SEM
Initial weight(g)	159.97	156.00	158.99	157.67	159.00	1.58^{NS}
Final weight (g)	1913.33	1966.67	1996.67	1921.19	1932.33	19.40^{NS}
Total weight gain	1753.36	1748.52	1837.98	1763.52	1773.44	17.66^{NS}
AV. Daily Feed Intake (g)	116.82	123.5	130.15	128.09	123.67	1.20^{NS}
AV. Daily Weight Gain (g)	31.31	31.22	32.82	31.49	31.66	0.31^{NS}
Feed Conversion Ratio (FCR)	3.73^{b}	3.95^{b}	3.96^{6}	4.06^{a}	3.99^{b}	0.03*

Means in the same row bearing different superscripts differ significantly (P<0.05)
ns= not significant (P<0.05), SEM = Standard error mean

The average daily weight gain (ADWG) was not statistically significant (P>0.05). Similar result was observed by [21], when they fed cockerel with graded levels of RMR. The ADWG was highest in T2 (32.82 g) and least in T1 (31.31 g). Since there was no significant difference (P>0.05) observed among ADWG, this suggests that RMR did not affect weight gain.

The feed conversion ratio or feed to gain ratio (FCR) show significant difference (P>0.05) across the treatment groups. The range of 3.73 – 4.06 is slightly lower than 5.07 – 6.05 recorded by [22] and higher than 1.98 – 2.5 recorded by [23]. The difference may be traceable to the fact that they were used for different purposes i.e. energy and fibre sources. Superior FCR was also recorded in T1, T2, T3 and T5. This may be attributed to a high fibre content of this diet, since high fibre in the diet of monogastric impairs the utilization of other nutrients especially crude protein [24].

4. CONCLUSION

From the result obtained in this study, It was concluded that rice milling residue (RMR) can completely replace wheat offal without any detrimental effect on growth performance of broilers chickens.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Jafarnejad S, Farkhoy M, Sadegh M, Bahonar AR. Effects of crumble pellet and mash diets with different levels of dietary protein and energy on the performance of broilers at the end of the third week. Veterinary Medicine Online. 2011;3(1):34-37.
2. Ike PC, Ugwumba CC, EA. Profitability of small scale broiler production in Onitsha North Local Government Area of Anambra State. Nigeria International Journal of Poultry Science. 2011;10(2):106-109.
3. Esonu BO. Evaluation of *Microdesmis puberula* leaf meal as food ingredient in broiler starter diet. Nigerian Journal of Animal Production. 2011;30(1):3-8.
4. Ojewole GS, Abasiekong SF, Ukachukwu SN. Methonic supplementation in the productive efficiency, carcass characteristics and economic of growing indigenous turkey. Tropical Journal of Animal Science. 2001;4(2):161-170.
5. Taraba State Diary (2008). State Annual Official Diary Reports; 2008.
6. Duncan DB. Multiple Biometrics. 1955;1:1-42.
7. Obeka EA, Aduku AO, Yakubu B. Nutritive evaluation of rice offal: 1: The feeding value of rice offal in the diets of growing pullets. Nigerian Journal of Tropical Agriculture. 2004;3:58-63.
8. Ambashankar K, Chandresekan. Chemical composition and metabolisable energy value of rice waste for chicken. Indian Veternary Journal. 1998;475-476.
9. Abu OA, Igwebuike JU, Danny CB, Mbaya MY, Umaru RS. Growth performance and economy of production of rabbits fed urea treated and untreated rice husk based diets. Proc. 26th Annual Conference of Nig. Society for Animal Prod. 21-25thMarch Ilorin. 1999;140-143.
10. Obeka EA. Nutritive evaluation of rice offal in the diet of growing pullets and layers. Unpublished M.Sc Thesis. Department of Animal Science: Ahmadu Bello University, Zaria. 1985;1985:76-90.
11. Oyeyiola LBE. Utilization of rice offal by egg type chickens. M.Sc Thesis.

Department of Animal Science, Ahmadu Bello University, Zaria. 1991;89-101.
12. Taiwo AA,. Adejuyigbe AD, Adeowale JA, Osbotan JS, David OO. Performance and nutrient digestibility of weaned rabbits fed forages supplemented with concentrates. Nigerian Journal of Animal Peoduction. 2005;32(1):74-78.
13. Alaku SO. Introduction to animal science. Jee Communication. INSB No. 9789789074204. 2010;69-70.
14. Olomu JM. Monogastric animal nutrition principles and practice. 2nd Edition. St. Jackson Publishing. 2011;184. ISBN 984-2692-53-0
15. Olomu JM. Monogastric animal nutrition principles and practice. Jachem Publication. 1995;67-76:320.
16. Payne WJA. An introduction to animal husbandry in the tropics. 4th edition. English Low Priced Book Scheme. 1990; 34-97.
17. Ayanwale BA, Ari MM. Nutrient retention and serum profile of broilers fed fermented african locust beans (Parkiafilicoide). Asian Journal Agricultural Research. 2012;6(2) 129-136.
18. Moran ET. Jr. Performance and nutrient utilization of laying hens fed tropical rations having extremes in fibre content. Can J. of anim. Sci. 1977;53(3):437-438.
19. Dafwang IJ, Damang P. Rice and offal finishing diets of broilers. Journal of Animal Production Research. 1995;15 & 16 (1 & 2):131-139.
20. Church DC. Livestock feed and feeding. Practice Hall Inc. 1991;78-98.
21. Awusu RJ, Bangbose AM, Oduguwa OO, Oguntona EB. Utilization of rice milling waste in diets for cockerel finisher. Book of proceeding 25th Annual NSAP Conference 19-23. March, Umudike. 2000;45-49.
22. Amaefule K, Ihenkwumere F, Nwapkoro C. A note on the growth performance and carcass characteristics of rabbits fed graded levels of boiled pigeon Pea Seed (*Cajanus cajan*). Livestock Research for Rural Development. 2005;17(5):567-589.
23. Akinusi O. Utilization of rice milling waste (RMW) in cockerel finisher ration. Proceeding 25th Annual NSAP Conference 21 – 25 March, 1999. Ilorin. 1999;120 – 122.
24. Deloreme CB, Wojeik. International of dietary protein with cellulose in the adaptability to caloric dilution by weaning rats. Journal of Nutrition. 1982; 112:21-28.

Peer-review history:
The peer review history for this paper can be accessed here:
http://sciencedomain.org/review-history/18418