



EFFECT OF GRADED LEVELS OF CASSAVA SIEVIATE/PALM KERNEL CAKE MIXTURES ON THE PERFORMANCE OF WEANER PIGS

¹Moseri, H., ²Umeri, C. and ¹Oseghale, P. E.

¹Department of Animal Science,
Ambrose Alli University Ekpoma, Edo State, Nigeria.

²Department of Agricultural Education,
College of Education Agbor, Delta State, Nigeria.

Corresponding Authors' E-mail: mosierihillary@gmail.com **Tel:** +23408059138901

ABSTRACT

A twelve-week feeding trial was conducted to determine the effect of graded levels of cassava sieviate/palm kernel cake mixture on the performance of weaner pigs. The mixture was achieved on one to one basis between cassava sieviate and palm kernel cake. The mixture replaced maize at 0 (control), 25, 50 and 75% and designated A, B, C and D and was replicated twice. Thirty two (32) large white x land race crossbred weaner pigs of mixed sexes were randomly allocated to the four diets in a completely randomized design at four animals per diet. Feed and water were made available as required. Average feed intake was significantly higher ($p < 0.05$) on the control (3.82kg/day) than on diets B (3.32), C (3.39) and D (3.67 kg), respectively. Intake on diet D was significantly higher than on diets B and C. Average weight gain was significantly higher ($p < 0.05$) on diet A (2.78 kg) than on diets C (2.61) and D (2.43 kg) only. Feed conversion ratio was significantly better ($p < 0.05$) on diet B (1.89) than on the other diets (A, 2.38; C, 2.32; D, 2.50), respectively. However, the value on diet D was better than on diet C. Protein efficiency ratio (PER) was better on diet B (2.60) than on diets C (2.30), A (2.06) and D (1.93), respectively. Final body weight was significantly higher on diet A than on diets C and D only. Therefore, animals on diet B had comparably better performance than the control and the other diets and so diet B (25% of maize replaced by cassava sieviate/pc mixture) is recommended.

Keywords: Cassava sieviate, palm kernel cake mixture, Pigs, Weight gain, Weaner.

INTRODUCTION

Nigeria is presently facing serious challenges posed by political insurgencies such as herdsmen attacks, Boko Haram issues and natural disasters like flooding that have devastated her agriculture produce in the country. This has forced the price of conventional feed ingredients to rise. However, it becomes paramount to search for underutilized crops and their byproducts that have less competition with man for food. Cassava (*Manihot esculenta*) is an all-season crop of the humid tropics and ranks among the top 10 food crops in the world (Oyebimpe *et al.*, 2006). It is one of the highest suppliers of carbohydrates among staple crops (FAO, 1995). Annual production estimated in Nigeria was put at 34 million tonnes in 2002 (FAO, 2002). Cassava roots contain 30 to 40% dry matter, more than most roots and tubers. It is estimated that about 40% is used as animal feed and in the industries (Oboh, 2016). Cassava sieviate is a byproduct of garri production derived from cassava, a popular West African staple food. Harvested tubers are processed by peeling, crushing, fermenting and pressing to reduce moisture, before frying to produce garri. The left over materials after sieved or sales in the market is the cassava sieviate. The sieviate represents about 15-17% of the root (Nwokoro *et al.*, 2005).



The erratic increase in the cost of conventional ingredients has posed serious problems on the cost of raising animals most especially pigs. Therefore, it becomes necessary to investigate locally available, cheaper, alternative sources of energy for commercial pig enterprise in Nigeria. This study evaluated the effect of graded levels of cassava sieviate or palm kernel cake (pkc) mixture on the performance of weaner pigs.

MATERIALS AND METHODS

Experimental Site

The research was carried out at the piggery unit of the teaching and research farm, Faculty of Agriculture, Ambrose Alli University, Ekpoma. The farm is located in Esan West Local Government Area Council of Edo State, Nigeria; with an annual rainfall of 1500-2000mm per annual. Relative humidity is 75% and average temperature is 32⁰C.

Source of Test Materials

The cassava sieviate and palm kernel cake were obtained from the reputable garri processors and markets within Ekpoma town. Other ingredients for the research were purchased from recognized animal feed dealers in Benin City and its' environ.

