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Full Length Research Paper

Nutritional value of chicken offal as replacement for local fish meal in growing snail

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A total of ninety growing snails of mean weight 91.23 ± 2.4 g were used to determine the effects of partial or total replacement of local fish meal as a source of protein with less expensive, chicken offal in the diet of growing snails. Completely randomized design was used for the study. The feeding trial had four treatments, C_1, C_2, C_3 and C_4 in which fish meal fraction of the diets was replaced at 0, 50, 75 and 100% with chicken offal, respectively. The parameters taken were weight gain and feed intake. Feed conversion ratio, total feed cost, and cost per weight gain were calculated. The trial lasted for twelve weeks. Significant differences were not observed in the mean weekly feed intake of the snails in all the treatments. The mean weight gain in all the treatments was not significantly influenced by the inclusion of chicken offal in the diet ($P > 0.005$). Total feed cost reduced as the level of the chicken offal increased while the lowest cost/weight gain was observed in C_4. The inclusion of Chicken offal in all the diets had no detrimental effect on the animals in all the treatments. Based on the present results chicken offal could replace local fish meal in the diet of growing snail up to 100%.

Key words: Snails, chicken offal, local fish meal, feed utilization, replacement.

INTRODUCTION

Snail meat has been found to be nutritious with high protein content. The fat content is very low when compared to the conventional livestock such as broiler chicken meat and pork. Moreover, there is growing interest in the rearing of snail for meat and sale in Africa and Nigeria in particular (NRC, 1991; Omole, 2001).

One of the major limitations to the efficient snail rearing is the availability of quality feed at affordable price. The protein feed stuff mainly used in livestock production in Nigeria are groundnut cake, soybeans meal and fish meal, etc. (Olomu, 1995). Fish meal could be imported or produced locally. Fish meal is more expensive than the other protein feed stuffs because of its high biological value. The high cost of fish meal as a source of animal protein necessitates looking for alternative source of animal protein which is affordable. Chicken offal meal is good source of animal protein. Chicken offal is a waste product when broiler chicken is slaughtered. It is made up of kidney, liver, intestines, oesophagus and proventricus of eviscerated table birds (Nwokoro, 1993; Salami and Oyewole, 1994). The poultry offal has been used to replace fish meal in layers diet (Salami, 1997). In broiler diet, poultry offal has also been used to replace fish meal and the cost per weight gain was reduced. There is no information on the use of chicken offal in the diet of snails; hence the study was conducted to evaluate the performance of the snails when local fish meal was partially or wholly replaced by chicken offal.

MATERIALS AND METHODS

The experiment was carried out at the Snailery Unit of the Institute of Agricultural Research and Training (I.A.R. & T.), Moor Plantation, Ibadan which is located on longitude 03°51E, latitude 07°23N and altitude 650" lies in the humid zone of the rainforest belt of South-western Nigeria with mean annual rainfall of 1220 mm and mean temperature of 26°C. A total of ninety six growing snails of mean weight 91.23 ± 2.4 g were used for the feeding trial. The snails were acclimatized for one week before the commencement of the feeding trial. Chicken offal was collected from broiler slaughtering farm in Ibadan, Oyo state. The chicken offal was later sun dried before in-

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Table 1. Chemical composition of test ingredients.

Parameter	Chicken offal (%)
Crude protein	65.8
Ether extract	4.6
Ash	13.9
Crude fibre	0.1
Nitrogen free extract	15.6

Table 2. Gross composition of the experimental diets.

Parameters (/100kg)	C_1 (0%)	C_2 (50%)	C_3 (75%)	C_4 (100%)
Maize	22.5	22.5	22.5	22.5
Maize bran	10	5	2.5	1.5
Wheat offal	10.6	10.6	8.1	4.1
Palm kernel cake	5.0	5.0	5.0	5.0
Pineapple waste	0	5	10	15
Soybean meal	25.7	25.7	25.7	25.7
Groundnut cake	10	10	10	10
Fish meal	4.0	2.0	4.0	0.0
Chicken offal	0	2.0	3.0	4.0
Oyster shell	9.7	9.7	9.7	9.7
Bone meal	2.15	2.15	2.15	2.15
Premix	0.25	0.25	0.25	0.25
Salt	0.1	0.1	0.1	0.1
Calculated chemical composition				
Crude Protein	24.3	23.57	23.35	23.02
Energy	2623.12	2601.5	2575.3	2498.7

corporating with other feedstuffs. Four diets were formulated to contain chicken offal at 0% (C1) control, 25% (C2), 75% (C3) and 100% (C4) as replacement for local fish meal in the diet of growing snails. The diets were formulated to contain about 24% crude protein and energy of 2400 – 2500 kcalME/kg. Feed intake and weight gain were measured on daily and weekly basis with the use of sensitive weighing balance. Shell length, width and aperture were measured on weekly basis with Venier Calliper. Feed conversion ratios were calculated as the ratio of feed intake to weight gain. Feed cost and cost per weight gain were also calculated. Carcass analysis was done at the end of the feeding trial by striking the shell with hard object. The shell, foot and viscerals were separated and weighed separately.

The chemical composition of the experimental diets and the foot were done according to the method of A.O.A.C. (1990). All data were subjected to statistical analysis using analysis of variance and the means were separated using Duncan Multiple Range Test (SAS, 1995).

