HAEMATOLOGY AND SERUM BIOCHEMICAL PARAMETERS OF FINISHER BROILER CHICKENS FED *MAIWA* MILLET (*PENNISETUM GLAUCUM* L.) AS REPLACEMENT FOR PEARL MILLET

[1]Tok, C. C., [1]Datit, J. S., [1]Gosup, G. B., [2]Bot, M. H.

[1]Department of Agricultural Science, Federal College of Education, Pankshin, Nigeria.
[2]Federal College of Animal Health and Production Technology, Vom.
Corresponding Author: tokcharitydung@gmail.com Phone no. 08065491117

Abstract

An experiment was conducted to evaluate the haemato-biochemical indices of finisher broiler chickens fed *Maiwa* millet based diets. Five experimental diets in which *Maiwa* millet replaced pearl millet at 0, 25, 50, 75 and 100% levels respectively, were formulated and coded as T1, T2, T3, T4 and T5. A total of three hundred finisher broiler chickens with average weight of 987±3.70 g each were randomly allotted to the five diets in replicates of four containing 15 birds each in a completely randomized design. Feed and water were supplied *ad libitum* and the study lasted for twenty-eight days. Results for haematological analysis indicated no significant ($P<0.05$) difference in terms of PCV (29.00 – 34.25%), Hb (9.72 – 11.42g/dl), RBC (2.41 – 3.51 $x10^6$ mm^3). However, white blood cell count showed a significant ($P<0.05$) influence of *maiwa* millet. Birds on diets, T1, T3, T4 and T5 (5.26 -7.20 $x10^3$ mm^3), which were similar, had higher counts than those on T2 (4.55 $x10^3$ mm^3). Serum biochemical assay revealed no significant ($P>0.05$) effect of diet on total protein (27.94 – 30.55g/dl), albumin (15.59 – 16.70g/dl), globulin (12.42 – 16.51g/dl), cholesterol (68.81 -75.41 mg/dl), Urea (7.74 – 8.06 mmol/l) and glucose (5.52 – 6.46 mg/dl). It was therefore concluded that *maiwa* millet can replace pearl millet at 25% level in broiler finisher diets without any adverse effect on blood composition.

Key words: Finisher Broiler, Haematology, Biochemical indices, *Maiwa* millet, Pearl millet.

Introduction

The Nigerian poultry industry, currently worth about ₦1.6 trillion, has been identified as the most commercialized of all the agricultural subsectors in the country. According to World Data Atlas (2017), in 2006, Nigeria produced 232,100 metric tonnes of poultry meat. However, this quantity declined to 201,493 metric tonnes in the year 2017. A number of factors have been attributed to this unfortunate scenario. Notably the increasing cost of poultry feed ingredients in general and that of conventional energy source in particular. Feed alone, constitutes approximately 75% of the variable cost in intensive poultry production (Asaniyan and Ogundele, 2020). The conventional feed ingredients, especially maize and soya bean, which are competitive and expensive, need to be substituted with cheaper and more readily available alternatives in order to reduce feed cost. Earlier studies have shown that millet, irrespective of the variety, has the potentials to replace maize in poultry diets (Bashar *et al.*, 2012; Bulus *et al.*, 2014; Kawu *et al*. 2020 and Bot *et al.*, 2021 and). Its amino-acid profile was reported to be better than maize (NRC 1994). Similarly, it has a crude protein value of 10 - 12.96% (Aduku, 1993). However, its metabolizable energy value (2675kcal/kg) is lower than that of maize.

Available literature on the utilization of *maiwa* millet as dietary energy source in broiler chickens centred mainly on growth performance and economic benefits. Limited studies have been carried out on the effect of this alternative energy source on haemato-biochemical parameters. Consequently, the aim of this study was to bridge this gap.

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 9°N and longitude 9.92°E. According to (Dafur. *et al.*, 2008), the area has minimum and maximum temperatures of 10°C and 27ºC respectively. 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 clean drinking water were provided *ad libitum* and the study lasted for 28 days. Five broiler finisher experimental diets with 20% CP level were formulated. *Maiwa* millet replaced pearl millet at 0, 25, 50, 75 and 100% levels in the

diets coded as T1, T2, T3, T4 and T5 respectively. The main protein source used in the diets was full fat soya bean (Table 1).

