



EVALUATION OF THE EFFECT OF FEEDING BROILER CHICKENS VARYING LEVELS OF *MAIWA* MILLET AND SORGHUM AS DIETARY ENERGY SOURCE

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ABSTRACT

The study was carried out to evaluate the effects of feeding broiler chickens varying amount of Maiwa millet and sorghum as dietary energy sources. The experiment utilized 250 broiler chickens and conducted in two different phases (starter and finisher) for eight (8) weeks. Five experimental diets for both starter and finisher phases were formulated with varying inclusion level of 0, 25, 50, 75 and 100%. The broiler chickens were randomly weighed and allotted to five (5) treatment groups of 50 chickens each. Each treatment was replicated five time with 10 birds per replicate and laid out in a completely randomized design (CRD). The result of the experiment shows that, daily feed intake values ((51.60-55.01g; 119.70-121.88g; 81.09-83.33g) and the daily weight gain values (28.80-30.97g; 39.92-43.55g; 31.20-33.99g) indicated a non-significant ($P \le 0.01$) differences among the treatments in the two (2) phases of the experiments. Moreover, the dietary treatments had no effect on the carcass and visceral organ parameters of broiler chickens, with the exception of caecal weight and small intestine length, which differed significantly (P≤0.01) with values ranging from 0.40 - 0.66% and 160.25 - 190.66cm respectively. Based on the research findings, the study concludes that broiler chickens can be fed *maiwa* millet and sorghum along with other ingredients as nutritional energy sources without any effect on their growth and development.

Keywords: Feed, Energy, Source, Maiwa, Sorghum, Broiler

INRODUCTION

The supply of animal protein that humans need to achieve daily protein consumption is largely provided by poultry, particularly broilers (Ogundipe, 2003; Igwebuike *et al.*, 2009; Maidala and Istifanus, 2012). They have characteristics that react to feeding and nutritional manipulations in a matter of days, as well as a high growth rate, a high feed conversion ratio, a short generation interval (5-6 months), and a short intestinal feed transit of 2-3 hours (Atteh, 2003). Since chicken meat has higher protein content than other meat sources and is linked to a comparatively lower calorie and sodium intake, it is superior to that of other livestock species (Atteh, 2003). When processed, poultry meat is palatable, soft, juicy, nutritious, and generally regarded as acceptable (Omole *et al.*, 2006). Possibly one of the most crucial factors in poultry production is nutrition. Low livestock productivity in the tropics can be caused by a variety of causes, including stale feeds, nutritionally unbalanced meals, contaminated ingredients, and inadequate feed supplies (Ogundipe *et al.*, 2003). In addition to nutrition, the poultry sector has been significantly impacted by the high cost of feed because





human consumption and livestock feed compete for the same grains (Olomu, 2011). The main factor limiting poultry productivity is feeding. Since birds will typically eat to meet their energy needs, the feed's energy content is the primary determinant of feed intake (Akinola and Sese, 2011). If they are not to become deficient with low feed intake or consumed more with low energy diet, the other dietary nutrients typically vary in connection to the diet's dietary energy content.

Maiwa millet (Pennisetum spp) and Sorghum (Sorghum bicolar L. moench) belongs to the cereals family *Poaceae* which are among the earliest crops to be grown in the tropics. In general, the two cereals crops were grown and utilized in Nigeria for food and feed as they are Native to the Sahara desert. Nigeria and other developing nations must improve their use of animal feedstuff since feed accounts for 50-75% of production costs. The constraint of insufficient production of cereals crop to meet the consumption and daily needs of humans and livestock and the ever increasing cost of maize as a reason for the increased in cost of feeds had made it necessary to examine some other grains products like millet (Maiwa or pearl) and sorghum for alternative energy sources in poultry production. In poultry nutrition energy is used for the provision of body heat, maintenance, growth and production (Inaku et al. 2011). Therefore, finding inexpensive feed sources might be the best way to succeed. One of the main obstacles to intensive poultry production has been the high cost of conventional feedstuffs, particularly protein and energy sources. Although there are many bye-products and other unconventional feedstuffs available that can be used as alternative sources of energy and protein feedstuff for livestock production, the methods for making them more profitable for animal feeding systems are frequently unknown or too difficult to implement for efficient livestock production. This is due to the fact that the cost per unit of feed has increased over the past few years, making poultry production more expensive. In light of this, the study was carried out to assess the performance of broiler chickens fed graded levels of maiwa millet and sorghum as dietary energy source and determine carcass and visceral organ characteristics of broiler chickens fed graded levels of millet and sorghum as dietary energy source.

MATERIALS AND METHODS

The Experimental Site

The study was carried out at the Yobe State College of Agriculture, Science and Technology Gujba poultry unit in Damaturu. Damaturu lies between latitudes 11⁰ 43' and 37" North and longitudes 11⁰ 58' and 26" East of the equator. Damaturu is situated in Nigeria's semi-arid, tropical continental region. The region is distinguished by a lengthy dry season (October-May) and a brief period of rainfall (June-September). In July and August, the average daily maximum temperature is 29.20°C, whereas in March and April, it is 43°C. Rainfall typically occurs between June and September and ranges from 500 to 1000 mm per annum (Google map, 2015).

