



The Effect of Feeding Cassava Peels Meal and Palm Kernel Cake (PKC) Mixtures on the Productive Performance of Grower Pigs.

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Abstract

The study was carried out for a period of ten (10) weeks at the piggery unit of the Teaching and Research Farm of the Faculty of Agriculture, Ambrose Alli University, Ekpoma, Edo State, Nigeria. The objective of this study was to assess the effect of feeding cassava peels meal and palm kernel cake (PKC) at 50:50 ratio on the performance of grower pigs. The performance of grower pigs were determined using forty (40) grower pigs of large white breed. The pigs were divided into 5 groups based on average initial weight (20-25kg) and each group of grower pigs were respectively allocated to each of the five treatment diets in a Completely Randomized Design (CRD). During the feeding trial, weekly feed consumption and weight changes were recorded for all the treatments, while weekly weight gain, feed conversion ratio and protein efficiency ratio were estimated to assess performance of the grower pigs. The results from the study showed significant ($p < 0.05$) differences for the performance characteristics of grower pigs and this indicate that increased inclusion of cassava peels/PKC mixture in diets for grower pigs invariably led to reduction in the cost of feed but the 25% level of replacement for maize resulted in the higher revenue of N1517.62 per pig and this therefore proved to be the most suitable formulation.

Keywords: Productive performance, Grower pigs, Cassava peels, Palm kernel cake

Introduction

The extremely high prices of conventional feed ingredients in Nigeria has increased the feeding cost to about 60-80% of the total cost of intensive livestock production especially for poultry and pigs (Oboh, 2016). However, the exploitation of the full potentials of alternatives (local roots, tubers and their by-products including other under-utilized energy sources) can only be adjudged after detailed nutritional evaluation. In this respect cassava peels and palm kernel cake deserve considerable attention. The successful use of these roots and their by-product as feedstuff for animals may reduce the over dependence on the well-known grain such as maize and sorghum as energy sources. This may eventually result to a decrease in the cost of energy sources and compounded livestock feeds.

Studies have shown that the cost of energy feed ingredient for conventional feed production is on the increase unconditionally (Aro *et al*, 2013). It is hoped that the nutritional status of cassava peels meal and palm kernel cake mixture will make a possible replacement of energy sources in pig diets. This will awaken the consciousness of pig farmers on the need to exploit the readily available cassava peels meal and palm kernel cake in their environment.

The objective of this paper is to assess the effect of feeding cassava peel meal (CPM) and palm kernel cake (PKC) mixture at a 50:50% (1:1) ratio on the performance of grower pigs.

Materials and Methods

The research was carried out at the piggery unit of the Teaching and Research farm of the Faculty of Agriculture, Ambrose Alli

University, Ekpoma. The Farm is located in Esan West Local Government Area Council of Edo State, Nigeria; with an average annual rainfall of 1500-2000mm per annual. Relative humidity is about 75% and average maximum temperature is 32°C. The study lasted for a period of ten weeks. A total of 40 grower pigs of large white breed were used for the study. The pigs were allocated to 5 treatment groups based on average initial weights (20-25kg). The pigs were allocated to each of the five treatment diets in a completely randomized design (CRD). Each treatment group contained 2 replicates of 4 pigs (2males and 2females). These pigs were fed twice daily and water supplied *adlibitum*. The treatment diets contained the following levels of cassava

peels/PKC mixture at 0, 25, 50, 75 and 100% replacing of maize. The 50:50 ratio of cassava peels and palm kernel cake at by weighing (kg) equal parts of the two test ingredients in the diet using a manual scale. All the diets were formulated to be iso-nitrogenous and iso-caloric.

During the feeding trial, weekly feed consumption were recorded while weight gain, feed conversion ratio and protein efficiency ratio were calculated as indicated in the productive performance of the grower pigs. All data collected were analyzed using SAS (2003) package and difference in treatment means were separated using Duncan's Multiple Range Test (Duncan, 1955) as outlined by Obi (2002).

The formula for calculating the different parameters were:

- i. Feed intake = Feed given – Feed left over
- ii. Feed conversion ratio = $\frac{\text{Feed Consumed (kg)}}{\text{Weight gain(kg)}}$
- iii. Total Weight gain = Final weight - Initial weight
- Protein efficiency ratio = $\frac{\text{Gain in weight}}{\text{Protein consumed.}}$

