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COMPARATIVE RESPONSES OF MEAT-TYPE POULTRY TO POULTRY OFFAL MEAL (POM) AND DRIED MAGGOT MEAL (DMM) IN BROILER DIET

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Target Audience: Poultry farmers, animal scientists, nutritionists, extensioners, feed toxicologists and educators.

ABSTRACT

This experiment was conducted to compare two animal protein ingrediets as alternative to fish meal. A total of 270 day-old chicks of Anak strain were used for the assessment. The ingredients, poultry offal meal (POM) and dried maggot meal (DMM) were locally processed, milled and used to replace fish meal (FM) at grade levels of 0, 25,50,75 and 100% in a compounded starter diet containing 12.25 MJ/kg ME,230g CP/kg in which fish meal contributes 3.705g CP/kg. (5.7% of the diet). Results showed significant differences in final liveweight, weight gains and operative protein efficiency which were better for FM and DMM. Other parameters examined were not significantly (P<0.05) affected. There was however, higher savings accruing from the use of POM and DMM compared to FM. POM was slightly better in cost/kg gains than DMM at similar levels of replacement.

Keywords: Poultry offal meal, dried maggot meal, broilers

DESCRIPTION OF PROBLEM

It is evident that 65-80 percent of the total cost of production of meal-type poultry especially broiler chickens can be attributed to the cost of finished feed alone. Owing to their fast growth rate, this strain of poultry eats voraciously to meet their body demand. This group of animals will therefore respond to slight variation in nutrition. One ingredient that has shown great indispensability in poultry feed is Fish Meal (FM). Its palatability, attractive smell (1) and high nutritive value have made FM a choiced animal protein ingredient in livestock diets especially poultry.

However, the limitation we have with the use of FM is that it is not locally available in the quantity required. Therefore its importation for use in poultry feed has been one singular cause of the high cost of finished feed. Consequently, poultry production is affected and the price of poultry

products has gone beyond the reach of the common man.

At this time, when there is a clarion call for poverty alleviation, one way out is boosting agriculture and especially poultry that has dwindled drastically in the past decade to provide rich animal protein for the populace. This has high implication on the health and mental ability of the people (2), these issues can be addressed by making poultry production more reasonable through reduction in the cost of finished feed by exploring alternative animal protein sources two of such viable alternatives, poultry offal meal (POM) and dried maggot meal (DMM) in replacement for fish meal (FM).

MATERIALS AND METHODS

The tested ingredients, POM amd DMM were processed locally. The POM consisted of the normal visceral offals excluding the liver, heart and head. The fresh poultry offals were collected from a processing plant, rinsed in clean water and devoid of feathers as much as possible before being parboiled for 15 minutes. This process was followed by draining the offals in sacks and slightly pressed to reduce fat content. The drained offals were smoke-dried and milled ready for inclusion in the diets. The DMM was processed according to the procedure of (3). These two ingrediets contained similar crude protein contents on analysis as 540g CP/kg. The POM and DMM were respectively used to gradually replace FM at 0,25,50,75 and 100 percent on equal protein basis in a broiler starter diet (12.55 MJ/kg ME; 230g CP/kg) in which FM (65% CP) containing 5.7% thereby contribuing 3.705g CP/kg ME;230g CP/kg) of the diet. A total of 9 experimental diets were formulated with diet 1 serving as the control and contains no POM and DMM but fish meal. Two hundred and seventy day-old Anak strain broiler chicks were assigned to 9 treament groups, each in 3 replicates of 10 chicks per replicate. Birds in each treament group were fed for a period of 5 weeks. The Birds were managed on deep litter system. At the end of the fifth week two birds per replicate were sacrificed to assess their carcass characteristics. Data were collected for all performance characteristics on the replicate basis and used for statistical analysis according to (6). The cost analysis of the experiment was computed on the mean using the prevailing price of ingredients at the time of experiment.

