
PERFORMANCE AND ECONOMICS OF FINISHER BROILER CHICKENS FED DIETS CONTAINING *MAIWA* MILLET (*PENNISETUM GLAUCUM*). REPLACEMENT FOR RED SORGHUM

¹Tok, C.C., ²Dafur, B.S., ¹Ruma, A.G., ¹Gosup B. G.

1Department of Agricultural Science, Federal College of Education, Pankshin, Nigeria.

2Department of Animal Production, University of Jos, Plateau State, Nigeria

Corresponding author's E-mail address : bdafur70@gmail

ABSTRACT

The experiment was conducted to evaluate the performance and cost benefits of replacing red sorghum with Maiwa millet in broiler finisher diets. Three hundred broiler chickens weighing 899.99-985.53g each were assigned to five diets in replicates of four containing 15 birds each in a completely randomized design. In the diets Maiwa millet replaced red sorghum at 0, 25, 50, 75 and 100% levels, designated as T1, T2, T3, T4 and T5, respectively. Feed and water were served ad libitum during the experiment which lasted for four weeks. Daily feed intake of birds did not differ among treatments and ranged between 90-18-97'23g on T5 and T2, respectively. However, daily weight gain was higher ($P<0.05$) in broiler birds feed T5 (56.53g), feed conversion ratio was better for broiler chickens fed T5 (1.60). Economics indices showed that total feed intake was highest (2.72kg) on T2 and lowest (2.53kg) on T5, feed cost per kg was lowest on T5 (N287.01) and highest on T1 (N392.11) while feed cost per kg gain was N541.98 (T4) and N601.96 (T1). The highest cost savings of N142.38 was made on T4. It was concluded that Maiwa millet can completely replace red sorghum in broiler finisher diets without any negative effect on growth performance. Replacing red sorghum with Maiwa at 75% level gave a highest cost savings.

Keywords: Performance, Broiler, Economics, Finisher, *Maiwa* Millet, Red Sorghum

INTRODUCTION

Livestock especially poultry production seems to be recognized as the fastest industry which can overcome the animal protein deficiency especially in third world countries due to short generation interval, high turnover rate and economic efficiency (Inuwa *et al.*, 2020). Similarly, in the face of the current level of food insecurity, inflation and high level of youth unemployment especially for the teaming youths (Ajala *et al.*, 2021). However, poultry industry has been greatly affected by high cost of feed due to competition for the available grains between livestock feed and human consumption (Olomu, 2011). Maize which constitute a major source of energy in poultry diets in the tropics (Oluwemi and Roberts, 2013) is becoming scarce and expensive in Nigeria because of decline in its production due to unfavourable climate conditions (Kwari *et al.*, 2012).

Studies have shown that both millet and sorghum has the potentials to replace maize in poultry diets (Raju *et al.*, 2003, Yunusa *et al.*, 2015 and Kawu *et al.*, 2016). However, the use of sorghum by poultry is limited by the presence anti-nutritional factors like phytate and tannins (Selle *et al.*, 2010 and Ethik *et al.*, 2012). The advantage of millet that makes a good source of energy in poultry diets is the absence of anti-nutritional factors as in sorghum which can interfere with or slow down digestability and palatability (NRC, 1994, Ibitoye, 2012 and Calislar, 2018). This study therefore, evaluated the performance and cost benefits of finisher broiler chickens fed graded levels of *Maiwa* millet as replacement for sorghum.

MATERIALS AND METHODS

The research was carried out at the agricultural farm, Federal College of Education, Pankshin, Plateau State. Pankshin is located between the GPS coordinates of Latitude 9⁰N and Longitude 9.92⁰E. the area has the minimum and maximum temperatures of 10⁰C and 27⁰C respectively (Dafur, *et al.*, 2008). A total of 300 finisher broiler chickens were allotted to five diets in replicates of four containing 15 birds each in a completely randomized design. Feed and water were provided *ad libitum* and study lasted 28 days. Five broiler finisher experimental diets with 20% crude protein level were formulated. *Maiwa* millet replaced red sorghum at 0, 25, 50, 75 and 100% levels in the diets coded as T₁, T₂, T₃, T₄, and T₅ respectively. The main protein used in the diets was full fat soya bean (Table 1)

