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Research Paper

EFFECTS OF GRADED LEVELS (0, 5, 10 AND 15%) OF CASSAVA BY-PRODUCTS IN THE DIETS OF GROWING SNAILS (*Archachatina marginata* SWAISON) ON GROWTH PERFORMANCE AND CARCASS YIELD

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Abstract

A sixteen week feeding trial was conducted, with 720 growing Snails of an average weight of 65±2.00g. They were randomly allotted to sixteen treatments of 45 Snails per treatment, while each was replicated thrice. Cassava by-products such as Cassava Peel (CPL), Cassava Leaf (CL), Cassava Seviate (CS) and Cassava Chaff (CC) were included in the diets at 0,5,10 and 15% each, making 16 treatments The experimental layout was a 4×4 factorial design, to evaluate the growth performance, shell morphology and cost per gramme weight gain. The Snails were housed in wooden boxes at 0.250×.25×0.5m^3 for 15 Snails, feed and water were given ad libitum. All data collected were analyzed by procedure of SAS(1998) and means sums of square partitioned to test for liner, quadratic and cubic trends. Growth parameters like weekly weight gain and feed intake were not significantly affected by levels of inclusion. Feed conversion ratio of 6.01(CPL), 4.99 (CL), 5.09 (CS) and 5.99 (CC) were significantly varied and highly significant (P<0.01) for linear, quadratic and cubic probability, likewise the offal and shell weight. Cost of production was not significant(0,36-0.38) in all the treatments. Carcass yield conformed to standard (40.18-44.80%). All cassava by-products can be included in snail dietsup to 15%, without any deleterious effect.

Key words: Snails, Cassava, inclusion levels, Growth.

INTRODUCTION

The conventional feed of snails are mainly of plant origin i.e. fruit and leaves of pawpaw, cocoyam, sweet potato, orange, carrot, lettuce, watermelon etc. (Ejidike 2001)

In the findings of Omole(2002), it was elicited that snail performed creditably well, when fed with forages and broiler finisher diet, this resulted in enhanced feed conversion, faster growth and a carcass yield of 40-45%. The enhanced performance did

not compromise shell quality characteristics, such as shell thickness and shell length growth, which were indication of good calcium and phosphorus utilization.

Many research works carried out have shown that snails cannot subsist on forages alone, because their full performance will not be optimized. (Kehinde2009),reported reduced carcass yield and growth in snails fed on exclusive plant materials of cassava origin. This resulted in depressed carcass yield of lower than 40%. It has been diversely reported that many of the plant feed stuffs are rich in anti-nutrients,such as tannin, cyanide, alkaloids etc which are poisonous, while some are irritants (Omole 2002).

Snails in most Nigerian markets are seasonably supplied; they are only available for few months of the year, especially during the rains (Imran 2007). This has consistently led to price fluctuation, high during the dry season and low during the wet season, Snails have been at the mercy of the environment. It is very susceptible to high temperature, with accompanying high mortality and will only be available, when rainfall is moderate, high mortality is recorded in the wild, when rainfall intensity and distribution is high, resulting also in depigmentation of the flesh.

The Forestry research Institute of Nigeria has greatly invested in the domestication of Giant Land Snail, through domestication and improved nutrition, this trial attempted to evaluate the effect of inclusion of cassava by-products in the ration of Snails on growth, economy of production and shell morphology.

MATERIALS AND METHOD

The feeding trial was conducted at the Wildlife Section of the Forestry Research Institute of Nigeria, Ibadan,Oyo State, Nigeria.

GROWTH EVALUATION

A 4×4 factorial design was used and the trial lasted 16 weeks. 720 growing snails of mean weight 65±2.00g were allotted to 4 cassava by-products based diets, with CL, CC, CS and CPL incorporation at 0,5,10 and 15% each. Each treatment was replicated 3 times, with 45 snails per treatment.

The snails were reared in a cage of 0.25×0.25×0.5m^3/15 snails. Feed and water were given adlibitum.

PARAMETERS EVALUATED

The feed intake and weight gain were measured on a daily and weekly basis, with the use

of electric weighing scale, while shell length and width were measured on a weekly basis, with

the use of vernier caliper.The shell thickness was measured with a micrometer screw gauge on a

weekly basis. Records of feed conversion ratio, mortality and cost of production was carried out

using the method of (Omole2002)

DATA ANALYSIS

Data from the parameters investigated were analyzed using the procedures of S.A.S (1998). Model sum of squares were partitioned to test linear quadratic andcubic trends (Gomez and Gomez,1983).

RESULTS AND DISCUSSION

Table 1, shows the gross composition of experimental diets, the diets adopted were 16, with 0,5,10 and 15% incorporation of cassava by-products, they were tagged T_1-T_{16}. The resultant diets had 24% crude protein and 2,400 kcal/kgME, based on the recommendation of (Hamzat 2000) and (Omole2004). Diets T_1, T_2, T_3 and T_4, contained 0,5,10 and 15% cassava peel, T_5,T_6,$T_7$and T_8 contained 0,5,10 and 15% cassava leaf,T_9,T_{10},T_{11}, andT_{12} contained 0,5,10 and 15% cassava sieviate, while T_{13},T_{14},T_{15} and T_{16} contained 0,5,10,and 15% cassava chaff.

