



UTILIZATION OF DIETARY LEVELS OF BAUCHI RED SORGHUM VARIETY BY STARTER BROILER CHICKENS

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ABSTRACT

An experiment was conducted to evaluate the growth performance and financial benefits of starter broiler chickens fed dietary levels of Bauchi red sorghum variety. Five diets were formulated in which the red sorghum replaced maize at 0, 25, 50, 75 and 100% levels coded as diets A, B, C, D and E respectively. Two hundred broiler chickens were randomly allotted to five diets with 40 chicks per replicate in a completely randomized design (CRD). Feed and water were supplied *ad libitum* and the feeding trial lasted for a period of 28 days. The growth performance parameters revealed that starter weight (1147.50 -1167.50g), total weight gain (1030.50 – 1063.60g), daily weight gain (36.80 – 37.99g), total feed intake (2100.50 – 2130.50g), daily feed intake (75.01 – 77.81g), feed conversion ratio (1.98 – 2.10) and feed efficiency (0.46 – 0.50), were not significantly affected by the dietary levels of red sorghum variety. The survivability rate varied between 97.50 and 100% across the diets. Feed cost per kg gain decreased with increasing levels of red sorghum variety with a cost saving of 11.81% on diet E (100% RSV). Based on the results of this study, it was concluded that BRSV can completely replace maize as dietary energy source in starter broiler diets without compromising performance as well as reduction in feed cost.

Key words: Starter broiler, Performance, Bauchi red sorghum, Maize, Cost benefit.

INTRODUCTION

Maize has been the major source of energy in poultry diets. However, inadequate production of this grain and the intense competition for it between man and livestock especially in the tropics, has made poultry rations to be expensive (Bala *et al.*, 2017 and Ndelekwute *et al.*, 2021). According to Amaza *et al.* (2020), the rising cost of poultry feeds have continued to be a major problem in developing countries as feed cost constitutes about 65 to 70% of the total cost of production while the energy component alone stands at about 70% of the feed cost (Cisse *et al.*, 2017).

Similarly, there has been a steady increase in the cost of conventional feed ingredients such as maize, groundnut cake, soybean meal and fish meal in the past years and this has led to an increase in the prices of animal protein sources. Consequently, this has negatively affected protein intake among communities in Nigeria. According to a recent report 45% of Nigerians do not eat protein daily (Daily Trust, 2021). As at 2019, Nigeria's per capita daily protein intake (45.4g) was lower than both the Food and Agriculture Organization (FAO) recommended minimum per capita daily protein intake (53.8 g) and the global daily intake (64 g), indicating that the country is faced with protein deficiency (Akelere *et al.*, 2017; Protein Challenge, 2020). By way of comparison, the average daily intake of animal protein for inhabitants of the USA stands at 69.0g (Flachowsky *et al.*, 2017). This scenario has indicated that to minimize feed cost with rapid growth at best feed conversion and to maximize profit for the producer while making available cheaper poultry meat and products to the common man. This will invariably





improve affordability and access to animal protein. In developing countries like Nigeria, animal protein sources for human consumption are far from the reach of average citizens (Adekunmi et al. 2017). This is partly due to high cost of feed ingredients. Consequently, the expansion of commercial poultry industry is also negatively impacted by the utilization of competitive and costly ingredients in making poultry diets. Against this backdrop, the identification and utilization of locally available alternative feed ingredients would greatly reduce the cost of poultry products, production and improve affordability. Furthermore, the over-dependence on maize as the principal energy component in broiler diets would no longer be sustainable due to its soaring prices. According to Betaprices (2023), the current price of maize compared to sorghum stands at N250,000/tonne versus N220,000 respectively. In addition to climate change and global warming, maize production is also being challenged by inadequate supply of fertilizer, herbicides, pesticides, improved seeds and extension services. Therefore, one of the formidable solutions to this predicament could be the use of Bauchi red sorghum to replace maize in broiler diets. Accordingly, the present study was designed to investigate the effects of partial and complete replacement of Bauchi red sorghum variety for maize on growth performance and cost benefit of broiler chickens.