Table 1: Percentage composition of finisher broiler chickens fed *Maiwa* Millet as replacement for Red Sorghum (5 – 9 weeks)

Ingredients	Diets				
	T1 (0%)	T2 (25%)	T3 (50%)	T4 (75%)	T5 (100%)
Red sorghum	49.96	37.47	24.98	12.49	0.00
Maiwa Millet	0.00	12.49	24.98	37.47	49.96
Full fat soya bean	27.04	27.04	27.04	27.04	27.04
Wheat offal	15.00	15.00	15.00	15.00	15.00
Fish meal	4.00	4.00	4.00	4.00	4.00
Bone meal	2.00	2.00	2.00	2.00	2.00
Limestone	1.00	1.00	1.00	1.00	1.00
Premix*	0.25	0.25	0.25	0.25	0.25
Salt	0.25	0.25	0.25	0.25	0.25
Methionine	0.30	0.30	0.30	0.30	0.30
Lysine	0.20	0.20	0.20	0.20	0.20
Total	100	100	100	100	100
Calculated Analysis					
ME (kcal/kg)	2836.30	2800.57	2764.85	2729.12	2775.24
Crude Protein(%)	20.00	20.00	20.00	20.00	20.00
Crude Fibre (%)	3.90	4.46	5.02	5.60	6.15
Ether extract (%)	7.26	7.38	7.50	7.63	7.76
Calcium (%)	1.30	1.30	1.30	1.30	1.30
Phosphorus (%)	0.90	0.90	0.90	0.90	0.90
Methionine (%)	0.67	0.67	0.66	0.65	0.63
Lysine (%)	1.26	1.22	1.23	1.23	1.26

ME; Metabolizable Energy, *Vit/mineral premix supplied/Kg of Diet: Vit. A, 8,500IU; Vit. D₃, 2,000IU; Vit. E, 10mg; Vit. K₃, 1.5mg; Vit. B₁, 1.6mg; Vit. B₂, 4mg; Niacin, 20mg; Pantothenic acid, 5mg; Vit. B₆, 1.5mg; Vit. B₁₂, 0.01mg; Folic acid, 0.5mg; Biotin, 0.75mg; Chlorine chloride, 175mg; Cobalt, 0.2mg; Copper, 3mg; Iodine, 1mg; Iron, 20mg; Manganese, 40mg; Selenium, 0.2mg; Zinc, 30mg and Antioxidant, 1.25mg.

Data for growth performance which include daily feed intake (DFI), daily weight gain (DWG), feed conversion ratio (FCR), final weight and mortality were collected. Daily feed intake was obtained by difference between quantity of feed offered and the leftover collected the following morning. Weight gain was determined by the difference between two consecutive weighing carried out on weekly basis. This value was divided by 2 to obtain the DWG while FCR was computed by dividing DFI with DWG. Mortality was recorded. Feed cost per kg was calculated using the prices of feed ingredients at the time of purchase. Feed cost per kg gain was obtained by dividing the total cost of feed consumed per bird by total weight gain. Percent cost saving was computed by dividing the difference between feed cost per kg gain of each diet and the control (T₁) by feed cost per kg gain (T₁) and multiplying by 100. All data were subjected to Anova using the SPSS V1.25 statistical software. Difference between treatments means were separated using Duncan's Multiple Range Test (DMRT).

RESULTS AND DISCUSSION

The productive performance of finisher broiler chickens fed diets containing *Maiwa* millet as replacement for red sorghum is shown on table 2. Most of the performance parameters showed significant ($P < 0.05$) influence of *Maiwa* millet base diets. The initial weight of birds ranged between 899.99g on T₁ 985.53g on T₅. There was however, a significant (PL0.05) effect of *Maiwa* millet in final weight of birds, with chickens fed T₅ (2543.66g) outweighing those on other diets (2237.54-2384.68g) which were similar. Total weight was also higher (PL0.05) in birds fed T₅. Daily feed intake did not differ among treatments and ranged between 90.18g (T₁) and 97.23g (T₂). Daily weight gain was higher (PL0.05) in broiler birds fed T₅ (576.53g) which was similar to 51.60g (T₄), than for those on T₃ (50.46g), T₂ (49.64g) and T₁ (47.77g) which were the same and similar to T₄. Feed conversion ratio was better for broiler chickens fed on T₅ (1.60), which did not differ from T₃ (1.97), T₂ (1.96) and T₄ (1.86), than those on T₁ (1.99) which were also similar to T₂, T₃ and T₄. A mortality of one bird

