PERFORMANCE AND COST BENEFIT OF REPLACING FISH MEAL WITH BLOOD MEAL IN BROILER FINISHER DIETS

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ABSTRACT:
Fish meal, an ingredientused in poultry feed formulation, is expensive and very often scarce in Nigeria. Consequently, this has contributed in the rising cost of poultry diets. There is therefore a need to identify other available and cheaper alternatives that can substitute fish meal in poultry rations. An experiment was conducted to evaluate the growth performance and financial benefits of finisher broilers fed diets containing blood meal as replacement for fish meal. Five diets were formulated in which blood meal replaced fish meal at 0, 25, 50, 75and 100% levels, designated as diets 1, 2, 3, 4 and 5 respectively. Three hundred finisher broiler chickens of the cobb strain weighing between 475.00 and 481.00 g were randomly allotted to five diets in replicates of four containing 15 birds each in a completely randomized design. Feed and water were provided *ad libitum* and the study lasted for twenty-eight days. Parameters studied include daily feed intake, daily weight gain, feed conversion ratio, mortality, feed cost per kg, feed cost per kg gain and cost saving (₦). No significant (P>0.05) difference was observed in daily feed intake (85.52 -90.55 g). However, daily weight gain (22.43 – 28.92 g) was higher (P<0.05) on diets 1 and 3. Similarly, feed conversion ratio (3.10 – 4.04) was better (P<0.05) on diets 1 and 3 and poorer on diet 4. Feed cost per kg was lower on diets containing blood meal (₦122.12 – 142.55) compared to diet 1 (₦152.52). Feed cost per kg gain was least on diet 4 (₦423.23) and highest on diet 2. (₦495.90). It was concluded that blood meal can replace fish meal in broiler diets up to 50% level without compromising performance and with a cost saving of ₦28.35.
Keywords: Finisher, Broiler, Blood meal, Performance, Cost

INTRODUCTION:

Poultry production is an enterprise that can be used to fight poverty and malnutrition. However, feed cost has been on the increase which constituted a major challenge for growth of the industry. Consequently, effective management of costs and benefits must be put in place in order to make profit and remain in business. Factors that affect profitability in poultry production include costs of inputs, rate of growth(weight gain), flock size, disease risks, general management, judicious use of inputs and disease control, among others (Jadhav and Siddiqui, 2010). Feed constitutes 60-70% of the total cost of poultry production (Adebambo *et al.*, 2010). In most tropical countries, fish meal, is very expensive and often scarce. Its scarcity has contributed in the rising costs of poultry feeds (Oluyemi and Roberts, 2013). Blood meal is a dark chocolate-coloured powder with characteristic smell. It contains about 65 – 85% protein. This variation could be due differences in processing methods (McDonald, 1992). It is one of the richest sources of lysine (NRC, 1994). Research findings have shown that the incorporation of blood meal at 1 – 45 level in poultry diets resulted in better growth (Ikram *et al.*, 1989). In a recent study, Ebuo *et al.* (2017), reported no significant difference when fish meal was replaced for blood meal at 3% level in broiler chicken diets. This study was therefore designed to determine the optimum replacement level of blood meal (BLM) in broiler finisher diets.

MATERIALS AND METHODS

The experiment was conducted at the Poultry Unitof the Teaching and Research Farm, Abubakar Tafawa Balewa University, Bauchi, Nigeria. The area lies within the coordinates; 10^{o} 18'37.2" N and 9^{o} 50' 38.0" E and islocated at an altitude of about 616 metres above sea level with average annual rainfall of 1009 mm and daily temperatures of 13 - 17^{o} C (December – January) and 36 – 37^{o} C (March – April) (Geodatos, 2019). Blood meal and other feed ingredients including fish meal, were

procured from different markets in Bauchi Metropolis. Proximate analysis ofBLM and fish meal (Table 1) were carried out to determine their nutrients content according to (AOAC, 2006). Five isonitrogenous, isocaloric diets were formulated in which blood meal replaced fish meal at 0, 25, 50, 75 and 100% levels designated as diets 1 (control), 2, 3, 4 and 5 respectively (Table 2). Ingredient composition (%) of the experimental dietsis presented in Table 2. A total of three hundred (300) broiler chickens of the cobb strain weighing between 475.00 and 481.00gwere used for the experiment. The birds were randomly allotted to five diets in replicates of four, containing fifteen birds each in a completely randomized design. Feed and clean drinking water were served *ad libitum* and the study lasted for 4 weeks. Daily feed intake was measured as the difference between quantity of feed offered and left-over collected the following day. Body weight gain was determined as the difference between two consecutive weighing (1-week interval) while feed conversion ratio was calculated using the relationship of daily feed intake and daily weight gain. Mortality was recorded as it occurred. Cost benefit was computed using the cost of dietary ingredients (₦/kg), cost of diet per kg, total feed intake and total weight gain. All the data collected were subjected to analysis of variance using the SPSS software, version 25, and where significant differences in means were observed, Duncan's Multiple Range Test (Duncan, 1955) was used to separate them.

Table 1: Proximate composition of fish meal and blood meal

Ingredient	%DM	%CP	%EE	%CF	%Ash	%NFE
Fish meal	89.11	62.29	7.26	0.98	14.51	4.17
Blood meal(BLM)	88.16	73.19	0.54	0.72	3.88	8.93

DM; Dry matter, CP; Crude Protein, EE; Ether extract, CF; Crude fibre, NFE; Nitrogen free extract.