Experimental Diet

Equal weights of each test material (cassava sieviate, palm kernel cake) were mixed together at the ratio of 1:1 to achieve a homogenous blend. Four diets containing graded levels of cassava sieviate/palm kernel cake mixture and replacing maize at 0 (control), 25, 50 and 75% and tagged A, B, C and D, respectively, were formulated. The crude protein content of the diets increased slightly from 18.58 to 18.92% as the content of the feed material increased in the diet. The diets contained 3256.86 (A), 3262.90 (B), 3210.98 (C) and 3188.04kcal/kg ME (D), respectively.

Experimental Animals Design, Housing and Management

A total of 32 large white x land race crossbred weaner pigs were used for the study. The piggery units is a modified Danish type of house, with central passage and open exercise yards, the main structural features of the house is low walls of 1.2m, over which are wooden frames and supporting roof. The roof was made up of asbestos, ideal for heat insulation and protection from the effect of direct solar radiation and control of thermal stress. The pigs were housed on a concrete floor pen, each of which had a concrete in-built water trough and feeding cubicles. The pigs had initial weight ranged from 8.5-8.19kg/pig. The animals were randomly allocated into four diets with four animals (2 male and 2 female) per diet in a completely randomized design (CRD). The weaner pigs were fed twice daily and water supplied *adlibitum* for twelve weeks.

Method of Data Collection

Data on feed intake and weight gain were collected in the course of the study. A known quantity of feed was provided and the corresponding left over recovered and quantified. The difference between what was given and the left over divided by the time interval is the daily feed intake. Pigs from each group were weighed at the beginning and thereafter weekly to determine the body weight. The difference between the initial and final body weight is the weight gain. Feed conversion ratio is the ratio of feed intake to the gain in weight. Protein efficiency ratio (PER) is the ratio of weight gain to the protein consumed.

Economics of Production

The price of the feed ingredients at the time of the experiment was used to estimate the cost of the production namely Cost of feed per kg (₦), cost of feed per unit weight gain (₦), total cost of production including, cost of pigs (₦), feed, labour, housing, medication. Total



revenue: revenue per pig (₦). The gross margin, that is, total cost of production per pig minus total revenue per pig.

Statistical Analysis

The data collected were analyzed using SAS (2003) package, and differences between treatment means were separated using Duncan’s New multiple range test as outlined by Obi (2002).

Table 1: Composition of Experimental Diet for Weaner Pigs

Table with 5 columns: Parameters, 0 A, 25 B, 50 C, 75 D. Rows include Maize, Cassava sieviate/pkc, Groundnut cake, Fish meal, Wheat offal, Palm oil, Bone meal, Limestone, Salt, Premix*, Total, Calculated composition, Cp (%), ME (kcal/kg), Calcium (%), Phosphorus (%), Feed cost (₦/Kg).

*Premix supplied per kg diet 4,000,000 I.U Vit.A, 800,000 I.U Vit. D3, 12,000 I.U Vit E, 0.80g Vit K, 0.60g Vit B1, 2.0g Vit B2, 1.40 g pantothenic acid, 20.00mg biotin, 0.40g folic acid, 120.0g choline chloride, 8.0g zinc 40.0g manganese, 20.0g iron, 18.0g zinc, 0.80g copper, 0.60g iodine, 0.09g cobalt, 0.04g selenium, 36.0g lasalocid (Avatec). PKC = Palm Kernel Cake, C.P. = Crude protein, ME = Metabolizable energy.

RESULTS AND DISCUSSION

Performance Characteristics of Weaner Pigs Fed Graded Levels of Cassava Sieviate/Palm Kernel Cake Mixture

The performance characteristics of weaner pigs as shown in Table 2, indicated that final weight, total weight gain, average weekly weight gain (kg), feed conversion ratio and protein efficiency ratio of weaner pigs were significantly (P< 0.05) affected by the experimental diets. The final weight gain of the weaner pigs was highest on 0% inclusion, followed by 25, 50 and 75% with respective values of 25.00, 24.00, 23.00 and 21.50 kg. Total weight gain values recorded a highest value on 0% (16.69 kg) and lowest 75% (13.90 kg). However, average weekly weight gain followed a similar pattern. Highest feed intake was observed in 0% cassava sieviate/pkc meal. However, 25 and 50% were statistically the same in values. Feed conversion ratio values of 2.38, 1.89, 2.32 and 2.50 for control (0%), 25, 50 and 75%, respectively, significantly (P<0.05) differed from each other. Protein efficiency ratio



