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Leaf Composite Mix as Alternative Premix to Commercial Premix in Broiler Finisher Diets

Muyiwa Adegbenro*, Akinlolu Ayeni, Janet C. Olowoyeye, O. Matthew Bankole, J. Oluwasola Agbede*, G. Emmanuel Onibi, V. Ayobore Aletor
Department of Animal Production & Health,
The Federal University of Technology, Akure, Nigeria
Corresponding author: muyiwaz@yahoo.com; joagbede@yahoo.com

Introduction

The search for least-cost formulations has involved the replacement of expensive feeding-stuffs with cheaper alternatives in the formulation of poultry rations. Of the input costs in intensive poultry enterprise, feed is the major component and the ultimate challenge is to reduce cost of input to a minimum (Ziggers, 2011). Thus, adequate knowledge of poultry nutrition and of course micro-nutrients (vitamin and mineral) in alternative feed ingredients like leaves is imperative for good ration formulation (Adegbenro *et al*., 2012). Feed formulation involves combining different ingredients in proportions necessary to provide the animal with proper amounts of nutrients needed at a particular growth stage. It has been established that green vegetable leaves are the cheapest and most abundant source of proteins because of their ability to synthesize amino acids from a wide range of available primary materials such as water, carbon dioxide and atmospheric nitrogen (Agbede and Aletor, 2004, Fasuyi, 2006). Hence, this study examines the nutritive potentials of leaf composite mix from 5 leaves available locally as alternative premix in broiler diets.

Material and Methods

The experiment was carried out at the Poultry Unit of the Teaching and Research Farm, The Federal University of Technology, Akure, Nigeria. Air-dried and ground leaves of *Moringa oleifera, Ocinum gratissimum, Manihot esculenta, Telfaria occidentalis and Vernonia amygdalina,* and their proportional composite leaf mix were analysed for their micro-mineral and vitamin contents. The leaves were mixed in equal proportion into a composite mix and used to replace broiler commercial premix in a 4-week feeding trial at 0, 1, 2, 3, 4 and 5% in place of 0, 20, 40, 60, 80 and 100% reduction levels of commercial premix, respectively. A basal diet (190 g/kg crude protein & ME: 13.44 MJ/kg) containing 3 g/kg commercial premix was formulated for the growth study. Three hundred 4-week old Abor Acre broiler started birds were randomly allotted at 50 chicks per treatment in 5 replicates of 10 birds in a Completely Randomized Design. The birds were fed their respective diets for a period of 4 weeks during which daily feed consumption and weekly weight changes were monitored. At the close of the feeding trial, 3 birds per replicate were randomly selected and sacrificed for haematological indices and serum metabolites measurement and cost implication of replacing the commercial premix with composite leaf mix was also calculated.

Results and Discussion

Results showed that the analyzed micro-mineral and vitamin contents of these leaves varied with the plant species while the contents in the composite leaf mix in most cases were identical with the average value for each analyzed micro-mineral or vitamin in the plants. Table 1 showed that only the Total feed intake (TFI) and Average daily feed intake (ADI) were significantly ($p<0.05$) influenced by the CM inclusion in the diets. The TFI and ADI did not follow a particular trend but the values observed for birds fed on 5% composite leaf mix-based diet were statistically similar ($p>0.05$) with those fed on the control diet and 1, 3 & 4% CM-based diets but significantly ($p<0.05$) lower than those fed 2% CM-based diet. Though not statistically different, the total live weight gain (TLG) of birds fed on 1,3 and 5% CM-based diets were numerically higher than those fed the control diet with all birds fed the test diets having better FCR (2.28-2.22) than those fed the control diet (2.31). Also, the cost of feed/kg gain was highest in birds fed the control diet (₦213.08) and lowest in birds fed 3% composite leaf mix-based diet (₦199.72) while the % cost reduction was lowest (0.87) in birds fed the control diet and increased with increased composite leaf mix inclusion from 1.91 to 4.40 (Table 1).