Results

Performance characteristics of grower pigs fed the diets containing graded levels of cassava peels meal and PKC mixture are shown in Table 2. Average initial weight of the grower pigs were 23.84, 25.67, 22.00, 21.50 and 20.80kg for diets 1, 2, 3, 4 and 5 respectively while the average final live weights ranged from 42.25kg in diet 1(0%) to 32.75kg in diet 5(100%). Total weight gain were significantly ($P<0.05$) affected by the experimental diets. Pigs fed control diet had the highest weight gain of 18.41kg/pig. There were no significant difference ($P>0.05$) between weight gain of pigs fed 50 and 75% levels of cassava peels and PKC mixtures. Similarly, 75 and 100% levels of inclusion were statistically the same. The values were 13.00, 12.25 and 11.91kg respectively. Weekly weight gain values were

also significantly ($P<0.05$) differed from control diet 1 (2.63kg), and diets 2, 3, 4 and 5(2.10, 1.86, 1.75, 1.70kg) respectively. Feed intake were also significantly ($P<0.05$) affected during the growers phase. Highest feed intake was in the group fed 0% cassava peels/PKC meal mixtures. Feed conversion ratio obtained for treatment 1, 2, 3, 4 and 5, have corresponding values of 2.61, 2.94, 3.31, 3.40 and 3.52, which measures the amount of feed required to produce one kilogram gain on a grower pig live weight. Pigs on the control diet significantly ($P<0.05$) gained more weight than the other treatments. Protein efficiency ratio of the growing pigs were significantly ($P<0.05$) affected by the diets. The values were 2.26, 1.97, 1.78, 1.72, and 1.67 for diets 1, 2, 3, 4 and 5. Pigs fed treatment 5 diet has the lowest, and this decreased



Table 1: Composition of Experimental Diets for Growers Pig Inclusion Levels of CPM and PKC Mixtures.

Ingredients	0	25%	50%	75%	100%
Maize	45.00	33.75	22.50	11.25	---
Cassava peels/PKC	---	11.25	22.50	33.75	45.00
Ground Nut Cake	18.87	20.0	21.13	22.28	23.42
Wheat Offal	30.83	28.70	27.37	26.02	24.68
Bone Meal	1.50	1.50	1.50	1.50	1.50
Limestone	2.00	2.00	2.00	2.00	2.00
Palm Oil	1.00	2.00	2.20	2.40	2.60
Growers Premix*	0.25	0.25	0.25	0.25	0.25
Salt	0.35	0.35	0.35	0.35	0.35
Ronozyme**	0.20	0.20	0.20	0.20	0.20
Total	100.00	100.00	100.00	100.00	100.00
Calculated Analysis:					
Crude Protein (%)	17.18	17.27	17.66	17.84	17.93
ME(Keal/Kg)	2824	2804	2783	2761	2739
Fibre (%)	5.07	6.72	8.37	10.01	11.64
Ash (%)	5.88	9.00	12.16	15.39	18.62
Calcium (%)	0.80	0.80	0.80	0.80	0.80
Starch (%)	40.15	37.04	33.91	30.77	27.62
Fat (%)	6.21	7.47	8.72	9.97	11.23

*Grower Premix supplied the following per kg diet: Vit A 10,000,000 IU; Vit D32,000,000IU; Vit E 8,000 IU; Vit K 2,000mg; Vit B12,000 mg; Vit B25,500mg; Vit B61,200 mg; Vit B12 12 mg; Biotin30mg; Folic Acid 600 mg; Niacin 10,000 mg; Pantothenic Acid 7,000mg; Choline chloride 500,000 mg; Vit C 10,000mg; Iron 60,000 mg; Mn 80,000 mg; Cu 8,00mg; Zn 50,000 mg; Iodine 2,000 mg; Cobal 450 mg; Selenium 100 mg; Mg 100,000 mg; Anti Oxidant 6,000 mg; PKC – Palm Kernel Cake, GNC = Groundnut cake, C.P. = Crude protein, ME = Metabolizable energy.

**Ronozyme Composition of the product, sodium sulfate (52.7%), calcium carbonate (15%), kaolin (9%), dextrin and sucrose (8%), cellulose (6%) and vegetable oil (7%). Bulk density of 1,100 kg/m³. The particle size distribution of the product showed that 98% of the particles are between 150 and 1,200 µm in diameter and less than 1% of particles are below 150 µm.

steadily from the control diet as the cassava peels/PKC meal mixture increased in the diets. Economics of production data are presented in Table 3. Feed Cost per kg of the experimental diets were ₦107.56, ₦98.12, ₦91.40, ₦82.58 and ₦73.69 for diet 1, 2, 3, 4 and 5 respectively. Average cost of total feed consumed per pig live weight gain was highest in the control diet, followed by diet 2, 3, 4 and 5 respectively while total revenue per total live weight gain per pig was higher for the animals on control diet

containing only maize, followed by those on the dietary treatments 2, 3, 4, and 5. The values were ₦6443.50, ₦5148.50, ₦4550.00, ₦4287.50 and ₦4168.50 respectively. Animals fed 25% (treatment 2) had the highest gross profit per total live weight gain followed by animals on treatments 4, 3, 1 and 5 which are contained in cassava peels and PKC mixtures. The values are ₦1517.62, ₦1474.50, ₦1367.00, ₦1280.62 and ₦1073.02 in that order.