Table 2: Percentage Composition of broiler finisher diets in which blood meal replaced fish meal (5-8) weeks

Ingredients	Diets				
	1	2	3	4	5
Maize	53.36	53.36	53.36	53.36	53.36
Full-fat soya bean	22.24	22.24	22.24	22.24	22.24
Fish meal	5.00	3.75	2.50	1.25	0.00
Blood meal	0.00	1.25	2.50	3.75	5.00
Wheat offal	15.00	15.00	15.00	15.00	15.00
Limestone	1.50	1.50	1.50	1.50	1.50
Bone meal	2.00	2.00	2.00	2.00	2.00
Salt	0.25	0.25	0.25	0.25	0.25
Premix*	0.25	0.25	0.25	0.25	0.25
Methionine	0.20	0.20	0.20	0.20	0.20
Lysine	0.20	0.20	0.20	0.20	0.20
Total	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**
Calculated Analyses					
CP (%)	19.23	19.57	19.83	20.06	20.27
ME (Kca/kg)	2824.00	2803.00	2809.00	2801.00	2793.00

RESULTS AND DISCUSSION:

The results for proximate analysis of blood meal and fish meal used in the study showed that blood meal has a crude protein content of 73.19%, ether extract 0.54%, ash 3.88% and NFE 8.93%. These values are lower than 83.12%, 1.00% 5.00% and 10.88% respectively reported by (Ebuo *et al.,* 2017). Results of growth performance showed that daily feed intake (88.25 – 90.55 g) did not significantly ($P>0.05$) differ among treatments and were slightly lower than 94.44 – 103.02g obtained by (Khawaja *et al.,* 2007). Daily weight gain (DWG) was however higher ($P<0.05$) in birds fed the control diet (28.92g) which was comparable to 26.28g for those on diet 3. Other treatments did not differ and were lower in DWG. This agrees with (Khawaja *et al.,* 2007) but contradicts (Ebuo *et al.,* 2017) who reported no significant ($P>0.05$) difference when methionine fortified blood meal replaced fish meal in broiler chicken diets. Feed conversion ratio was better ($P<0.05$) on diet 1 (3.10), poor and similar

on diets 3 (37), 4 (3.46) and 2 (3.50) and poorest on diet 5 (4.04). Total weight gain was higher ($P<0.05$) on diets 1 (0.81 kg) and 3 (0.74 kg) which were similar. Other diets had lower values (1.11 – 1.19 kg) which were also similar. Feed cost per kg was lower on diets containing blood meal (₦122.12 – 142.55) compared to the control (₦152.52). Feed cost per kg gain was lowest on diet 4 (₦423.23), followed by ₦444.28 (diet 3) and highest in diet 2 (₦495.90). Consequently, the highest cost saving of ₦49.40 was realizedon diet 4.

Table 3: Performance of finisher broiler chickens fed diets containing blood meal as replacement for fish meal

Parameters	**Diets**					
	1	**2**	**3**	**4**	**5**	**SEM**
Initial weight (g)	480.0	475.00	477.80	481.00	477.00	1.67^{NS}
Daily Feed Intake (g)	89.53	88.25	88.54	85.52	90.55	2.05^{NS}
Daily Weight Gain (g)	28.92^{a}	25.18^{b}	26.28^{ab}	24.71^{b}	22.43^{b}	1.51^{*}
Feed Conversion Ratio	3.10^{a}	3.50^{b}	3.37^{b}	3.46^{b}	4.04^{c}	0.10^{*}
Total feed intake (kg)	2.51	2.47	2.48	2.39	2.44	0.16^{NS}
Final weight (kg)	1.29^{a}	1.19^{b}	1.22^{a}	1.17^{b}	1.11^{b}	0.03^{*}
Total weight gain (kg)	0.81^{a}	0.71^{b}	0.74^{a}	0.69^{b}	0.63^{b}	0.03^{*}
Mortality (%)	1.66	0	0	1.66	1.66	-

NS = Not significant, SEM= Standard Error of the Mean.

Table 4: Cost benefits of replacing fish meal with blood meal in broiler finisher diets

Parameter	**Diets**				
	1	**2**	**3**	**4**	**5**
Total feed intake(Kg)	2.51	2.47	2.48	2.39	2.44
Feed cost ₦/kg	152.52	142.55	132.57	122.19	122.12
Total feed cost(₦)/bird	382.83	352.09	328.77	292.03	297.97
Total weight gain(Kg)	0.81	0.71	0.74	0.69	0.63
Feed cost ₦/kg gain	472.63	495.90.	444.28	423.23	472.97
Cost saving (₦)	-	-23.27	28.35	49.40	-0.34

CONCLUSION AND RECOMMENDATION

The results of this study showed that blood meal can replace fish meal up to 50% level in broiler finisher diets without compromising performance and with a cost saving of ₦28.35. The replacement of fish meal with blood meal at 50% inclusion level is hereby recommended in diets for finisherbroiler chickens. Further study on other classes of poultry such as layers, quails, turkeys, guinea fowl and ducks is also recommended.

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