Experimental Diets and Design

The experiment used 250 broiler chickens. The experiment lasted for 8 weeks and was divided into two phases (starter and finisher). Five experimental diets for both the starter and finisher phases were formulated with varying inclusion level of 0, 25, 50, 75 and 100%. The broiler chickens were randomly weighed and allotted to five (5) treatment groups of 50 chickens each. Each treatment was replicated into five; with 50 birds per replicate in a completely randomized design (CRD). Feed and water were provided *Ad libitu*m from the 2-8 week of the experiment.





Data Collection

Feed conversion ratio was obtained on a weekly basis by dividing the mean feed intake per birds in grams by the mean live weight gain per bird for each treatment group. As for carcass measurements, two birds were chosen at random for carcass analysis from each of the replicates at the end of the experiment. By weighing a representative chicken live, draining the blood, and then weighing it again, the quality of the carcass was assessed. After that, they are defeathered by immersing them in hot water at 80°C for ten to fifteen minutes. Then, visceral organs and chopped-up portions were also weighed. The weight of each chicken's component parts was then measured with an electronic sensitive balance and reported as a percentage (%) of the slaughter weight.

Data Analysis

All data collected were subjected to analysis of variance (ANOVA) using Statistical Package for Social Science (SPSS, 2016 version). Moreover, where significant differences among treatment exist, LSD was used to separate the means.

RESULT AND DISCUSSION

Performance of Broiler Chickens Fed Graded Levels of *Maiwa* Millet and Sorghum as Energy Source

The result of the performance of broiler chickens fed varying levels of *maiwa* millet and sorghum as dietary energy sources is presented in Table 1. The result revealed that, there was no significant difference in the daily feed intake values (51.60-55.01g; 119.70-121.88g; 81.09-83.33g) between the treatments during the starter, finisher, and overall phases. The daily weight gain values obtained (28.80-30.97g; 39.92-43.55g; 31.20-33.99g) also showed no significant difference between the treatment groups at the three phases. The results were in agreement with that of Kwari *et al.* (2014) who observed that performance were not affected when broiler chickens were fed maize, sorghum, millet, and their combinations as dietary energy sources in the semi-arid zone of Northern Nigeria. The result further indicated that, feed conversion ratio was not significantly affected by the treatments at all phases of the experiment.





Table 1: Performance of Broiler Chickens Fed Graded Levels of Maiwa Millet and Sorghum as Energy Source for Starter, Finisher and Overall Diets

	Experimental Diets					
Parameters	T_1	T_2	T ₃	T ₄	T 5	SEM
Production performance						
Initial weight (g)	74.44	79.72	80.00	81.11	80.00	4.18 ^{NS}
Body weight at 4 wks (g)	958.22	951.30	977.91	969.22	957.99	11.66 ^{NS}
Final weight (g)	1938.60	1903.30	1908.21	1902.33	1911.00	39.93 ^{NS}
Total weight gain (g)	1859.11	1819.18	1825.66	1813.40	1820.05	37.73 ^{NS}
Starter phase (1-4 weeks)						
Daily feed intake (g)	52.38	51.60	52.73	54.21	55.01	0.62^{NS}
Daily weight gain (g)	29.77	28.80	30.97	30.55	29.99	0.69 ^{NS}
Feed conversion ratio	1.89	1.73	1.77	1.73	1.85	0.01^{NS}
Mortality (Number)	2.00	1.00	1.00	2.00	1.00	
Finisher phase (5-9 weeks)						
Daily feed intake (g)	120.11	119.95	119.70	121.88	120.05	1.20^{NS}
Daily weight gain (g)	43.55	42.03	39.92	41.22	42.64	1.88 ^{NS}
Feed conversion ratio	2.58	2.88	2.75	2.82	2.86	0.09^{NS}
Mortality (Number)	2.00	1.00	2.00	1.00	2.00	
Overall phase (1-9 weeks)						
Daily feed intake (g)	83.33	82.65	81.78	81.09	83.21	0.77^{NS}
Daily weight gain (g)	32.86	33.44	31.20	32.87	33.99	0.73 ^{NS}
Feed conversion ratio	2.28	2.25	2.28	2.22	2.18	0.02^{NS}
Mortality (Number)	1.00					

NS = Not significant.

