GROWTH PERFORMANCE OF BROILER STARTER CHICKENS FED *MAIWA* MILLET (*Pennisetum glaucum L.*) IN COMBINATION WITH DIFFERENT PLANT PROTEIN SOURCES

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ABSTRACT
A 28 day study was conducted to evaluate the performance of broiler starter chickens fed diet containing maiwa millet (MM) in combination with different plant sources. A total of 288 marshal broiler chicks weighing between 133.78 to 137.54g were allotted to four starter diets in replicates of four containing 18 birds each in a completely randomized design (CRD). Four diets containing maiwa millet in combination with full fat soya bean (FFSB), soya bean meal (SBM), local groundnut cake (LGNC) and industrial groundnut cake (IGNC) coded T_1, T_2, T_3 and T_4 respectively were fed to the birds. The parameters studied were daily feed intake (DFI), daily weight gain (DWG), feed conversion ratio (FCR), final weight and mortality. Productive Performance of Broiler starter chickens fed maiwa millet (Pennisetum glaucum L.) in combination with different plant protein sources. The result indicated that feed intake and feed conversion ratio did not differ ($P<0.05$) among treatments and ranged between 54.67 to 60.43g and 2.44 to 2.66 respectively. However, daily weight gain showed a significant ($P>0.05$) effect of diets on birds fed diets T_2 (23.07g) and T_4 (23.24g) which were similar. The result of final weight also revealed a significant ($P<0.05$) effect of diets among treatments with birds fed diets T_2 (779.74g) and T_4 (788.26g) having higher values. It can be concluded that maiwa millet + soya bean meal or maiwa millet + industrial groundnut cake diets were superior to other combinations used in the study.
Keywords: Performance, *Maiwa* millet, Starter, Broiler chickens, Plant protein sources

INTRODUCTION
Global population is increasing in geometric progression and in the year 2050, the world human population is projected to increase to 10 billion (FAO 2009a and Nkwocha *et al*., 2018). There is a need for adequate and nutritious food supply for the teaming population, through sustainable production systems. Broiler remains one of the fastest sources of readily available animal protein for human consumption because of their short generation interval and rapid growth, when given good nutrition and management. Expanding broiler production would help in feeding the expanding population with adequate animal protein. The greatest constraint to livestock production is the cost of feedstuff which represents 65-70% of the total cost of production (Van der Sterren, 2018). Available data on the utilization of *maiwa* millet in combination with plant protein sources is scanty. *Maiwa* millet is a variety of pearl millet grown in Northern Nigeria and has the same characteristics like other varieties of pearl millet; it does well on soil with low fertility and moisture. Therefore, the objective of the study was to evaluate the performance of starter broiler chickens fed diets containing *maiwa* millet in combination with different plant protein sources.

MATERIALS AND METHODS
Experimental Sites
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 9^0N and Longitude 9.92^0E. The area has the minimum and maximum temperatures of 10^0C and 27^0C respectively (Dafur, *et al*., 2008).

Experimental birds and their management
A total of 288 marshal broiler chicks weighing 133.78 to 137.54g were allotted to four diets in four replicates containing 18 birds each in a completely randomized design. Feed and clean water were provided *adlibitum* throughout the experimental period which lasted 28 days.

Experimental Diets
Four experimental starter diets (Table 1) were compounded in which *maiwa* millet was used in combination with full fat soya bean meal, soya bean meal, local groundnut cake and industrial groundnut cake coded as diets T_1, T_2, T_3 and T_4 with T_1 as the control diet.

Data Collection
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 two

consecutive weighing carried out on weekly basis. This value was divided by 7 to obtain the DWG while FCR was computed by dividing DFI with DWG. Mortality was recorded as it occurred.

Table 1: Ingredients composition of broiler starter diets (2-5 weeks) containing different protein sources.

