PERFORMANCE AND COST BENEFITS OF WEANED GRASS-CUTTERS FED DIET CONTAINING SNAIL SHELL AS REPLACEMENT FOR OYSTER SHELL

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Abstract
A total of thirty six weaned grass-cutters of mixed sexes of mean weight of 412.23±2.6g were used for the feeding trial to assess the nutritive potential of snail shell (SS) as replacement for oyster shell in the diet of grass-cutter. Four diets were formulated to contain SS at 0% (SS_1) Control, 50% (SS_2), 75% (SS_3) and 100% (SS_4) as replacement for oyster shell in the diet of grass-cutters. Each dietary treatment was replicated thrice with 3 grass-cutters per replicate in a completely randomized design. Data were collected on feed intake, weight gain, feed efficiency and cost benefits. The inclusion of snail shell in the diet of weaned grass-cutter did not influence the weight gain (P>0.05) and the values ranged between 19.12g and 19.30g. The efficiency of feed utilization was not significantly different from one another across the treatments (P>0.05) The cost per kg feed and total feed cost reduced as the level of snail shell increased from zero to 100% in the diet. The lowest cost per weight gain per of N166.96 was reported in SS4 in which Oyster shell was totally replaced by snail shell. It could be concluded that growth performance was not significantly influenced by the inclusion of varying levels of snail shell as partial or total replacement for Oyster shell in the diet of weaned grass-cutter but reduced the feed cost.

Keywords: Cost/weight gain, grass-cutters feed efficiency, oyster shell, snail shell

Introduction

Mineral sources such as bone meal, oyster shell, limestone, calcium, phosphate and gypsum are necessary for bone formation and adequate utilization of the feed (Oluokun *et al.*, 2005; Omole and Owosibo 2006; Houndonougbo, *et al.*, 2012). Calcium is also important in cellular metabolism, blood clotting, enzyme activation and neuromuscular action. It is also very important for egg shell formation and milk secretion (Houndonougbo, *et al.*, 2012). Therefore calcium supply is very important in the nutrition of man and animal. Calcium is the key feed stuff for shell strength (Oluokun *et al.*, 2005; Omole and Owosibo 2006). Investigations has been done on the use of many sources of calcium such as gypsum, limestone and oyster shell in the diet of layers, broilers and rabbits diet (Oluokun *et al.*, 2005; Omole and Owosibo, 2006 ; Houndonougbo *et al.*, 2012) . In the feeding of Brown layer hen, Safaa *et al.*, (2008) did not find a significant effect in feed intake and feed conversion ratio when evaluating the effect of limestone and oyster shell between 58 to 73 weeks of age . Snail shell is a mineral ingredient that contain about 98% of calcium carbonate (Omole and Owosibo, 2006). It is cheap when compare with the price of bone meal, limestone and oyster shell There is paucity of information on the use of snail shell in the diet of grass-cutters hence this study assessed the nutritive potential of snail shell in the diet of grass-cutter

Materials and Method

A total of thirty six weaned grass-cutters of mixed sexes of mean weight of 412.23±2.6g were used for the feeding trial. The grass-cutters were acclimatized for one week before the commencement of the feeding trial. Snail shells were collected from the Institute of Agric.Research and Training Snailery Unit, Ibadan, Oyo state, Nigeria. The snail shells were washed, dried and ground and later incorporated with other feedstuffs. Four diets were formulated to contain SS at 0% (SS_1) Control, 50% (SS_2), 75% (SS_3) and 100% (SS_4) as replacement for oyster shell in the diet of grass-cutters. Each dietary treatment was replicated thrice with 3 grass-cutters per replicate. The diets were formulated to contain about 16% crude protein and energy of about 2600 kcalME/kg (Table 1). Each grass-cutters was given 30g each of elephant grass stem as a basal diet. Feed intake and weight gain were measured on daily and weekly basis with the use of weighing balance. Feed intake and weight gain were measured on daily and weekly basis respectively, with the use of sensitive weighing balance. Feed intake was calculated by subtracting the left-over