All the haematological indices measured were significantly ($P<0.05$) affected by the dietary treatments (Table 2) while in Table 3, only the total protein, globulin, cholesterol and creatinine were significantly ($p<0.05$) influenced. Of special interest is that the inclusion of composite leaf mix significantly ($p<.05$) reduced the cholesterol level of the serum by 47.75-66.43% and this increased with increased substitution of commercial premix with composite leaf mix (Table 3).

Conclusions and Outlook

The replacement of commercial broiler premix in finisher diet with composite mix made from the leaves under study could help to stem over dependence of broiler farmers, especially the low holding backyard farmers, on importation of commercial premix in developing countries.

References

Adegbenro M., Ayeni A. O., Agbede J. O. Onibi G. E. Onibi and Aletor V. A. (2012). Performance and cost evaluation of some leaf meals as composite premix in broiler starter diets. 31st Biennial Conference of Ghana Animal Science Association. Book of Abstract, pp 2

Agbede J. O. and Aletor V. A., (2004). Chemical characterization and protein quality evaluation of protein concentrates from *Gliricidia sepium and Leucaena leucocephala. Int J. Food Sc* 27:77-84

Fasuyi, A. O. (2006). Nutritional potentials of some tropical vegetable leaf meals: chemical characterization and functional properties. African Journal of Biotechnology Vol. 5 (1), pp. 049-053.

Ziggers, D. (2011). Optimising nutrient density in a volatile market. *All About Feed. 2 (3): 18 – 20*

Table 1: Influence of Leaf Composite mix on the Performance and Cost of Production Estimates of Broiler Chicken

	DIETS					
Parameters/	**1**	**2**	**3**	**4**	**5**	**6**
% Premix Replacement	**0**	**20**	**40**	**60**	**80**	**100**
Initial Weight (g/bird)	1008.33±12.7	977.78±43.7	975.00±31.6	942.22±29.9	994.44±19.5	958.33±19.3
Final live weight (g/bird)	2688.89±92.0	2705.56±82.8	2538.89±77.2	2638.89±30.9	2636.11±95.3	2683.33±25.5
Total live weight gain (g/bird)	1680.56±81.6	1727.78±74.7	1563.89±60.9	1696.67±3.3	1641.67±97.2	1725.00±16.7
Total Feed Intake (g/bird)	3855.21±98.8[ab]	3852.32±99.6[ab]	3586.98±83.1[b]	3769.10±13.9[ab]	3738.04±94.3[ab]	3933.68±46.8[a]
Average live weight gain (g/bird/day)	60.02±4.2	61.71±2.7	55.85±2.2	60.59±0.1	58.63±3.7	61.61±0.6
Average feed Intake (g/bird/day)	137.69±4.6[ab]	137.58±4.7[ab]	128.11±3.0[b]	134.61±0.5[ab]	133.50±4.7[ab]	140.49±1.7[a]
Feed Conversion Ratio	2.31±0.1	2.23±0.1	2.30±0.0	2.22±0.1	2.28±0.1	2.28±0.0
Cost of Feed Consumed ((₦/kg)	357.98	353.93	326.58	339.53	335.18	348.43
Cost of Experimental Diets (₦/kg)	92.74	91.93	90.97	90.06	89.62	88.66
Cost of Feed/Kg gain (₦)	213.08	204.58	209.35	199.72	203.14	201.40
% Cost Reduction	-	0.87	1.91	2.89	3.36	4.40

Table 2: Effects of Varying Levels of Leaf Composite Mix as Premix on Haemotological Indices