was obtained at the finisher phase. The results on daily weight gain, feed conversion ratio and total weight gain of broiler chickens confirms the findings of Hosena *et al* (1987) Davis *et al.* (2003) and Adam and El-bashir (2016) who reported that pearl millet is at least equivalent to maize and generally superior to sorghum in broiler chicken diets. The result also agrees with the reports of other earlier workers such as Sharma *et al.* (1979 and Yunusa *et al.* 2015). Economic analysis of finisher broilers fed *Maiwa* based diets is shown on table 3. Total feed intake was highest on T₂ (2.72kg), followed by T₄ (2.69kg), T₁ (2.67kg), T₃ (2.64kg) and T₅ (2.53kg) in that order. Feed cost per kg was highest on T₁ (₦302.11), followed by T₂ (₦298.07), T₃ (₦294.55), T₄ (₦290.13) while T₅ (₦287.01) was the lowest. Feed cost per kg again was highest on T₂ (₦810.75) and lowest on T₅ (₦726.14) thereby making it the diet on which the highest cost saving of ₦142.38 was realized. This findings confirms the earlier reports of Rama Rao *et al.* (2002). Medugu *et al.* (2010) and Ibe *et al.* (2014) that feed cost per kg gain was lowest in birds fed millet-based diets than those fed maize. The report also confirms the report of Tok *et al.* (2018) who report that feed cost per kg gain was lowest in birds fed Gayamba millet-based diets. The report contradicts the findings of Bot *et al.* (2021). Where diets containing red finger millet has higher feed cost per kg gain values than maize base diets.

Table 2: Performance of finisher broiler chickens fed diets containing *Maiwa* Millet as Replacement for Red Sorghum (5 – 9 weeks)

Parameters	DIETS					SEM
	T1	T2	T3	T4	T5	
Productive performance						
Initial weight (g)	899.99	950.78	936.06	924.05	985.53	34.10 ^{NS}
Final weight (g)	2237.54 ^b	2286.17 ^b	2349.09 ^b	2384.68 ^b	2543.66 ^a	45.92*
Total weight gain (g)	2090.47 ^c	2132.55 ^b	2203.47 ^b	2237.91 ^b	2391.69 ^a	36.83*
Finisher phase (6 -9 weeks)						
Daily feed intake (g)	95.18	97.23	94.36	96.04	90.18	2.94 ^{NS}
Daily weight gain (g)	47.77 ^b	49.64 ^b	50.46 ^b	51.60 ^{ab}	56.53 ^a	1.82*
Feed conversion ratio	1.99 ^b	1.96 ^{ab}	1.87 ^{ab}	1.86 ^{ab}	1.60 ^a	0.12*
Mortality (number)	1	0	0	0	0	-

^{ab}Means bearing different superscripts within the same row differ; * = (P<0.05); NS= Not significant; SEM = Standard Error of Means

Table 3: Economics of finisher broiler chickens fed diets containing *Maiwa* Millet as Replacement for red sorghum (5 – 9 weeks)

Parameter	Diets				
	1	2	3	4	5
Finisher phase (6-9 wks.)					
Total feed intake (kg)	2.67	2.72	2.64	2.69	2.53
Feed cost (₦/kg)	302.11	298.07	294.55	290.13	287.01
Total feed cost (₦)/bird	806.63	810.75	777.61	780.45	726.14
Total weight gain (kg)	1.34	1.39	1.41	1.44	1.58
Feed cost /kg gain (₦)	601.96	583.27	551.50	541.98	459.58
Cost saving (₦)	-	18.69	50.46	59.98	142.38

CONCLUSION

The study showed that *Maiwa* millet can completely replace red sorghum in finisher broiler diets without negatively affecting growth performance. Similarly, the use of *Maiwa* millet as replacement for dietary red sorghum resulted in reduction in feed cost. Seventy five percent (75%) replacement level showed the highest cost saving and was therefore recommended for broiler chicken producers and feed millers in order to reduce feed cost and increases profit.