Table 2 shows proximate composition of cassava by-products based diets, which elicited the dry matter, crude protein, crude fibre, ether extract, ash and nitrogen free extract of cassava by-products (cassava peel, leaf, sieviate and chaff), and each was included at graded levels of growing snails at 0,5,10 and 15% respectively. Highest dry matter (94.92%) was obtained in T_{11} diet, with 10% CassavaSieviate inclusion, the level of crude protein (25.04-23.92%) and metabolizatile energy in the diets compared.

Table 3 had the growth performance, carcass yield, shell morphology and economy production of snails fed cassava by-products based diets. The initial body weight of the snails compared 65± 1.5g; which had a non-significant probability for linear (L), quadratic (Q) and cubic (C) trends. Highest final body weight of 154.76g was recorded for snails on cassava seviate based diet and the least 141.36g for snails on cassava leaf based diet, there was however anon significant trend for P:L, P:Q and P:C. the feed conversion ratio, offal weight, shell length increment were significantly ($P<0.05$) affected for (P:L,P:Q and P:C). Least cost was recorded (#0.35/g weight gain) was recorded for snails fed cassava leaf based diets. Best dressing percentage of 44.78 and 44.80% were recorded for CPL and CL based diets. The diets, which were cassava peel, leaf, chaff and sieviate based diets affected feed intake, with the highest value (42.00g) in snails fed cassava peel based diets. The reduced feed intake recorded for snails on cassava leaf based diets could be attributed to the reduced palatability of the feed, due to the bitterness of the cassava leaf and the elevated crude fibre contents of cassava leaf based diets. This was in consonance with the findings of Amao*et al.,* (2002).

Cassava by-products did not depress feed intake, all intakes recorded were within the range recommended by (Cobbinah, 1992). The weekly body weight gain value of 6.28± 1.16g for the treatments was within the range obtained by Ejidike and Ajileyi (2007), optimal feed conversion ratio of 4.99 was obtained for snails fed cassava

leaf based diets. The enhanced utilization of cassava leaf based diets could be attributed to the preference of Giant Land Snail for leaves and fruits (Imevbore, 1990), coupled with the enhanced gut movement due to the higher fibre content of the diets, which had been linked to improved feed utilization in monogastrics (Omole, 2002), other factors were the high level of protein in cassava leaf and its high level of balanced amino acids. The outcome of the trial revealed enhanced dressing percentage and the inclusion of cassava by-products in the of snails feed did not depress dressing percentage, this agrees with the findings of Oredein et al., (2003), when growing snails were fed dry feed, supplemented with agro-by-products. Generally, dressing percentage of snail was low when compared to other conventional livestock (Shoremi et al., 2001 and Nyako and Mogaji, 2001)

Shell morphological parameters, such as shell length, and width increment were highest ($P<0.05$) in snails fed with cassava leaf based diets, attributable to the optimal feed conversion ratio in the treatment and the superior nutritional quality of cassava leaf, followed by snails fed with cassava peel based diets. Mogaji (2001) was of the opinion that snails fed cassava peel based diets performed better than those on the pulp, due the slightly.

Generally the outcome of this trial has revealed that growing Snails utilized the four cassava by-products, their incorporation reduced cost, minimize mortality, enhanced growth and carcass yield. Farmers are enjoined to adopt the diets.

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Table 1: Gross Composition of Experimental Diets Fed to Growing Snails.

	TREATMENT															
Ingredients%	T_1	T_2	T_3	T_4	T_5	T_6	T_7	T_8	T_9	T_{10}	T_{11}	T_{12}	T_{13}	T_{14}	T_{15}	T_{16}
Maize	22.60	21.60	21.10	21.10	22.50	22.50	19.50	17.50	23.50	22.25	21.10	20.75	22.50	22.25	21.10	21.10
Maize offal	10.00	9.00	9.00	7.00	13.50	13.50	13.50	13.50	10.00	8.35	7.50	4.50	10.00	8.35	7.50	4.50
Wheat offal	10.60	7.10	4.10	1.10	10.60	8.60	6.60	6.80	9.60	7.10	2.10	1.10	10.60	7.10	2.10	1.10
Palm kernel cake	5.00	5.00	3.50	1.10	5.00	5.00	8.00	8.00	5.00	5.00	5.50	2.00	5.00	5.00	5.50	2.00
Soya bean cake	25.70	22.10	22.10	22.00	22.20	18.70	15.20	13.00	25.70	22.10	25.10	14.95	25.70	22.10	25.50	25.50
Groundnut cake	10.00	12.10	14.00	16.50	10.00	11.00	11.50	10.00	14.00	12.10	12.10	14.95	10.00	14.00	12.10	14.60
Fish meal	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
Oyster shell	9.70	9.70	9.70	9.70	9.70	9.70	9.70	9.70	9.70	9.70	9.70	9.70	9.70	9.70	9.70	9.70
Bone meal	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15
Grower premix	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15
Salt	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Cassava peel	0.00	5.00	10.00	15.00	-	-	-	-	-	-	-	-	-	-	-	-
Cassava leaf	-	-	-	-	0.00	5.00	10.00	15.00	-	-	-	-	-	-	-	-
Cassava sieviate	-	-	-	-	-	-	-	-	0.00	5.00	10.00	15.00	-	-	-	-
Cassava chaff													0.00	5.00	10.00	15.00
Total	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Calculated nutrient composition																
Crude protein	23.98	23.45	23.34	23.38	23.99	23.93	23.99	23.92	24.13	24.11	24.09	24.19	23.92	23.90	24.10	24.09
Energy (kcal/kg M.E)	24.00	23.99	24.01	23.90	24.03	24.15	24.12	24.13	24.03	24.10	24.09	24.12	24.03	24.13	24.10	24.09