Table 2: Ingredients and Percentage Composition of *Maiwa* Millet Based Diets Fed to Finisher Broilers

Ingredients	**Diets**				
	T1	**T2**	**T3**	**T4**	**T5**
Maize	47.22	35.41	23.61	11.81	0.00
Maiwa Millet	0.00	11.81	23.61	35.41	47.22
Full fat soya bean	27.78	27.78	27.78	27.78	27.78
Wheat offal	15.00	15.00	15.00	15.00	15.00
Fish meal	4.00	4.00	4.00	4.00	4.00
Palm oil	2.00	2.00	2.00	2.00	2.00
Bone meal	1.00	1.00	1.00	1.00	1.00
Limestone	2.00	2.00	2.00	2.00	2.00
Min-vit 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)	2900.00	2900.00	2900.00	2900.00	2900.00
Crude Protein (%)	20.13	20.13	20.13	20.13	20.13
Crude Fibre (%)	6.15	6.15	6.15	6.15	6.15
Ether extract(%)	9.70	9.70	9.70	9.70	9.70
Calcium (%)	1.41	1.41	1.41	1.41	1.41
Phosphorus (%)	0.91	0.91	0.91	0.91	0.91
Methionine (%)	0.64	0.64	0.64	0.64	0.64
Lysine (%)	1.06	1.06	1.06	1.06	1.06

ME = Metabolizable Energy

At the end of the study, forty birds, two per replicate, were randomly selected for collection of blood samples. The birds were fasted overnight to avoid temporary elevation of blood metabolites through feeding (Bush, 1991). Early in the morning, syringe and needle sets (5ml) capacity and 21G were used to draw 5ml of blood from the left wing web vein of each bird. Samples for haematological study were collected in properly labelled sterilized non-vacuum tubes containing a potassium salt of ethylene diamine tetra-acetic acid (K_3EDTA) as an anti-coagulant, thinly spread along the inner walls, while samples for serum analysis were collected in plain non-vacuum tubes (K_3EDTA-free). The tubes were kept on ice in a cool container to avoid proteins denaturation. All samples were analysed according to routine clinical methods as described by Baker *et al*. (1998).
All Data was subjected to ANOVA using the SPSS vr. 25 statistical software. Where means differed among diets, Duncan Multiple Range Test (DMRT) was used to separate them.

Results and Discussion

The haematological and biochemical characteristics of finisher broiler chickens fed maiwa millet based diets are presented in Table 2. Except for white blood cell count, which was significantly ($P<0.05$) higher and similar on T1, T3, T4 and T5 (5.26 – 7.20 x103 mm3), no significant ($P>0.05$) effect of diet was obtained among treatments. However, the mean value on T2 did not differ from T3, T4 and T5. Packed Cell Volume ranged between 29.00 and 34.25% on T4 and T5, Haemoglobin 9.73 and 11.35 g/dl on T4 and T5 and Red blood cell count 2.41 – 3.51 x106 mm3 on T2 and T3. All values obtained in this study are within the range for normal and healthy birds (Branson *et al.,* 1994).

All the biochemical indices considered in this study did not differ (P>0.05) among diets. Values for total proteins were within the range of 27.94g/dl (T2) and 30.56g/dl (T3), albumin, 15.59g/dl (T3) and 16.70g/dl (T2), Cholesterol, 68.81mg/dl (T1) and 75.41mg/dl) T5, urea, 7.75mmol/l and 8.06mmol/l on T4 and T1 respectively. Glucose concentration was numerically lowest on 5.52mg/dl and highest on T3 (6.46mg/dl). All values obtained in this study fall within the normal reference values reported for healthy birds (CDD 1990 and Jain 1993) which indicated that birds were healthy and not nutritionally challenged.

Table 2: Haematology and Blood Biochemical Constituents of Finisher Broiler Chickens Fed Maiwa Millet-Based Diets

Parameter	Diets					
	T1	**T2**	**T3**	**T4**	**T5**	**SEM**
Packed Cell Volume (%)	34.00	31.00	31.25	29.00	34.25	2.82^{NS}
Haemoglobin (g/dl)	11.34	10.15	10.43	9.73	11.35	1.01^{NS}
Red Blood Cells (x 10^6 mm^3)	2.60	2.41	3.51	3.13	2.94	0.57^{NS}
White Blood Cells (x10^3 mm^3)	7.20^{a}	4.44^{b}	6.19^{ab}	5.38^{ab}	5.26^{ab}	0.67*
Total proteins (g/dl)	28.32	27.94	30.56	30.18	28.61	1.49^{NS}
Albumin (g/l)	16.20	16.70	15.59	15.98	15.95	0.48^{NS}
Globulin (g/l)	12.65	13.51	15.15	12.42	16.51	1.40^{NS}
Cholesterol (mg/dl)	68.81	71.36	71.27	72.44	75.41	3.46^{NS}
Urea (mmol/l)	8.06	7.94	7.88	7.75	7.83	0.23^{NS}
Glucose (mg/dl)	5.66	5.81	6.46	5.64	5.52	0.31^{NS}

a,b, Means within the same row with different superscripts differed significantly (P<0.05), SEM = Standard Error of the Mean, NS = Not significant

Conclusion and Recommendation

Based on the results of this experiment, it was concluded that *maiwa* millet can replace pearl millet at 25% level in finisher broiler diets without any deleterious effect on blood profile. Therefore, *maiwa* millet is recommended as alternative dietary energy source in finisher broiler chicken diets.

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