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Performance and Cost Evaluation of Substituting Rubber Seed Cake for Groundnut Cake in Diets of Growing Pigs

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Abstract: Thirty six weeks old (Large white X Landrace) hybrid weaner pigs (fifteen females and fifteen males) were used in a 12-week experiment to determine the cost effectiveness of substituting rubber seed cake for groundnut cake on the growth rate of weaner pigs. Graded levels of rubber seed cake (0%, 25%, 50%, 70% and 100%) replaced corresponding levels of groundnut cake in five Iso-Nitrogenous and Iso-caloric treatments (A, B, C, D and E) respectively which were further replicated three times in a completely randomized design. Feed and water were supplied *ad libitum* to the experimental pigs while medication (wormers) were administered to maintain good health. Feed intake was recorded everyday while body weight was taken every week in all the treatments. The average weight of pigs at eighteen (18) weeks were 40.30^{c}, $41.70b^{c}$, 39.30^{c}, 41.80^{b} and 47.20^{a} for treatments A, B, C, D, E respectively while the average feed cost (naira) per kilogram of pork gained were N86.95a, N77.47b, N84.04a, N68.00bc and N56.56c for treatments A, B, C, D, and E respectively. Results showed that treatment E had both significantly ($P<0.05$) higher weight gain and lowest cost of production.

Key words: Growing pigs, rubber seed cake, groundnut cake

Introduction

The race to feed an exploding Nigerian human population in the next 50 years will be won if the conventional methods of food production are improved. This need is more critical in the animal protein component which needs an immediate bridge of the demand and supply gap. Sub-optimal animal protein supply is consequently blamed on high cost of livestock production, which Agbakoba *et al.* (1995) have rated at over 70% of total cost of production of monogastric species while energy and protein sources constitute 50%. The high cost of feed is sequel to the competition between man and livestock for these feed ingredients. The search for cheaper alternative sources of feed is imperative if livestock products will be optimal to resolve the present animal protein deficit at affordable prices and therefore save Nigerians from imminent malnutrition. One of such cheap alternative feeding stuffs for all classes of livestock and poultry is the rubber *Hevea brasilliensis* seed cake (RSC).

The seed of para-rubber tree is a potentially available feed raw material which has received scanty research attention in recent years (Fetuga, 1975; Oluyemi *et al.*, 1975; Babatunde *et al.*, 1991 and Achienewhu, 1982). Research results (Oluyemi *et al.*, 1975) indicate that Nigeria para-rubber seed is high in oil contact (49.49%), phosphorous (0.82%) and rich in essential amino acids like L-Lysine (3.60%) and Methionine (1.4%). On the other hand, the groundnut cake has a crude protein level of 42% and digestibility of 45-48% (Ulimen, 1993; Close and Menke, 1986). But whereas rubber seed cake sells for between N12,000 to N14,000 per metric tonne, groundnut cake sells for between N36,000 and N38,000 per metric tonne.

Achinewhu (1982) reported the existence of 1.2% of crude saponin in rubber seed but was quick to conclude that soyabean meal containing a higher (2.4%) saponin level has successfully been used for decades in poultry nutrition without adverse effects. Ononogbo (1998) also reported the presence of anti-nutritional factors like Tannin 4.23%, trypsin inhibitor 0.422 units, phytate $3.7x10^{-4}$g/ml. However, Offiong and Olumu (1990) had confirmed that these anti-nutritional factors are heat labile and are reduced to an insignificant non-toxic level when either toasted (105^{o}) or stored for 4 – 6 months before processing (Anonymous, 1975).

Materials and Methods

Thirty six-week old weaner pigs (land race x large white crossbred) procured from CABO piggery farm Okija in Anambra State of Nigeria were used in a twelve week experiment conducted in the same farm.

The pigs were reared in pens of 3m x 3.6m with dwarf walls 1.05m high and 1.2m passage between two rows of nine pens on each row. The pens were of hard free draining concrete floor. Para-rubber seeds were procured from local suppliers. The seeds were toasted for ten minutes at 50^{o}C to ease decortication. Decorticated seeds were subjected to another round of toasting for ten minutes at 100^{o}C-105^{o} before milling and extraction of oil via a hammer mill and expeller press respectively. Toasting of decorticated seeds boasted the expulsion of oils and as well destabilized the anti-nutritional factors in the seed. Other feed

Table 1: Composition of Experimental rations

Ingredients	Treatments (Dietary Levels)				
	A	B	C	D	E
GNC	10	7.5	5	2.5	0
RSC	0	2.5	5	7.5	10
Cassava chips	24	24	24	24	24
Soyabean meal	4	4	4	4	4
Palm Kernel Cake	14.5	14.5	14.5	14.5	14.5
Deoiled PKC	15	15	15	15	15
Brewers spent grain	20	20	20	20	20
Fish mill	5	5	5	5	5
Oyster shell	3	3	3	3	3
Limestone	3	3	3	3	3
L-Lysine	0.55	0.55	0.55	0.55	0.55
Common salt	0.30	0.30	0.30	0.30	0.30
Premix (PG)	0.25	0.25	0.25	0.25	0.25
Total	100	100	100	100	100
Feed cost/kg (N)	15.22	14.52	13.82	13.12	12.42
Calculated CP (%)	16.54	16.24	15.91	15.59	15.26
ME Kcal/kg	2289.73	2333.3	2376.3	2419.63	2462.93

Table 2: Proximate Analysis of Decorticated Rubber Seed Meal

Ash	6.21%
Ether extract	10.12%
Crude fat	5.09%
Fibre	4.20%
Crude protein	32.98%
Moisture	5.8%
ME Kcal/kg	4280
Anti-Nutritional Studies	
Tannin	4.23mg
Trypsin inhibitor	0.432 units (trace)
Amylase	1.14g/kg
Cyanogenic glucose	not detected
Agemaglutinin	not detected.

