The potential of snail (*Pila leopoldvillensis*) meal as protein supplement in broiler diets.

Patricia M. Barcelo* & J.R. Barcelo*

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Summary

The chemical analysis revealed that raw golden snail meal (R.GSM) had 53.22%, 6.01% and 0.49% crude protein, calcium and phosphorus respectively. The cooked golden snail meal (C.GSM) had 52.25% CP, 6.51% Ca and 0.41% P.

Birds fed with fish meal (control) had significantly the highest feed conversion ratio followed by the birds fed the (C.GSM) (P 0.05). The gain in weight of the birds fed the (C.GSM) had comparable gain in weight with the birds fed the control diet. There were no significant differences observed in a second experiment because the somme feed ingredients had compensated for the deficiency of the nutrients to meet the requirements of the birds.

Results reveal that the ingredients of golden snail meal in broiler diets is just as good as incorporating the imported fish meal.

Résumé

L'analyse chimique a révélé que la farine d'escargot doré cru (R.GSM) contenait respectivement 53,22% - 6,01% et 0,49% de protéines brutes, de calcium et de phosphore. La farine d'escargot doré cuit (C.GSM) contenait 52,25% de PB - 6,51% de Ca et 0,41% de P.

Les poulets nourris avec la farine de poisson (témoin) ont eu significativement le taux de conversion alimentaire le plus élevé (P 0,05). Le gain de poids des oiseaux nourris au C.GSM a été comparable à celui des témoins. Aucune différence significative n'a été observée dans le deuxième essai où des compensations alimentaires ont compensé des déficiences en nutriments de certaines matières premières.

Les résultats ont montré que les éléments de la farine d'escargot doré sont aussi bons que ceux de la farine de poisson importée dans les rations pour poulet.

Introduction

Due to the high cost of imported feed ingredients, Filipino researchers are now checking on abundant supply of locally available animal protein source for feeds as replacement for imported feed.

Recently, the golden snail (*Pila leopoldvillensis*) was introduced to the Philippines by a wife of a prominent politician with the aim of uplifting the socio-economic status of the Filipinos. Its characteristics show that it multiplies very fast, reaches sexual maturity within three months and is able to lay 50 to 300 tiny pink eggs with 90 to 96% hatchability (1). It is a voracious cater, has a fast growth rate and reaches the size of 5.0 cm (2.0 inches) at maturity. It originated at the Amazon River basin in South America and is served as a delicacy by the people of Brazil and Argentina.

Most of the farmers integrated golden snail in their ricefields. However, due to the above-mentioned characteristics particularly its fast growth rate and voraciousness, it has, nonetheless been considered as a pest. Magallona (2) reported that the golden snail attacked the emerging radicle or plumule of newly germinated seeds. They also feed on the leaves of younger submerged plants.

This study was then conducted to determine the chemical composition and the nutritive value of golden snail meat meal (GSM) on broilers. This will give a baseline data to the researchers for the utilization of golden snail meat meal for poultry and livestock feeding. In this manner, the population of golden snail in ricefield infested areas will be reduced.

Materials and methods

Procurement and preparation of the golden snail meal.

The golden snails were collected in Bay, Laguna. In this area, snails are removed by hand during the rice planting season to reduce the extent of damage to the transplanted seedlings.

Two preparation methods were followed prior to the grinding of the golden snail meat meal. In the first method, the shell and the operculum are separated and removed from the meat giving a «Raw GSM». Boiling for 5-15 minutes prior to the separation of the meat from the shell and operculum was employed in the second method which gave a «Cooked GSM». The meat was then dried at 70°C for three consecutive days. After grinding, the crude protein, calcium and phosphorus contents were analyzed.

The feed ingredients used were bought from the Sunflower Feed Mill in Batangas. The first experiment was done to assess the protein quality of the golden snail meat meal if fed in one-day old chicks. The feed ingredients used were limited so that most of the nutrients will come from the golden snail meal in order to assess the nutritional qualities. Table 1 shows the formulated rations in Experiment 1.

Methodology of the First Experiment

In the first experiment, a total of eighteen (18) birds were used. The birds were randomly distributed into individual cages divided into three treatments with six replications each using the Completely Randomized Design.

* Don Mariano Marcos Memorial State University. Bacnotan — La Union - 0502 Philippines.
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TABLE 1

Composition of the semi-purified experimental meals used for growing chickens.

Ingredients	FM	R.GSM	C.GSM
Fish Meal	10.000	0	0
Raw Snail Meal	0	11.900	0
Cooked Snail Meal	0	0	12.120
Yellow Corn	70.000	70.000	70.000
Rice Bran	11.325	9.355	9.135
Vitamin-mineral premix	0.225	0.225	0.225
Salt (NaCl)	0.100	0.250	0.250
Crude Protein (%)	16.000	16.000	16.000
Calcium (%)	1.100	1.100	1.100
Phosphorus (%)	0.400	0.400	0.400

F.M. Fish Meal

Methodology of the Second Experiment

The second experiment was done to determine the feeding values of the golden snail meat meal in broiler diet. Forty five birds were randomly assigned to three treatments with three replications per treatment. Each replicate had five birds. Initial weights of the chicks were obtained on a replicate basis and thereafter, weekly weights and feed consumption were taken. The body weight gain, feed consumption and feed conversion ratio were computed. After seven weeks, two birds of each replicate were dressed. The visceral organs particularly the liver was analyzed for any abnormality and to determine the possible existence of any toxic substance in the snail meal. Experiments 1 and 2 lasted for forty five days.