feed from the feed given while the weight gain was calculated by deducting the initial weight from the final weight. Feed conversion ratio was calculated as the ratio of feed intake to weight gain. Feed cost and cost per weight gain were also calculated. The prevailing market prices of the feed ingredients at Ibadan, Oyo State, Nigeria where the feed ingredients were purchased at the time of study were used to calculate the feed cost/kg feed and the cost of the feed to produce a unit weight (N/kg weight gain). The chemical composition of the test ingredient, experimental diets were carried out according to the method of (AOAC, 1990). All data were subjected to analysis of variance and where differences were observed, means were further separated using Duncan multiple range test (SAS, 2000).

Results and Discussion

The chemical composition of the experimental diet is as shown in table 2. The crude protein reported is relatively the same with protein requirement for grass-cutter as reported by (Ajasin *et al.*,2014). The calcium contents of Snail and Oyster shell were relatively similar. As reported in table 3, no significant difference was observed in the mean daily weight gain ($P>0.05$). The values vary between 82.4 and 83.11g. The inclusion of snail shell in the diet of weaned grass-cutter did not influence the weight gain ($P>0.05$) and the values ranged between 19.12g and 19.30g. The efficiency of feed utilization was not significantly different from one another across the treatments ($P>0.05$).

The results of weight gain, feed intake and feed conversion that were not significantly different among the treatments indicated that snail shell can partially or wholly replace Oyster shell. This observation was similar to the report of (Omole and Owosibo 2006) where snail shell was used to replace Oyster shell in the diet of rabbit. The zero mortality reported in all the treatments also proved that snail shell is not detrimental to grass-cutters. The daily feed intake and weight gain reported in this trial was relatively similar to the report of different authors (Ajasin *et al.*, 2014).The cost kg feed and total feed cost reduced as the level of snail shell increased from zero to 100% in the diet. The lowest cost per weight gain of N166.96 was reported in SS4 in which Oyster shell was totally replaced by snail shell. It has been reported by several authors that substituting conventional feed resources with unconventional ones normally lead to cost reduction (Omole, *et al.*, 2011;Houndonougbo, *et al.*, 2012). The same trends were observed when Oyster shell was replaced by snail shell in the diet of rabbits, broilers and laying birds (Oluokun *et al.*, 2005; Omole and Owosibo 2006; Houndonougbo, *et al.*, 2012). It could be concluded that growth performance were not significantly influenced by the inclusion of varying levels of Snails shell as partial or total replacement for Oyster shell in the diet of weaned grass-cutter. Hence Snail shell could be used as substitute for Oyster shell so as to reduce the cost of feeding.

Table 1: Gross Composition of the Experimental Diet.

Ingredient (%)	SS_1 (0%)	SS_2 (50%)	SS_3 (75%)	SS_4 (100%)
Maize	32.0	32.0	32.0	32.0
Oyster shell	8.0	4.0	2.0	0.0
Snail shell	0.0	4.0	6.0	8.0
*Others	60.0	60.0	60.0	60.0
Total	**100.0**	**100.0**	**100.0**	**100.0**
Cost/kg feed (N/kg)	**42.32**	**41.21**	**40.63**	**40.04**
Calculated analysis				
Crude protein (%)	16.13	16.13	16.13	16.13
Metabolizable energy (kcal/KgME)	2628.1	2628.1	2628.1	2628.1

*Other fixed ingredients: Wheat offal -20, BDG, 25, Fish meal -0.5, Soya bean meal -5.5, Ground nut cake-7.0, Bone meal-1.70,, Premix-0.25.