Source: Eneh, 1998.

ingredients were procured from reliable outfits, crushed where necessary and mixed according to the formula as shown in Table 1.

The pigs were randomly allocated to 15 pens (3 in each) dewormed with Levaniisole, wormer, and placed on stabilization ration (conventional grower ration) for one week. At the end of one week, the initial body weight was taken and thereafter placed on diets A, B, C, D, and E with rubber seed cake replacing groundnut cake.

The pigs were fed *ad libitum* and left over feed was collected the next morning, sun dried, weighed and recorded. Feed intake was calculated by subtracting the feed remains from the quantity supplied while feed efficiency was calculated by dividing feed intake by weight gain and multiplying by 100. Water was also provided *ad libitum*. All the pigs were weighed every seven days before the day's feeding. Data collected were subjected to one way analysis of variance and means were separated, using Duncan's multiple range test according to Steel and Torrie (1980).

Results and Discussion

The results of the performance, feed and cost components of the experimental pigs are presented in Table 3. From this table, the average daily weight gain for pigs on E diet (278.02g) was significantly ($P<0.05$) higher than that of diet D pigs (241.76g) while D pigs scored higher than the diet B pigs (228.60g). Pigs on A and C diets had significantly similar growth rates (210.0g and 207.70g) ($P>0.05$).

The total weight gained during the 12 weeks period (relative growth rate), and the average weekly weight gain followed the same trend as the average daily growth rate.

No significant ($P>0.05$) difference was observed for the average daily feed consumption though the diet E pigs consumed their feeds faster than all the other treatment pigs. This must be due to the inviting aroma of rubber seed cake.

Feed cost per kilogram was highest ($P<0.05$) for pigs on diet A while diet E had the lowest cost/kg with B, C and D in that order. Feed cost/kg of feed decreased as RSC replaced GNC in the order A>B>C>D>E due to the wide margin between the market prices of GNC (N36,000/ton) and RSC (N12,000/ton).

Feed efficiency was highest for E pigs (21.96%) followed by D pigs (19.29). Means within the same row with different subscripts (a>b>c) are significantly ($P<0.05$) different and lowest ($P<0.05$) for the C pigs (16.50).

Feed cost per kilogram of pork produced was lowest for pigs on diet E pigs (N56.56/kg) and highest for A pigs

Table 3: Growth parameters of weaner pigs fed different combinations of GNC and RSC

Parameters	A	B	C	D	E
Initial body wt (kg)	21.20^{b}	20.90^{c}	20.40^{c}	19.80^{c}	21.90^{a}
Final body wt (kg)	40.30^{c}	41.70^{c}	39.30^{c}	40.80^{c}	47.20^{a}
Average total wt gain (kg)	19.10^{c}	20.80^{bc}	18.90^{c}	22.00^{b}	25.30^{a}
Average daily wt gain (gm)	210.0^{c}	228.60^{bc}	207.70^{c}	241.76^{b}	278.02^{a}
Average weekly gain (gm)	1.47^{c}	1.60^{b}	1.45^{c}	1.69^{b}	1.95^{a}
Total feed intake (kg)	109.20^{c}	111.93^{b}	114.66^{a}	113.75^{a}	115.57^{a}
Avg. daily feed consumption (kg)	1.20^{a}	1.23^{a}	1.26^{a}	1.25^{a}	1.27^{a}
Avg. feed cost/kg (naira)	15.22^{a}	14.52^{b}	13.82^{bc}	13.12^{bc}	12.42^{c}
Feed efficiency	17.50^{bc}	17.10^{bc}	16.50^{c}	19.29^{b}	21.96^{a}
Feed cost per kg of pork (naira)	86.45^{a}	77.47^{b}	84.04^{a}	68.00^{bc}	56.56^{c}

(N86.95/kg). The feed cost for C pork was also high (N84.04/kg). D port (N68.00/kg) though next to E pork (N56.56/kg) in cost is significantly ($P<0.05$) more expensive than the later. The cost of the pork/kilogram was heavily dependent on the cost of feed since there was no significant ($P>0.05$) difference between the treatment groups in average daily feed consumption.

Conclusion and recommendation: From the results of this study, pig grower rations compounded with upto 10% RSC will not only finish pigs at a faster rate but will also produce pork at a cheaper rate for consumers. The current scarcity and high cost of livestock feeds call for a search for cheap local raw materials that could be profitably used in feeding livestock. The results of this study point to the fact that RSC happens to be one of such. The study shows that 10% inclusion rate of RSC is beneficial to pig production in terms of faster weight gain and cost effectiveness.

Rubber seed cake has been evaluated and accepted as a good component of livestock feeds in other parts of the world especially South East Asia. Chandrasiri (1992) had published data to prove that since 1969, Indonesian pig farmers have been using upto 50% RSC in compounding their pig ration.

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