MATERIALS AND METHODS

Study Area

The experiment was conducted at the Teaching and Research Farm, Abubakar Tafawa Balewa University, ATBU, Bauchi. Nigeria. The area lies between latitude 10^{0} , 17^{0} N, longitude 9^{0} 49^{0} E and at altitude of 902 meters above the sea level.

Experimental Design and Management of Birds

Five diets were formulated in which the red sorghum replaced maize at 0, 25, 50, 75 and 100% levels coded as diets A, B, C, D and E respectively (table 1). Two hundred broiler chickens were randomly allotted to five diets with 40 chicks per replicate in a completely randomized design. Feed and water were supplied *ad libitum* and the feeding trial lasted for a period of 28 days.





Table 1: Composition of Experimental Diets fed to Broiler Chicks at the Starter Phase (2-5 weeks)

	DIETS					
INGREDIENTS	T ₁ (0%)	$T_2(25\%)$	T ₃ (50%)	T ₄ (75%)	T ₅ (100%)	
Maize	45.30	33.97	22.65	11.33	0.00	
Bauchi Red sorghum	0.00	11.33	22.65	33.97	45.30	
Full-Fat Soya bean	33.20	33.20	33.20	33.20	33.20	
Wheat offal	10.00	10.00	10.00	10.00	10.00	
Fish Meal	5.00	5.00	5.00	5.00	5.00	
Palm oil	2.00	2.00	2.00	2.00	2.00	
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 (Starter)	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	100.00	100.00	100.00	100.00	100.00	
Calculated Analysis (%)						
ME (Kcal/kg)	2933.64	2921.08	2910.37	2900.02	2891.21	
Crude Protein	23.00	23.07	23.07	23.07	23.07	
Crude Fibre	3.28	3.31	3.31	3.31	3.31	
Ether Extract	7.91	7.87	7.92	7.93	7.95	
Calcium	1.77	1.80	1.82	1.83	1.84	
Phosphorous	0.82	0.82	0.82	0.83	1.84	

Data Collection

Data was collected for week 4 weight, total weight gain, daily feed intake (DFI), daily weight gain (DWG), feed conversion ratio (FCR), feed efficiency and survivability. Daily feed intake was obtained by difference between quantity of feed offered and the left-over retrieved the following morning. Weight gain was determined by the difference between two consecutive weighing carried out on weekly basis. This value was divided by 7 to obtain DFI while FCR was the value obtained when DFI was divided by DWG.

Data Analysis

All data collected were subjected to One Way Analysis of Variance (ANOVA) using IBM SPSS statistics 25 for windows (SPSS, 2017). Means were separated through the Duncan Multiple Range Test of the same software, at P<0.05 level of significance.

RESULTS AND DISCUSSION

Results for growth performance of starter broiler chickens fed dietary replacement levels of maize for Bauchi red sorghum is presented in Table 2. None of the parameters studied showed significant effect of diet. Initial weight of birds ranged between 115.20 and 120.00g on diets A and C respectively. Week 4 weight spanned from 1147.50g (diet B) to 1180.00 (Diet D), total weight gain was from 1030.50g on diet B to 1063.60g on diet D, while daily weight gain ranged from 36.80 to 37.99g on diets A and D respectively. Total feed intake of birds was between 2078.55g (diet C) and 2130.50g on diet E. Daily feed intake, which was also not significantly influenced, was from 75.01g on diet A to 77.81g on diet C, feed conversion ratio, from 1.98 (diet E) to 2.10 (diet C) and feed efficiency from 0.46 to 0.50 on diets B and D respectively. These findings agree with report of Farahat *et al.* (2020) who concluded that





sorghum can replace maize in broiler chicken diets without negative impact on performance. The findings also confirmed a recent report by Ciurescu *et al.* (2023) and Moses *et al.* (2024) using ES Shamal sorghum variety and malted sorghum respectively. However, different studies (Torres *et al.*, 2013 and Mohammed *et al.*, 2019) have shown that body weight decreased significantly in chickens fed sorghum-based diets. Survivability rate spanned between 97.50% on diets A, C, E and 100% on diets B and D.