RESULTS AND DISCUSSION

The chemical composition of the test ingredients is shown in Table 1. The crude protein of the chicken offal is slightly higher than that of local fish meal. The fat content of the chicken offal too was higher than that of local fish meal. The chemical composition of the experimental diets (Table 2) show that the crude protein were relatively the same and fell within the recommended values for growing snails (Omole, 2003). The crude fibre of the different formulated diets was not different from one another (Table 3). Table 4 shows the performance characteristics of growing snails fed varying levels of chicken offal as replacement for local fish meal in the diet. The mean initial weight of the snails in all the treatments showed no significant differences among the means ($P > 0.05$). There were no significant differences in the mean monthly weight gain thus indicating that chicken offal could partially or wholly replace local fish meal without affecting the growth performance.

No significant differences were obtained in the mean monthly feed intake ($P > 0.05$) in C_1, C_2 and C_3 but slightly higher than that of C_4 and this could be due to taste of fish meal. The mean monthly shell length and width increment were not significantly different from one another ($P > 0.05$) (Table 4). The feed conversion ratio in all the treatments was relatively similar ($P > 0.05$). No mortality was recorded in the course of the feeding trial as shown in Table 4 and this implies that chicken offal did not have any adverse effect on the health status of the snails. The total feed cost and cost per weight reduced as the le-

Table 3. Determined proximate composition of the experimental diets.

Parameters	C_1 (0%)	C_2 (50%)	C_3 (75%)	C_4 (100%)
Dry Matter	94.92	93.34	94.15	93.20
Crude Protein	23.15	23.17	23.35	23.62
Crude Fibre	7.88	7.89	7.95	7.85
Ether Extract	4.78	4.82	4.86	4.88
Ash	10.98	10.89	10.79	10.74
Nitrogen Free Extract	53.01	53.19	53.51	53.72

Table 4. Summary of performance of snails fed experimental diets.

Parameters	C_1 (0%)	C_2 (50%)	C_3 (75%)	C_4 (100%)
Initial weight (g)	90.8^{a}	91.5^{a}	90.1^{a}	92.1^{a}
Final weight (g)	301.9^{a}	311.2^{a}	308.6^{a}	308.0^{a}
Total weight gain (g)	220.1^{a}	219.7^{a}	218.5^{a}	215.9^{a}
Monthly weight gain (g)	73.4^{a}	72.2^{a}	72.8^{a}	72.0^{a}
Total feed intake (g)	946.9^{a}	941.38^{a}	940.3^{a}	937.2^{a}
Monthly feed intake (g)	315.6^{a}	313.7^{a}	313.43^{ab}	312.4^{b}
Monthly shell length increment (mm)	12.5^{a}	12.4^{a}	12.4^{a}	12.3^{a}
Monthly shell width increment (mm)	10.4^{a}	10.4^{a}	10.2^{a}	10.1^{a}
Feed conversion ratio	4.30^{a}	4.40^{a}	4.30^{a}	4.34^{a}
% Livability	100	100	100	100

Means along rows with different superscript are significantly different from each other ($p < 0.05$).

Table 5. Carcass analysis of snails fed experimental diets.

Parameters	C_1 (0%)	C_2 (50%)	C_3 (75%)	C_4 (100%)
Live weight (g)	308.7^{a}	309.5^{a}	307.1^{a}	306.9^{a}
Shell (g)	78.4^{a}	77.4^{a}	75.6^{a}	76.1^{a}
Foot (g)	133.0^{a}	132.8^{a}	131.4^{ab}	128.6^{b}
Offal (g)	62.1^{a}	62.8^{a}	60.8^{a}	60.5^{a}
Shell/Live weight (%)	25.4^{a}	25.0^{a}	24.9^{a}	24.8^{a}
Offal/Live weight (%)	20.1^{a}	20.3^{a}	19.8^{a}	19.7^{a}
Dressing (%)	43.4^{a}	42.9^{a}	42.8^{a}	41.9^{a}

Means along rows with different superscript are significantly different from each other ($p < 0.05$).

Table 6. Chemical analysis of the feet (edible portion).

Parameters	C_1	C_2	C_3	C_4
Crude Protein (%)	21.8^{a}	21.4^{a}	21.0^{a}	19.8^{a}
Ether Extract (%)	1.21^{a}	1.22^{a}	1.22^{a}	1.21^{a}
Ash (%)	15.6^{a}	15.3^{a}	14.9^{a}	14.8^{a}
Calcium (%)	3.8^{a}	3.7^{a}	3.7^{a}	3.6^{a}
Phosphorus (%)	1.1^{a}	1.1^{a}	1.0^{a}	1.0^{a}

Means along rows with different superscript are significantly different from each other ($p < 0.05$).

vel of chicken offal in the diet increased. This was as a result of high cost of obtaining local fish meal compared to chicken offal (Table 4).

The mean live weight of the snails was not significantly affected by different levels of chicken offal (Table 5). The foot (edible portion) were the same in C_1, C_2 and C_3 ($P >$

0.05). There were significant differences in C_1 and C_4 ($P < 0.05$). The shell/live weight of the snails in all the treatments was not significantly influenced by the inclusion of chick offal ($P > 0.05$). The dressing percent in C_1, C_2 C_3 and C_4 were 43.4, 42.9, 42.8 and 41.9% respectively and they were not significantly different from one another ($P > 0.05$). The crude protein, fat contents, ash, calcium and phosphorus of the foot otherwise called edible portion were relatively the same in all the treatments (Table 6).

It could be concluded that inclusion of chicken offal as replacement for local fish meal up to 100% in the diet of growing snails did not significantly affect the feed intake, weight gain, shell length and width and feed conversion ratio. The cost per weight gain was at the lowest at 100% inclusion of chicken offal. It is recommended that chicken offal should be used by snail farmers to replace local fish in order to save cost and increase production.

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