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Utilizing Mud Crab (*UCA Tangeri)* Meal as a Partial Substitute for Soyabean Meal in Broiler Production.

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Abstract
A study was undertaken to evaluate Mud Crab Meal as a partial replacement for Soyabean meal as protein source in broiler chicken production. One hundred and eighty unsexed day-old Cobb broiler chicks were randomly designed to four dietary treatment s in a completely randomized experimental design. Each of the treatments were replicated thrice with fifteen (15) birds per replicate. Different diets were formulated for broiler starter and finisher phases of feeding. The diet for the starter phase contained approximately 22% crude protein while the finisher phase contained approximately 18% crude protein. Crab meal was used as a source of protein to replace soyabean meal at 10, 20, 30% in treatment II, III, and IV respectively, while treatment I, had 100% soyabean meal as source of protein and also served. Water and feed were supplied ad libitum. The parameters measured were feed consumption, body weight gain , feed conversion ratio,feed cost/ kg, cost of feed consumed/bird, cost of feed/kg weight gain and % reduction of cost of feed. This study shows that soyebean can be replaced by crab meal in the diets at 30% of substitution rate (on protein basis) without negatively affecting broiler performance.
Keywords: Broiler, crab meal and Soybean meal.

Introduction

Conventional feed ingredients particularly those of plant protein origin (soybean and groundnut cake) that are very expensive could be replaced with less expensive protein meal and locally available substitutes in feed formulation represents a suitable approach at reducing the total feed cost of poultry production in Nigeria (Hardy, 1996). That food scarcity is a pestilence in many developing countries of the world, including Nigeria where daily intake of animal protein per caput falls far below the normal intake as recommended by ILCA (1980) and FAO (1986), is not in doubt. In order to assuage this situation, it has been observed that broiler production is the fastest and easiest path (George and Ugwuja, 2011; Nworgu, Egbunike and Ogundola., 2000; Dipeolu, Eruvbetine and Williams, 1996; Larry, 1993) since they possess a high feed conversion ratio and are accepted by all. The major object of poultry production is to produce meat and eggs efficiently, at economical rate, which is only possible by using cheaper locally available feed ingredients because the feed alone contribute to 70 to 75 percent of the total cost of poultry production (George and Sese, 2012; Han & Lee, 2000; Oruwari, Sese and Mgbere, 1995). SBM has been the most extensively evaluated and most commonly used in commercial aquaculture and livestock diets (George, Onunkwo and Ogbamba, 2008; Lovell, 1988; Akiyama, 1991). The search for alternative protein sources of feed ingredients as a partial or complete substitute to soyabean that is conventional costly ingredient in poultry rations has stimulated research interest aiming at exploiting different locally available alternative feeding resources. The mud crabs (Uca tangeri) found in estuaries and mangrove is highly valued and the most consumed crab of high demand in West Africa (Enzenross, Enzenross and Bingel, 2001; Ojewole and Udom, 2005). The shell and flesh of U. tangeri is highly portentous compared other Mollusk with protein ranging between 17.1gm/ 100gm to 21.31 gm / 100gm (Jimmy and Arazu, 2012; Gates and Parker, 1992; Ackman, 1990). It is also reported that the shells and tissues contained more than 20 different types of amino acids and that the crabs meat can provide all the needed amino acid for growth (FAO/WHO/UNO, 1985). The mud crab (U. tangeri) is not consumed as food in the study area, hence it can be exploited as alternative protein feed resources in poultry feeding. Thus, the present study was designed to evaluate the partial replacement of soyabean meal with mud crab meal in broiler diets.

Materials and Methods

Test ingredients: The mud crabs of was collected from the Brackish Water Fish Farm Station the Nigeria Institute for Oceanography and Marine Research at Buguma. They were killed by dipping in hot water. They were sun dried for 12 hours and later oven-dried at about 70-80^{o}C for 24 hours. The crabs were then ground into powdery form for experiment.

Experimental birds, management and design: One hundred and eighty unsexed day-old Cobb broiler chicks were randomly designed to four dietary treatment s in a completely randomized experimental design. Each of the treatments was replicated thrice with fifteen (15) birds per replicate. Different diets were formulated for broiler starter and finisher phases of feeding. The diet for the starter phase contained approximately 22% crude protein while the finisher phase contained approximately 18% crude protein. Mud Crab Meal (MCM) was used as a source of protein to replace Soya bean meal (SBM) at 10, 20, 30% in treatment II, III, and IV respectively, while treatment I, had 100% soyabean meal as source of protein and also served as the control, (Table1). Water and feed were supplied ad libitum. The chicks were reared in deep litter pens for 8 weeks by providing adlib fresh and clean water and weighed quantity of feed. The diets were made isocaloric and isonitrogenous by adjusting the other ingredients.

Data collection: The composition of the feed ingredients were analyzed as per A.O.A.C.(2002) and the same is furnished in Table 1, weekly body weights and feed consumption were recorded. Economic analysis of the broiler production was based on the cost of the diets computed based on the prevailing market price of the ingredients at the time of purchase. The data on body weight gain, feed consumption and feed conversion ratio were subjected to analysis of variance (ANOVA) and where differences existed, means were separated using the Duncan multiple range test (1955).