REFERENCES

- Ajala, A. O., Ogunjimi, S. I., Famuwagun, O. S. and Adebimpe, A. T (2021). Poultry production in Nigeria: Exploiting its potentials for rural youth empowerment and entrepreneurship. *Nigerian Journal of Animal Production*, 48 (1): 114 -123
- Bot, M. H., Kpanja, E.J., Salifu, A.O., Garba, S. I., Hassan, E. M., Idris, A. A., Aliyu, I. P., and Zungum, A.G (2021). Effect of Replacement Levels of Red Finger Millet-Based Diets on Growth Performance of Broiler Chickens Fed with and without Phytase Enzyme Supplementation. *Nigeria Journal of Animal Science*, 23(2): 51-59.
- Calislar, S. (2018). Tannin and their effects on poultry nutrition-A review. *KSU Journal of Agriculture and Nature*.2. (4), 615-623.
- Dafur, B. S., Mbap, S. T., and Butswat, I. S. R. 2008. Seasonal Pattern of Sheep Heliathiasis on the Jos Plateau. *Journal of Applied Poultry Research*, 12, 137-144.
- Etuk, E.B., Ifeduba, A.V., Okata, U.E., Chiaka, I., Okoli, I.C. and Okeudo, N.J. (2012). Nutrient composition and feeding value of sorghum for livestock and poultry; a review, *Journal of Animal Science Advances*. 2. (6), 510-524.
- Ibitoye, E. B., Olorede, B. R., Jimoh, A. A., and Abubakar, H. (2012). Comparative performance and organ relative weight of broiler fed three sources of energy diet. *Journal of Animal Production Advances*. 2. (5), 233-238.
- Inuwa, L., Adamu, S.B., Marte, U.M., Yusuf, A.M.G., Tukur, M.A. and Danbaki, A.A. 2020. Replacement Value of Soya Bean Residue for Soya Bean Meal in the Diet of Broiler Finisher Chickens. *Nigerian Journal of Animal Science and Technology* 3(1): 106-112.
- Kawu, Y.U., Muhammad, A.I. Yusuf, S.Z. and Doma, U.D. (2016a). Growth performance of broiler chicks fed replaced gayamba millet variety for maize as a source of dietary energy in Sudan Savannah of Nigeria. *Savannah Journal of Agriculture*. 11.(1), 84-88.
- Kwari, I. D., Igwebuike, J. N., Shuiabu, H., Titima and, S. I. and Raji, A. O. 2014. Growth and Carcass Characteristics of Broiler Chickens Fed, Maize, Sorghum, Millet and their Combinations in the Semi-Arid Zone of Nigeria. *International Journal of Science and Nature* 5(2): 240-245.
- NRC, (1994). National Research Council Nutrient Requirements of Poultry. 9thEdn., National Academy Press, Washington, D. C., U.S.A., ISBN-13: 978-0-309-04892-7.
- Olomu, J. M. (2011). Monogastric Animal Nutrition. Principles and practice. St. Jackson Publishing, Benin city, pp 217-218.
- Oluyemi, J. A. and Roberts F. A. (2013). Poultry Production in Warm Wet ZClimates. Spectrum, Ibadan pp 153-155.
- Raju, M.V.L, N., Shyam G.S., Elangovan, A.V., Reddy, M.R., Sadagopan, V.R. and Rama Rao, S.V. (2003). Sorghum, bajra and ragi VIS-À-VIS maize as energy sources in broiler chicken diets. *Indian Journal of Animal Nutrition*. 20. (2), 185-192
- Tok, C. C., Dafur, B. S., Anwo, O. J. and Datit, J. S 2018. Utilization of Graded Level of Gayamba Millet (*Pennisetum Specie*) Variety by Broiler Chickens. *Nigerian Journal of Animal Science* 20(4): 601-608
- Yunusa, Y., Doma, U.D., Zaharaddeen, D., Abubakar, S.B., Umar, A. and Isah, A. (2015). Performance and economics of broiler chickens fed different dietary energy sources. *Asian Journal of Poultry Science*.9, 41-49