Table 2: Gross Composition of Experimental Diets Fed to Growing Snails.

PARAMETERS																
PARAMETERS %	**CASSAVA PEEL**				**CASSAVA LEAF**				**CASSAVA SIEVIATE**				**CASSAVA CHAFF**			
	T 1	T 2	T 3	T 4	T 5	T 6	T 7	T 8	T 9	T 1 0	T 1 1	T 1 2	T 1 3	T 1 4	T 1 5	T 1 6
Dry Matter	92.15	92.83	92.45	93.01	90.49	90.14	90.26	89.68	94.92	93.34	94.15	93.20	89.42	87.64	89.01	88.41
Crude Protein	23.98	23.45	23.34	23.38	23.62	23.65	23.36	23.38	23.95	23.85	23.80	23.92	23.84	23.04	23.56	23.89
Crude Fibre	6.45	6.62	6.91	6.97	6.84	9.98	10.04	11.82	7.88	7.95	8.01	10.11	8.34	8.38	8.41	8.48
Ether Extract	3.48	3.31	3.26	3.18	0.46	0.76	1.18	1.07	4.98	4.92	4.89	4.81	4.96	4.80	4.71	4.62
A s h	8.94	8.96	8.71	8.65	4.28	10.86	16.13	16.89	10.98	10.98	10.79	10.74	11.47	11.38	11.25	11.08
Nitrogen Free Extract	57.15	57.86	57.78	57.84	55.29	44.89	39.55	36.52	53.01	53.19	53.51	53.72	51.39	52.40	52.07	51.65

Table 3: Treatments (Diets) Effects on the Growing Performance, carcass Yield, Shell Morphology and Economy Production of Snails Fed Cassava By-Products (CBPS).

PARAMETERS	TREATMENTS				PROBABILITY					
	T_1 (CPL)	T_2 (CL)	T_3(CS)	T_4(CC)	SEM	L	Q		C	
Initial body weight (g)	65.00	66.00	65.50	66.50	1.50	N	S	N	S	N	S
Final body weight (g)	148.88^{b}	141.36^{d}	154.78^{a}	145.82^{c}	2.05	N	S	N	S	N	S
Weekly body weight gain (g)	6.99	6.28	7.44	6.61	1.39	N	S	N	S	N	S
Weekly feed intake (g)	42.00	31.37	37.88b	3954b	2.69	N	S	N	S	N	S
Feed conversion ratio (g)	6.01^{a}	4.99^{b}	5.09^{b}	5.99^{a}	0.05	X	x	x	x	x	x
Dressing percentage (%)	44.78^{a}	44.80^{a}	42.05^{b}	40.18^{c}	0.09	N	S	x	x	X	x
Offal weight (%)	22.88^{d}	23.91^{c}	29.67^{a}	27.00^{b}	0.21	X	x	x	x	X	x
Shell weight (%)	32.47^{a}	31.29^{c}	28.28^{d}	32.19^{b}	0.07	X	x	x	x	X	x
Shell thickness increment (mm)	0.11	0.12	0.13	0.12	0,20	N	S	N	S	N	S
Shell length increment (mm)	0.25^{b}	0.70^{a}	0.26^{b}	0.20^{b}	0.09	X	x	x	x	X	x
Shell width increment (mm)	8.27^{b}	10.50^{a}	7.29^{c}	7.74^{c}	1.50	N	S	x		N	S
Mortality	-	-	-	-	-	-	-		-		
Cost/g weight gain (N)	0.38	0.35	0.36	0.36	0.20	N	S	N	S	N	S

NS = Not Significant
x = (P<0.05)
xx = (P<0.01)

CP = Cassava Peel
CL = Cassava Leaf
CS = Cassava Seviate
CC = Cassava Chaff.