RESULTS AND DISCUSSION

Table 1 shows the dietary compositions of the experimental diets. The determined crude protein content and the calculated metabolization energy values of all diets were similar thus the diets adequately provide the major nutrients in the daily needs of the birds. The results of the performance characteristics are shown in Table 2. Significant differences ($P<0.05$) were

observed for final live weight, weight gains and operative protein efficiency ratio among the treatment groups. Birds fed 25 and 100 percent POM were significantly (P<0.05) lower in weight than those fed control and 25,50 and

Table 1: Composition (g/kg) of experimental diets (230g CP,12.55 MJ/kg ME)

Ingredients	1	2		3		4		5	
		a	b	a	b	a	b	a	b
Maize	550.00	550.00	550.00	550.00	550.00	550.00	550.00	550.00	550.00
Fullfat Soyabean	230.00	230.00	230.00	230.00	230.00	230.00	230.00	230.00	230.00
FM (65% CP)	57.00	43.00	43.00	29.00	29.00	14.00	14.00	-	-
POM (54%CP)	-	17.00	-	34.00	-	52.00	-	69.00	-
DMM (54%CP)	-	-	17.00	-	34.00	-	52.00	-	69.00
Blood meal	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00
Maize offal	50.00	47.00	47.00	44.00	44.00	41.00	41.00	38.00	38.00
Fixed ingredient*	68.00	68.00	68.00	68.00	68.00	68.00	68.00	68.00	68.00
Determined CP(%)	23.10	23.05	23.08	22.85	22.90	22.50	22.50	22.58	22.60

*Fixed ingredients: Premix 10.00 Agricare mix 0.25, Pfizer Products Ltd. Nig., Bone meal 30.00, Oyster shell 15.00, salt 10.00, Methionine 3.00.

FM – Fresh meal, POM- Poultry Offal Meal, DMM- Dried Maggot Meal.
a- POM and b-DMM and 1-control diet.

75% DMM diets which were on the other hand similar statistically. These observed differences appear to agree with previous observation (7) placing meat below maggot meal and fish meal in order of superior biological value. However, the similarities in the performance characteristics of birds fed both DMM and FM contradict (7) while confirming some non-significant differences in biological value of the two ingredients reported by some authors (8,9).

Dried maggot meal completely replaces FM in the diet of broilers starter without any significant effect on final live weight, weight gains and operative protein efficiency ratio as well as other performance indices determined. The implication is that bioavailability of protein in FM and DMM for utilization by broiler starter are not different in spite of the higher nutritive value (amino acid profile) of FM compared to DMM (5). This reason may have accounted for the similarities in the performance characteristics of the birds fed both control and DMM diets.

Table 2: Performance characteristics of broiler starter fed POM and DMM diets.

Parameters	1	2		3		4		5		
		a	b	a	b	a	b	a	b	SEM
Initial LWT/bird (g)	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	-
Final LWT/bird (g)	1010.00^{a}	995.50^{b}	1012.00^{ab}	1000.00^{ab}	1020.00^{a}	1008.00^{ab}	1025.00	995.00^{b}	1000.00^{ab}	6.20
Ave. WT-gain/bird/d (g)	27.71^{a}	27.30^{b}	27.77^{a}	27.43^{ab}	28.00^{a}	27.66^{ab}	28.14^{a}	27.29^{b}	27.43^{ab}	0.11
Ave. Feed intake/bird/d (g)	55.60	56.50	56.00	56.00	55.50	55.80	55.00	56.00	54.80	1.10
Feed: Gain ratio	2.01^{ab}	2.07^{a}	2.02^{ab}	2.04^{a}	1.98^{b}	2.02^{ab}	1.95^{b}	2.05^{a}	2.00^{ab}	0.10
Operative protein efficiency ratio	2.17^{a}	2.10^{b}	2.16a	2.13^{b}	2.19^{a}	2.16^{a}	2.22^{b}	2.12^{b}	2 18^{a}	0.13
Mortality (No)	1	1	0	2	1	0	0	0	1	
Cost/Kg weight gain (N)	94.50	76.10	74.50	75.10	73.00	74.80	72.00	71.50	69.75	
Cost diff. /Kg gain (N)	-	18.40	20.00	19.40	21.50	19.70	22.50	23.00	24.75	

a/b Means with different superscripts are significantly different (P<0.05).
Cost were computed on mean values and were not statistically analysed.