TABLE 2

Composition of the three experimental meals used for growing chickens.

Ingredients	FM	R.GSM	C.GSM
Fish Meal	10.000	0	0
Raw snail meal	0	11.900	0
Cooked snail meal	0	0	12.120
Yellow Corn	54.000	54.000	54.000
Soybean oil meal	18.450	18.450	18.450
Copra meal	5.000	5.000	5.000
Rice bran	10.405	8.095	7.755
Tricaphos	0	2.100	2.200
Limestone	1.820	0	0
Vitamin-mineral premix	0.225	0.225	0.225
NaCl (Salt)	0.100	0.250	0.250
(Dry Matter Basis)			
Crude Protein (%)	21.000	21.230	21.330
Calcium (%)	1.100-1.300	1.420	1.500
Phosphorus (%)	0.400	0.430	0.430

The chemical analysis of the snail meat meal were done at the Animal Nutrition Laboratory, UPLB, College, Laguna. Table 3 shows the results of the analysis.

As shown in Table 3, snail meat meal had lower percent crude protein than the imported fish meal though high enough for food formulations. The shell can also be used as a source of calcium and phosphorus. However, this study being only a preliminary test on the potential of the snail meat meal, it is recommended that further chemical analysis of the meat meal and the shell should be done.

TABLE 3

Crude protein, calcium and phosphorus analysis of the snail meat meals and the fish meal used in the study (% on dry matter basis).

Feed ingredient	Crude protein (%)	Calcium (%)	Phosphorus (%)
Raw snail meat meal	53.22	6.01	0.49
Cooked snail meat meal	52.25	6.51	0.41
Peruvian fish meal	61.71	5.92	0.18

First Experiment: Evaluation of the protein quality of the golden snail meat meal on broilers.

Table 4 reveals that on the fourth week, the weights of the broilers fed cooked golden snail meat meal was significantly better than the broilers fed the raw golden snail meat meal but comparable to the broilers fed the imported fish meal. Broilers consumed the most feeds when given the imported fish meal and the lowest when given the raw golden snail meat meal. Results indicate that cooking improves the palatability of the golden snail meat meal.

Results further show that the broilers fed on the Peruvian fish meal had the best conversion ratio followed by the broilers fed on the cooked golden snail meat meal. It can be noted that the feed conversion ratio of the broilers fed on the cooked golden snail meat meal had a very close value to those fed on the imported fish meal. It implies that the cooked golden snail meat meal can be a substitute to the imported fish meal especially if the cost of preparation is cheaper than buying the imported fish meal. A cost and return analysis of the snail production and preparation is highly recommended for future research studies.

TABLE 4

Performance of birds in Experiment 1.

Parameters	FM	R.GSM	C.GSM
Weekly weights			
Initial weight (g)	41.12	39.38	39.04
Second week (g)	176.67	147.50	172.50
Third week (g)	337.58^{a}	233.33^{b}	295.00^{ab}
Fourth week (g)	583.33^{a}	368.33^{b}	500.83^{a}
Gain in weight (g)	542.21^{a}	328.95^{c}	461.79^{b}
Total feed consumption (g)	906.25^{a}	787.29^{c}	833.75^{b}
Feed conversion ratio	1.67^{c}	2.39^{a}	1.80^{b}

Treatment mean value in each row with similar superscripts are statistically comparable at 5% level using the Duncan's Multiple Range Test.

Second Experiment: Assessment of the feeding value of the golden snail meat meal.

Table 5 show the performance of birds in Experiment 2. There was no significant difference observed between groups in all parameters taken because the other feed ingredients in the formulated diets had compensated for the deficiency of nutrients to meet the requirements of the birds. The liveweight of the birds ranged from 900 grams to 1010 grams, however, the dressing rates were not taken. The results further show that the incorporation of the golden snail meat meal in broiler diets is just as good as incorporating the imported fish meal.

TABLE 5

Performance of birds fed cooked golden snail meat meal, raw snail meat meal and fish meal.

Parameters	FM	R.GSM	C.GSM
Average total gain in weight (g)	1178.17	1023.51	1103.98
Average feed consumption	2397.17	2424.81	2561.82
Average feed conversion ratio	2.03	2.41	2.33
Average liver weight (g)	2.98	2.58	2.69
Liver/Body weight ration after dressing	4.85	3.99	4.42

Conclusions and recommendations

Birds fed the fish meal had the highest feed conversion ratio followed by the birds fed the cooked golden snail meat meal.

The gain in weight of the birds fed the cooked golden snail meat meal had comparable gain in weight with the birds fed the fish meal. Results of the experiments conducted reveal that the crude protein content of the golden snail meat meal is high enough to be incorporated in broiler diets. However, the high levels of calcium and phosphorus contents may affect the nutritional values.

It is recommended that the whole snail meal be fed to other species of poultry like ducks and layers which require high amounts of calcium. Likewise, a cost and return analysis of the snail production and preparation is highly recommended for future research studies.

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Patricia M. Barcelo: Filipino, B.Sc. Assistant Professor at the Animal Science Department, Don Mariano Marcos Memorial State University, Philippines
J.R Barcelo Filipino, Ph. D . Associate Professor UPLB, College Laguna, Philipines.