Financial benefits of broiler chickens fed Bauchi red sorghum diets is presented in Table 3. Feed cost per kg was lowest on diet E ($\mathbb{N}375.00$) and highest on diet A ($\mathbb{N}442.00$). total feed cost per bird ranged from $\mathbb{N}798.75$ (diet E) to $\mathbb{N}888.42$ (diet A). Feed cost per kg gain was lowest on diet E ($\mathbb{N}760.71$) and highest on diet A ($\mathbb{N}862.54$) while cost saving was highest on diet E ($\mathbb{N}101.83$).

Table 2: Growth Performance of Starter Broiler Chickens Fed Dietary Levels of Bauchi RedSorghum Variety (2 - 5 weeks)

Dietary Levels of Bauchi Red Sorghum						
A (0%)	B (25%)	C (50%)	D (75%)	E (100%)	SEM	
115.20	117.00	120.00	116.40	118.00	2.52 ^{NS}	
1150.00	1147.50	1158.40	1180.00	1167.50	25.12 ^{NS}	
1034.80	1030.50	1038.40	1063.60	1049.50	44.22 ^{NS}	
36.98	36.80	37.09	37.99	37.48	3.54^{NS}	
2100.50	2105.40	2078.55	2110.00	2130.50	50.25 ^{NS}	
75.01	75.19	77.81	75.36	76.09	5.45 ^{NS}	
2.02	2.04	2.10	1.98	2.03	0.55 ^{NS}	
0.49	0.46	0.48	0.50	0.49	0.02^{NS}	
97.50	100.00	97.50	100.00	97.50	-	
	A (0%) 115.20 1150.00 1034.80 36.98 2100.50 75.01 2.02 0.49 97.50	Dieta A (0%) B (25%) 115.20 117.00 1150.00 1147.50 1034.80 1030.50 36.98 36.80 2100.50 2105.40 75.01 75.19 2.02 2.04 0.49 0.46 97.50 100.00	Dietary Levels of B (25%) C (50%) 115.20 117.00 120.00 115.20 117.00 120.00 1150.00 1147.50 1158.40 1034.80 1030.50 1038.40 36.98 36.80 37.09 2100.50 2105.40 2078.55 75.01 75.19 77.81 2.02 2.04 2.10 0.49 0.46 0.48 97.50 100.00 97.50	Dietary Levels of Bauchi Ree A (0%) B (25%) C (50%) D (75%) 115.20 117.00 120.00 116.40 1150.00 1147.50 1158.40 1180.00 1034.80 1030.50 1038.40 1063.60 36.98 36.80 37.09 37.99 2100.50 2105.40 2078.55 2110.00 75.01 75.19 77.81 75.36 2.02 2.04 2.10 1.98 0.49 0.46 0.48 0.50 97.50 100.00 97.50 100.00	Dietary Levels of Bauchi Red SorghumA (0%)B (25%)C (50%)D (75%)E (100%)115.20117.00120.00116.40118.001150.001147.501158.401180.001167.501034.801030.501038.401063.601049.5036.9836.8037.0937.9937.482100.502105.402078.552110.002130.5075.0175.1977.8175.3676.092.022.042.101.982.030.490.460.480.500.4997.50100.0097.50100.0097.50	

NS = Not significant @ P<0.05, SEM = Standard error of the mean

Table 3: Finar	ncial benefits of	broiler chickens	fed Bauchi red	sorghum diets (2	2-5 weeks)
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Donomotors	Dietary Levels of Bauchi Red Sorghum						
rarameters	A (0%)	B (25%)	C (50%)	D (75%)	E (100%)		
Total feed intake (g)	2100.50	2105.40	2078.55	2110.00	2130.50		
Feed cost per kg (N)	442.00	420.00	402.00	388.00	375.00		
Total feed cost (N)	888.42	886.20	836.16	818.68	798.75		
Total weight gain (kg)	1.03	1.03	1.04	1.06	1.05		
Feed cost per kg gain (N)	862.54	860.39	804.00	772.34	760.71		
Cost saving (N)		2.15	58.54	90.20	101.83		

CONCLUSION AND RECOMMENDATION

Based on the findings of this study, it was concluded that Bauchi red sorghum variety can completely replace maize as dietary energy source in starter broiler diets without compromising performance as well as reduction in feed cost and is recommended for profitable poultry production.

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