Ingredients	T1 (FFSB)	T2 (SBM)	T3 (LGNC)	T4 (IGNC)
Maiwa Millet	41.63	48.94	44.41	49.95
Protein sources	40.37	33.06	37.59	32.05
Wheat offal	8.00	8.00	8.00	8.00
Fish meal	4.00	4.00	4.00	4.00
Palm oil	2.00	2.00	2.00	2.00
Bone meal	2.00	2.00	2.00	2.00
Limestone	1.00	1.00	1.00	1.00
Min-vit premix	0.25	0.25	0.25	0.25
Salt	0.25	0.25	0.25	0.25
Methionine	0.30	0.30	0.30	0.30
Lysine	0.20	0.20	0.20	0.20
Total	**100**	**100**	**100**	**100**
Calculated Analysis (%)				
ME (kcal/kg)	2938.56	2835.09	2823.03	2819.47
Crude Protein	23.33	25.34	23.34	23.34
Crude Fibre	5.70	6.32	5.51	5.51
Ether extract	11.52	5.72	7.00	7.52
Calcium	1.07	1.07	1.07	1.07
Phosphorus	0.78	0.78	0.78	0.78
Methionine	0.67	0.67	0.67	0.67
Lysine	1.15	1.15	1.15	1.50

ME; Metabolizable energy, *Vit/mineral premix supplied/Kg of Diet: Vit. A, 12,500 IU; Vit. D_3, 2,500 IU; Vit. E, 30 IU; Vit. K, 2.5mg; Riboflavin, 6mg; Pantothenic acid, 10mg; Vit. B, 2mg; Niacin, 30mg; Vit. $B_{12, 22}$mg; Biotin, 0.05mg; Folic acid, 1mg; Chlorine chloride, 0.3mg; Antioxidant, 0.125mg; Iron, 100mg; Manganese, 100mg; Zinc, 100mg; Iodine, 1.5mg; Cobalt, 0.5mg; Selenium, 0.1mg and Copper 10mg.

Data Analysis

Data collected was subjected to ANOVA using the SPSS vr.25 (2017) statistical software. Where means differed among diets, Duncan Multiple Range Test (DMRT) was used to separate them.

RESULTS AND DISCUSSION

Performance of starter broilers fed diets containing different protein sources is presented in Table 2. Daily weight gain was significantly higher in broiler chickens fed diets T_2 (23.07g) and T_4 (23.24g) which were similar than those on T_1 (20.54g) and T_3 (21.68g) which also did not differ. This result is in line with the findings of Muhammad *et al*. (2021) who used local and industrial groundnut cake in broiler chicken diets. Final weight was also significantly ($P<0.05$) higher in T_2 (779.74g) and T_4 (788.26g).

This result agrees with the findings of Shehu *et al.* (2023) who used soya bean cake, baobab seed cake, Roselle seed cake and groundnut meal cake in broiler chicken diets. Daily feed intake ranged from 54.67g (T_1) to 60.43g (T_4) while feed conversion ratio varied between 2.44 on T_2 and 2.66 on T_1. The result conflicts with the findings of Maidala *et al.* (2021) who reported a significant effect in feed intake for broiler chickens fed diets containing, groundnut cake meal, full fat soya beans, African locust bean seed and sprouted Bambara nuts. One mortality was recorded on T_2. The mortality recorded in the study was less than the acceptable 5% level in successful broiler chicken production.

Table 2: Performance of broiler starter chickens (2-5 weeks) fed diets containing different protein sources.

	Diets				
Parameters	**T1 (FFSB)**	**T2 (SBM)**	**T3 (LGNC)**	**T4 (IGNC)**	**SEM**
Productive Performance					
Initial weight (g)	136.2	133.78	135.02	137.54	2.11^{NS}
Final weight (g)	711.32^{b}	779.74^{ab}	742.06^{b}	788.26^{a}	15.01*
Daily feed intake (g)	54.67	56.33	55.18	60.43	2.84^{NS}
Daily weight gain (g)	20.54^{b}	23.07^{a}	21.68^{b}	23.24^{a}	0.43*
Feed conversion ratio	2.66	2.44	2.54	2.6	0.09^{NS}
Mortality (Number)	0	1	0	0	

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

CONCLUSION/RECOMMENDATION

Based on the result obtained in this study, it can be concluded that the plant protein of choice along with *maiwa* millet in broiler chicken diets were soya bean meal and industrial groundnut cake.

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