	DIETS					
Parameters/	**1**	**2**	**3**	**4**	**5**	**6**
% Premix Replacement	**0**	**20**	**40**	**60**	**80**	**100**
Erythrocyte sedimentation rates (mm/hr)	2.67 ± 0.33^{ab}	2.17 ± 0.41^{b}	3.33 ± 1.03^{a}	2.17 ± 0.41^{b}	2.50 ± 0.55^{ab}	2.33 ± 0.82^{b}
Packed Cell Volume (%)	29.00 ± 2.00^{ab}	30.67 ± 1.21^{a}	27.67 ± 2.34^{b}	30.33 ± 1.03^{a}	30.17 ± 1.60^{a}	29.83 ± 2.23^{ab}
Red blood cell ($\times10^{6}mm^{-3}$)	2.24 ± 0.25^{ab}	2.41 ± 0.19^{a}	2.05 ± 0.31^{b}	2.38 ± 0.12^{a}	2.35 ± 0.19^{a}	2.28 ± 0.10^{ab}
Haemoglobin concentration (g/100ml)	9.65 ± 0.65^{ab}	10.23 ± 0.41^{a}	9.20 ± 0.80^{b}	10.12 ± 0.34^{a}	10.07 ± 0.52^{a}	9.93 ± 0.74^{ab}
Mean cell haemoglobin conc. (%)	33.27 ± 0.10^{ab}	33.37 ± 0.09^{ab}	33.25 ± 0.10^{b}	33.35 ± 0.09^{ab}	33.37 ± 0.10^{a}	33.30 ± 0.10^{ab}
Mean cell haemoglobin (pg of Hb)	43.33 ± 2.19^{ab}	42.64 ± 1.83^{b}	45.20 ± 3.13^{a}	42.57 ± 0.84^{b}	42.89 ± 1.40^{ab}	43.46 ± 1.44^{ab}
Mean cell volume (μ^{3})	130.18 ± 6.26^{ab}	127.78 ± 5.51^{b}	135.93 ± 9.59^{a}	127.63 ± 2.66^{b}	128.51 ± 3.90^{ab}	130.53 ± 4.37^{ab}

a’b: Mean within rows having different superscripts are significantly different ($P<0.05$)

Table 3: Effects of Varying Levels of Leaf Composite Mix as Premix on Serum Metabolites

	DIETS					
Parameters/	**1**	**2**	**3**	**4**	**5**	**6**
% Premix Replacement	**0**	**20**	**40**	**60**	**80**	**100**
Total Protein (g/dl)	6.33 ± 1.46^{ab}	4.66 ± 0.80^{ab}	3.46 ± 0.82^{a}	6.99 ± 1.37^{ab}	4.69 ± 0.94^{ab}	8.55 ± 2.05^{b}
Albumin (g/dl)	2.29±0.64	2.38±0.37	2.84±0.31	2.21±0.33	1.84±0.46	2.16±0.63
Globulin (g/dl)	4.04 ± 1.08^{ab}	2.28 ± 0.77^{ab}	0.61 ± 0.97^{a}	4.78 ± 1.60^{ab}	2.83 ± 0.64^{ab}	6.39 ± 2.15^{b}
Albumin/Globulin Ratio	4.13±4.13	2.01±0.99	4.66±5.25	0.02±0.54	0.69±0.16	0.23±1.38
Cholesterol (mg/dl)	122.80 ± 17.28^{b}	61.71 ± 16.03^{a}	53.44 ± 8.04^{a}	49.51 ± 5.70^{a}	42.32 ± 5.07^{a}	41.22 ± 6.87^{a}
Creatinine (mg/dl)	1.58 ± 0.69^{b}	0.43 ± 0.74^{ab}	0.67 ± 0.27^{ab}	0.62 ± 0.21^{ab}	0.46 ± 0.33^{ab}	0.39 ± 0.47^{a}
Alkaline Phosphatise (IU/l)	0.41±0.05	0.42±0.03	0.39±0.04	0.46±0.02	0.42±0.03	0.48±0.02
Aspartate Aminotransferase (IU/l)	13.67±6.67	7.50±0.50	7.00±0.00	14.33±3.49	8.50±1.50	9.00±2.00
Total Bilirubin (IU/l)	0.27±0.08	0.33±0.07	0.20±0.04	0.33±0.08	0.31±0.07	0.36±0.05

a’b: Mean within rows having different superscripts are significantly different ($P<0.05$)