were significantly (P<0.05) influenced by the experimental diets, highest value was recorded for 25% (2.60) diet, followed by 50 (2.30), 0 (2.06) and 75% (1.93). Average values for final weight, total weight gain and weekly weight gain decreased as the percentage of cassava sieviate/pkc mixture increased. This result is in conformity with report by Nodigha et al. (1995) and Ekwe et al. (2011) that recommended 20% cassava sieviate/palm kernel cake mixture as a replacement of maize in growing rabbits and stressed that higher levels of inclusion above 40% reduced growth performance compared to maize diet. Amaefuele et al. (2006); Ekenyem (2007) posited inclusion of cassava by-product above 60% also has a deleterious effect on the performance of weaner pigs. The depressed in the body weight gain of weaner pigs with increased graded levels of cassava sieviate/pkc mixture diets were ascribed to the fibre and techniques used in processing of cassava sieviate/pkc mixture meal. However, the experimental diets have showed that higher inclusion of cassava sieviate/pkc above (50%) reduced growth rate compared to maize based diet but the unit of feed to weight gain remained in favour of cassava sieviate/pkc meal utilization.

Table 2: Performance Characteristics of Weaner Pigs Fed Graded Levels of Cassava Sieviate/Palm Kernel Cake Mixture

Table with 6 columns: Parameters, Levels of Inclusion (0, 25, 50, 75), and SEM (±). Rows include Av. initial wt, Av. final wt, Av. total wt, Av. weekly wt gain, Av. weekly feed intake, Feed conversion ratio, and Protein efficiency ratio.

a, b, c, d means along the same row with different superscripts are significantly (P< 0.05) different from each other, Ave: Average, SEM = Standard error of mean.

Economics of Production of the Weaner Pigs Fed Graded Levels of Cassava Sieviate/Palm Kernel Cake Mixture

Economics of production of the weaner pigs fed experimental diets presented in Table 3, indicated that average total feed intake (kg) was highest in maize control diet, followed by 75, 50 and 25% with corresponding values of 45.84, 44.04, 40.68 and 39.84kg respectively. Feed cost per gain of the weaner pigs was highest in diet A (281.58) and lowest in diet B (200.17). Total cost of production per pig live weight gain values of ₦4519.25, ₦3516.05, ₦3169.82 and ₦3136.20 for diet A, B, C and D, revealed that maize based diet gave the highest value and lowest value was 75%. Total revenue per pig (₦) ranged from ₦8345.00 in diet A to ₦6595.00 in diet D. Gross margin per pig (₦) shows that diet B (₦4388.95) yielded the highest, followed by C (₦4080.18), A (₦3825.75) and D (₦3458.80) with the lowest value. Feed cost per gain, total cost of production (₦/kg) and total revenue per pig (₦) live weight gain (kg) decreased as the levels of inclusion of the experimental diets increased. Gross margin per pigs (₦) was better in diet B (₦4388.95) compared to other diets C (₦4080.18), A (₦3825.75) and D (₦3458.80) respectively. This is in accordance with earlier reports of Adesehinwa et al. (2011); Oboh et al. (2014); Oboh (2016) that stressed a surrogate of cassava by-product for



maize up to 50% level in a weaner pigs diet without any adverse effect on the performance and economic of production. However, cassava sieviate/pkc mixture at 25% diet has successfully replaced maize in a weaner pigs diet, most especially during scarcity.

Table 3: Economics of Production of the Weaner Pigs Fed Graded Levels of Cassava Sieviate/Palm Kernel Cake Mixture

Table with 5 columns: Parameters, Levels of Inclusion (%), 0, 25, 50, 75. Rows include Average total Feed intake /pig (kg), Feed cost/gain (₦/kg), Total cost of production, Total revenue/pig (₦), and Gross margin/pig (₦).

CONCLUSION AND RECOMMENDATIONS

This study revealed that at 25% inclusion of cassava sieviate/pkc mixture replacement of maize in the diets of weaner pigs has showed a better performance and economics of production. This indicates that cassava sieviate/pkc mixture can successfully replace maize up to the above level in weaner pig diets without any adverse effect on growth performance and economic of production.

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