SEM = Standard error of the mean

Carcass and Visceral Organ Characteristics of Broiler Chickens Fed Graded Levels of *Maiwa* Millet and Sorghum as Energy Source

The result of carcass and visceral organ features of broiler chickens fed varying levels of maiwa millet and sorghum as a dietary energy sources is presented in Table 2. The finding shows that, the live weights (2.02 - 2.35kg) were not statistically affected by the treatments. The result also indicated a non significant difference in the liver values (1.33 - 1.83%), and the kidney weight remained constant at 0.03%, the abdominal fat ranged between 0.89 -1.52%, while the gizzard weight (1.51 - 1.90%). The plucked weight (1.61 to 2.20 kg) and the eviscerated weight (1.43 - 1.64kg) was also not affected by the nutritional interventions of the treatments. The range of the dressing percentage values was 61.88 to 63.89%. In a related study, a similar results were found to be marginally higher (58.24 - 63.85%) than those published by Yunusa et al. (2014) and lower (67.18 - 81.247%) than those obtained by Kwari et al. (2014). While the lungs ranges between 0.40 - 0.53% and the heart ranges (0.30-0.33%) across the dietary levels of the treatments. However, all the parameters vary depending on the dietary treatments. The weights of the pancreas (0.13 - 0.18%), the small intestine (2.49-3.33%), and the caecal weight varied statistically ($P \le 0.01$). Furthermore, there was a significant difference ($P \le 0.01$) in small intestine lengths between the treatments; as shown in diet 3 and 5 which had 190.66cm and 160.25cm respectively. The large intestine length measurements ranged from 12.20 - 14.28cm, whereas the large intestine weight values ranged between 0.17 - 0.27%. The dietary levels of the treatments had no effect on the spleen weight with values ranging from 0.06 - 0.10%. The results of this study is in conformity with the





findings of Lakurbe *et al.* (2019), who fed broiler chickens various dietary energy sources without any adverse effect on their performance.

	Experimental Diets					
Parameters	T ₁	T ₂	T ₃	T ₄	T 5	SEM
T · · · · (1 ·)	0.05	0.01	0.01	0.01	2.02	0.00NS
Live weight (kg) L_{1}	2.35	2.31	2.21	2.21	2.02	0.08^{NS}
Liver weight (%)	0.42	1.70	1.85	1.33	1./0	0.25
Kidney weight (%)	0.03	0.03	0.03	0.03	0.03	0.006^{NS}
Abdominal Fat wt (%)	1.35	1.34	1.52	1.39	0.89	0.20^{NS}
Gizzard weight (%)	1.51	1.53	1.65	1.55	1.90	0.10 ^{NS}
Plucked weight (kg)	2.20	1.75	1.91	1.77	1.61	0.07^{NS}
eviscerated weight (kg)	1.64	1.55	1.51	1.55	1.43	0.06^{NS}
Carcass weight (kg)	1.54	1.42	1.42	1.41	1.30	0.06^{NS}
Dressing percentage	63.89	63.33	61.88	63.81	63.81	1.25 ^{NS}
Lung weight (%)	0.40	0.53	0.50	0.45	0.43	0.02^{NS}
Heart weight (%)	0.30	0.33	0.33	0.31	0.31	0.02^{NS}
Caecal weight (%)	0.40^{a}	0.64 ^{ab}	0.71ª	0.47 ^b	0.66 ^{ab}	1.24 **
Caecal length (cm)	18.33	21.12	19.35	18.98	21.80	0.76^{NS}
Pancrease weight (%)	0.13	0.17	0.18	0.14	0.18	0.21 ^{NS}
Small int. weight (%)	2.49	2.66	2.87	2.70	3.33	0.22 ^{NS}
Small int. length (cm)	181.77 ^{ab}	181.71 ^{ab}	190.66 ^a	168.93 ^b	160.25 ^b	31.55 **
Large int. weight (%)	0.22	0.22	0.17	0.24	0.27	0.03 ^{NS}
Large int. length (cm)	12.20	13.33	12.66	14.28	13.33	1.57 ^{NS}
Spleed Length (%)	0.06	0.09	0.10	0.08	0.10	0.01 ^{NS}

Table 2: Carcass and Visceral Organ Characteristics	s of Broiler Chickens Fed Graded Levels
of Maiwa Millet and Sorghum as Energy Sc	ource

 a^{b} = The superscripts indicate that values within the same row differ. NS = Not significant, ** = Statistically significant at (*P*≤0.01) level of significance, SEM = Standard error of the means.

CONCLUSION AND RECOMMENDATION

It was evident from the findings that *maiwa* millet and sorghum have no effect on the most of the growth parameters, carcass yield, or visceral characteristics. The study concludes that the use of graded levels of *maiwa* millet and sorghum and their different combinations had no effect on the performance or carcass characteristics of broiler chickens. The following recommendations were made based on the research finding;

1. Awareness and sensitization of poultry farmers and feed industry on the usage of *maiwa* millet and sorghum as dietary energy sources must be raised.

2. Farmers should endeavor to incorporate *maiwa* millet and sorghum into broiler chicken diets in order to reduce the cost of production.

3. Nigerian poultry feed companies can promote their utilization as dietary energy sources for broiler chicken





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CONFLICTING INTERESTS

The authors declared that no conflicts of interest exist.

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