Table 2: Performance Characteristics of Grower Pigs Fed Experimental Diets of CPM/PKC Mixtures (%)

	Levels of Inclusion					SEM (±)
	0	25	50	75	100	
Parameters	1	2	3	4	5	
Ave. Initial wt (kg)	23.84	25.67	22.00	21.50	20.80	-----
Ave. final wt (kg)	42.25 ^a	40.38 ^b	35.00 ^c	33.75 ^{cd}	32.75 ^d	0.65
Ave. total wt gain(kg)	18.41 ^a	14.71 ^b	13.00 ^c	12.25 ^{cd}	11.91 ^d	0.41
Ave. weekly wt gain(kg)	2.63 ^a	2.10 ^b	1.86 ^c	1.75 ^d	1.70 ^d	0.05
Feed intake(kg)	48.00 ^a	42.00 ^b	42.00 ^b	42.00 ^b	42.00 ^b	1.46
Feed conversion ratio	2.61 ^c	2.94 ^d	3.31 ^c	3.40 ^b	3.52 ^a	0.05
Protein efficiency ratio	2.26 ^a	1.97 ^b	1.78 ^c	1.72 ^{cd}	1.67 ^d	0.04
Mortality (%)	-	-	-	-	-	-

a,b,c,d means within the same row with different superscripts are significantly ($P < 0.05$) different from each other, Ave: Average, SEM: Standard error of mean, wt: weight, CPM: cassava peels meal, PKC: palm kernel cake.

Table 3: Economics of Production of Grower Pigs Fed Experimental Diets of CPM/PKC Mixtures (%)

	levels of Inclusion				
	0	25	50	75	100
Parameters	1	2	3	4	5
Av. initial wt/pig (kg)	23.84	25.67	22.00	21.50	20.84
Ave. final wt/pig (kg)	42.25	40.38	35.00	33.75	32.75
Ave. total gain wt/pig (kg)	18.41	14.71	13.00	12.25	11.91
Feed cost (₦/kg)	107.56	98.12	91.46	82.58	73.69
Total feed consumed/pig (₦/kg)	48.00	42.00	42.00	42.00	42.0
Total cost of feed/pig (₦)	5162.88	3631.44	3841.32	3468.36	3094.98
live wt gain					
Revenue/total live wt gain/pig (₦)	6443.50	5148.50	4550.00	4287.50	4168.50
Gross profit/pig (₦)	1280.62	1517.62	1367.00	1474.50	1073.02

Ave: Average, wt: weight, CPM: cassava peels meal, PKC: palm kernel cake.

Discussion

Performance characteristics such as average final weight, average total weight gain, average weekly weight gain, feed conversion ratio and

protein efficiency ratio experienced steady decline in values with increasing levels of cassava peels/PKC mixtures and this decline was critical at 100% replacement of maize.

Average final weight of grower pigs was highest in the control diet (0%), steadily declined in 25, 50, 75 and 100% levels of inclusion. The final weight of grower pigs fed 50% and 75% did not however differ significantly ($P>0.05$) from each other. This result is in agreement with the work of Igene (2006) who observed that the use of cassava in feeding pigs at levels higher than 50% usually decreased live weight and feed conversion ratio, and therefore, suggested supplementation with methionine at 0.2%. Oboh *et al.* (2004) reported decreased average weight gain, feeds intake and protein efficiency ratio when levels of cassava peel meal increased from 0 to 75% levels of inclusion.

Poor performance noticed with high cassava peels/PKC in the diets could also be attributed to the increased levels of fibre and toxic substances present in the palm kernel cake and cassava peels mixtures. This observation is in line with the reports of Oboh *et al.* (2004); Solami and Odunsi (2003); Tewe and Egbunike (1992) who stated that cassava peels contain large amount of cynogenic substances, phytate and variable crude fibre that ranged between 10 – 30%. Adeschinwa *et al.* (2011) stated that cassava peels are good feed source for pigs but they must be supplemented with protein and lipids in order to improve their palatability and

digestibility, due to their fibrous nature that limit its inclusion in pig diets.

The economics of production data revealed in Table 3 indicated that the cost of feed consumed (₦/pig), cost of feed per kg live weight gain (₦), feed cost (₦/kg) decreased as the levels of inclusion of cassava peels/PKC mixtures in the diets increased (0, 25, 50, 75 and 100%). Cost of feed/kg ranged from ₦107.56 in 0% to ₦73.69 in 100% diet. The result of this study agreed with the recommendations of Oboh *et al.* (2004) and Oboh *et al.* (2014) that emphasized the need for alternative to conventional feedstuffs especially waste by-product materials, which are readily available and cheaper to replace the major energy and protein feedstuffs in pig diets.

Conclusion

The result of the study indicated that increased inclusion of cassava peels/PKC meals in the diets for grower pigs led to reduction in the cost of feed. It was observed to be more economically viable to feed grower pigs with cassava peels/PKC based diets up to 25% as it was less expensive to produce 1kg of grower pigs compare to the conventional maize based diet. 25% replacement with maize which resulted in the greatest revenue of N1517.62 per pig indicated a more suitable formulation.

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