Table 2: Chemical Composition of the oyster shell, snail shell and Experimental diets on % dry matter basis

PARAMETERS	Oyster shell	Snail shell	SS_1 (0%)	SS_2 (50%)	SS_3 (75%)	SS_4 (100%)
Dry Matter	97.66	98.77	95.92	94.38	94.89	93.80
Crude Protein	0.02	0.01	16.02	16.04	16.02	16.14
Crude Fibre	0.01	0.02	11.36	11.36	11.33	11.32
Ether Extract			5.82	5.81	5.82	5.83
Ash	5.45	5.47	12.11	12.13	12.20	12.40
Ca	35.6	36.9	1.23	1.23	1.24	1.24
P	0.23	0.15	1.04	1.05	1.05	1.06
Nitrogen Free Extract			54.69	54.66	54.63	54.31

Table 3: Performance and cost benefits of weaned grass -cutter fed different levels of Oyster shell.

PARAMETERS	SS_1 (0%)	SS_2 (50%)	SS_3 (75%)	SS_4 (100%)	± SEM	Level of significance (P<0.05)
Total feed intake (g)	6921.6	6930.0	6972.0	6981.24	54.24	N.S
Daily feed intake (g)	82.4	82.5	83.0	83.11	3.21	N.S
Initial weight (g)	411.5	410.6	412.3	410.8	2.78	N.S
Final weight (g)	2017.58	2018.36	2033.50	2026.12	28.78	N.S
Total weight gain (g)	1606.08	1607.76	1621.20	1615.32	15.98	N.S
Daily weight gain (g)	19.12	19.14	19.30	19.23	1.21	N.S
Feed conversion ratio	4.31	4.31	4.30	4.32	0.41	N.S
Cost/kg feed (N)	42.32^{a}	41.21^{a}	40.63^{b}	40.04^{b}	1.01	significant
Total feed cost (N/kg)	292.85^{a}	285.59^{ab}	283.19^{ab}	279.48^{b}	4.10	significant
Cost/weight gain (N/kg)	181.89^{a}	177.39^{b}	174.81^{c}	166.96^{d}	3.01	significant

Means along rows with different superscript are significantly different from each other (P<0.05)

References

Ajasin, F.O., Omole, A.J., Okpeze, C.N., Ononogbu C.,Owosibo, A.O., Odunsi, O.O.,Oladele-Bukola, M. O. (2014) Evaluation of different varieties of quality protein maize as an energy source in grass-cutter diets *Agricultural Science Research Journal* 4(7); pp. 111-114

Fayenuwo, J.O., Akande,M, Taiwo, A.A., Adebayo, A.O., Saka, J.O., and Oyekan, P.O.(2003). Guidelines for grasscutter rearing . Institute of Agric. Research and Training Publications. 38Pgs

Houndonougbo, M F, Chrysostome, C A A M Odoulami, R C and J T C Codjia (2012) Snail shell as an efficient mineral feedstuff for layer hens: Effects and optimum rate. *Livestock Research for Rural Development 24 (9) 2012*

Oluokun, J.A, Omole, A.J And J.B. Fapounda (2005) Effect of increasing level of calcium supplementation in the diets of growing snail on performance characteristics. *Research Journal of Agriculture and biological Sciences* 1:76-79

Omole A J, Ogbosuka G E, Salako R A and Ajayi O O (2005) Effect of Replacing Oyster Shell with Gypsum in Broiler Finisher Diet. Journal of Applied Sciences Research 1(2): 245-248. http://www.aensionline.com/jasr/jasr/245-248.pdf

Omole, A.J. and Owosibo, A.O. (2006). Effect of replacing oyster shell with snail and egg shell in the diet of weaned rabbits. *Tropical Journal of Animal Science 9 (1)*: 7–10. **(Nigeria)**

Omole, A.J.; Ogunleke, F.O.; Kehinde, A.S.; Popoola, Y.A. (2011) Small & Medium Scale Grass-cutter Farming Green Choice Agric. Publications 58pgs

S.A.S. (2000). S.A.S. User's Guide. Statistical Analysis System Institute, Inc.Cary, N.C.

Safaa H M, Serrano M P, Valencia D G, Frikha M, Jiménez-Moreno E and Mateos G G (2008). Productive Performance and Egg Quality of Brown Egg-Laying Hens in the Late Phase of Production as Influenced by Level and Source of Calcium in the Diet. *Poultry Science 87: 2043-2051.*