Results and Discussion

Table 2 shows that the feed consumption, body weight gain and feed efficiency of birds fed the control fed diet were not significant (P> 0.05) different from those feed the test diets, indicating that the partially replacement of SBM with MCM at 30% level of inclusion had no effect on the feed consumption, body weight gain and feed efficiency of the broilers.

These findings corroborates the report of Leeson, Atteh, and Summer (1988) that diets containing 30% soybean meal of fish meal in laying hens had no effect on their performance. In the study with fish, Davis and Stickney (1978) states that at 36% protein, soyabean meal could totally replace fishmeal in the diets without significant reduction in the performance of the fish.

Also, in similar Piedad-Pascual et al. (1990) found no significant differences in weight gain of tiger prawn fed different levels of SBM (up to 55% SBM) which completely replaced FM. Tidwell et al. (1993) stated that variable percentages of SBM (25%, 15%, and 26.5%) and 40% of DDGS partially or completely replaced FM in the diets of the freshwater shrimp (M. rosenbergii) grown in ponds, so that average yield, survival, and individual weight did not differ among all treatments.

However, contradictory results have been reported by Shiau et al., (1989); these authors found out that at dietary protein level of 32%, replacement of 30% fishmeal with soyabean meal significantly decreased the growth of fish and feed efficiency and they attributed it to be poor amino acid balance and the presence of trypsin inhibitors in soyabean meal.

Table 3 also reveals that the cost of feed consumed/bird was highest (₦435.2) in the control diets and decreased gradually with increasing levels of MCM. Also, the feed cost/kg and cost of feed/kg weight gain was significantly (P>0,05) increased in the control diet and decreased gradually with increasing levels of MCM. The study suggests that livestock farmers would make 4 – 15 % cost reduction when MCM partially replace SBM in broiler production. Therefore, it is recommended soyabean meal can be replaced by crab meal in the diets at 30% of substitution rate (on protein basis) without negatively affecting broiler performance.

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Table 1: Composition of broiler starter and finisher diets used for study.

	Starter treatments				**Finisher treatments**			
Ingredients (%)	I	II	III	IV	I	II	III	IV
Yellow maize	46.73	46.73	46.73	46.73	48.20	48.20	48.20	48.20
Wheat bran	10.89	10.89	10.89	10.89	11.40	11.40	11.40	11.40
Soyabean meal	38.00	34.20	30.4	26.6	36.02	32.42	28.82	25.21
Bone meal	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
***Premix**	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Salt	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
DL methionine	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27
Lysine	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
Mud Crab meal	-	3.80	7.60	11.40	-	3.60	7.20	10.81
Total	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**
Determined analysis	**(g Kg $^{-1}$ dry matter)**							
Crude Protein	219.10	223.31	228.41	229.98	178.21	179.11	180.16	180.54
Ether Extract	80.1	78.32	77.26	76.98	79.55	78.17	76.74	75.93
Crude Fiber	51.0	49.60	49.27	48.69	73.26	71.83	71.28	70.51
Ash	67.5	72.73	73.44	74.21	86.21	83.54	83.23	81.09
Nitrogen free extract	**582.3**	**576.04**	**571.62**	**570.14**	**582.77**	**587.35**	**588.59**	**591.93**

***Premix:** Vitamin A 8000000 I.U, vitamin D_3 1600000 I.U, vitamin E 5000 I.U, vitamin K 2000 mgr, Thiamine 1500 mgr ,Riboflavin B_2 4000 mgr, Pyridoxine B_6 150\ mgr,Niacin 15000 mgr vitamin B_{12} 10 mgr, Pantothenic Acid 5000 mgr, Folic Acid 500 mgr, Biotin 20 mgr, Choline chloride 200 gr, Antioxidant 125 gr, Manganese 80 gr, Zinc 50 gr, Iron 20 gr, Copper 5 gr, Iodine 1.2 gr, Selenium, 200 mgr Cobalt 200 mgr.

Table 2: Cost analysis and performance responses by broiler birds fed different levels of Fiddler crab meal from 0-8 weeks

Dietary Treatment Parameters	0% MCM T_I (Control)	10 % MCM T_{II}	20% MCM T_{III}	30% MCM T_{IV}
Feed Consumption (kg)	3.4 ± 0.04[a]	3.5 ± 0.09[a]	3.49 ± 0.05[a]	3.5 ± 0.09[a]
Body weight gain (kg)	1.8 ± 0.02[a]	1.8 ± 0.04[a]	1.80 ± 0.03[a]	1.8 ± 0.02[a]
Feed Efficiency	0.5 ± 0.02[a]	0.5 ± 0.02[a]	0.52 ± 0.02[a]	0.5 ± 0.03[a]
Feed cost/kg (₦)	128.0 ± 0.07[a]	121.0 ± 0.03[b]	113.82 ± 0.06[c]	106.4 ± 0.04[d]
f feed consumed/bird(₦)	435.2 ± 0.02[a]	418.5 ± 0.05[b]	397.23± 0.03[c]	375.5 ± 0.04[d]
Cost of feed/kg weight gain (₦)	248.7 ± 0.06[a]	237.8 ± 0.06[b]	220.7 ± 0.06[c]	210.9 ± 0.07[c]
% Reduction	0	4.38	11.30	15.11

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