Table 3: Carcass Quality characteristics of Broiler chickens fed FM, POM and DMM diets for 5 weeks.

Characteristics	1	2		3		4		5		SEM
		a	b	a	b	a	b	a	b	
Dressed wt (g)	828.20 [a]	816.31[b]	829.84 [a]	820.00[b]	836.40 [a]	826.56 [ab]	840.50 [a]	815.90 [b]	830.00 [a]	4.05
Eviscerated wt (g)	606.00 [ab]	602.28[b]	607.20 [ab]	604.00 [ab]	612.00 [ab]	605.81[b]	615.00 [a]	602.00[b]	602.20[b]	3.04
Breast wt (PEW)	151.50	150.50	151.80	151.00	153.00	151.45	153.75	150.50	150.55	3.06
Thigh wt "	109.08	108.41	109.30	108.72	110.16	109.05	110.70	108.36	108.40	3.00
Drumstick wt "	99.99	99.38	100.19	99.66	100.98	99.83	101.48	99.33	99.36	2.45
Wing wt "	78.78	78.30	78.94	78.52	79.56	78.75	79.95	78.26	78.29	1.10
Shank wt "	48.48	48.18	48.42	48.32	48.9	48.46	49.20	48.16	48.18	0.72

a/b means with different superscripts are significantly different ($P<0.05$)
PEW: expressed as percentage of Eviscerated weight.
Wt = weight.

On the other hand, the lower ($P<0.05$) operative protein efficiency ratio observed for birds fed POM diets is an indication of lower bioavalability of protein from this ingredient compared to DMM whose crude protein content did not vary from POM. Therefore, it could be opined that the higher performances observed in birds fed DMM and FM compared to the bulk (crude) protein per se.

The feed intake of all birds were not significantly ($P>0.05$) affected, although there were slight reduction in feed intake for DMM treaments as against the POM counterparts and the control. A similar observation has been reported (5) which may be linked to palatability of the ingredient compared to FM.

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Table 3 shows the results of the carcass quality characteristics of the experimental birds. Significant differences ($P<0.05$) were noticed only in dressed weights which bear similar trends as the live weight as discussed earlier. However, eviscerated weights of birds fed control diets were not different from those placed on POM and DMM diets. Those fed 50 and 75% level of DMM diets had better ($P<0.05$) than the control. Although the trend of better utilization of DMM appeared in the carcass measurement of the chicken parts, the treament groups wee not significantly affected.

The cost analysis for producing a kilogram weight gain of broiler shows reduction with increase inclusion of either POM or DMM (Table 2). This could be attributed to their relative cheaper cost of production than the cost of purchasing fish meal. This observation is in agreement with antecedent reports (4,5,10).

The high savings accruing from the use of either POM or DMM compared with FM which increases with increased replacement levels is a positive indication of the suitability of these locally produced and processed ingredients as possible alternatives to FM in broiler starter diets. In spite of the lower weight gains for 100% DMM, both POM and DMM showed better economic gains for farmers than FM. It is worthy to note that the live weights of birds fed alternative ingredients even at complete replacemet did not fall short of recommended growth rate (11) for birds of that age in the tropics.

CONCLUSION AND APPLICATIONS

1. Dried Maggot Meal appeared to be better utilised than either FM or POM
2. Fish meal as animal protein ingredient for broiler starter ration proved superior to POM in terms of live weight, gains and protein efficiency ratio.
3. However, higher savings will accrue to the farmer by using either DMM or POM than FM.
4. Therefore, the use of DMM or POM as alternative animal protein ingredients for broiler starter diets should be encouraged with higher preference for DMM.

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