

PERFORMANCE AND ECONOMY OF PRODUCTION OF GROWING PIGS FED WHOLE CASSAVA PLANT BASED DIETS WITH VARYING LEVELS OF PALM KERNEL CAKE AND CASSAVA PEELS IN THE HUMID TROPICS

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Target Audience: Feed manufacturers, livestock farmers, nutritionists

ABSTRACT

Eighteen Large White + Hampshire growing pigs with initial mean weight of 16.±0.21kg were used to determine the effects of whole cassava plant based diet with varying levels of palm kernel cake and cassava peel on performance and economy of pigs. Six diets were formulated to contain six levels of crude protein (ranging from 16.45-20.07%), 2 levels of palm kernel cake (0,20%) and 3 levels of cassava peels (0,10,20%). Cassava leaves plus tender stems were used at 255 in all diets. The experiment which lasted twelve weeks revealed no significant differences ($p>0.05$) for growth performance and feed conversion ratio (FCR) among treatments. The inclusion of palm kernel cake (PKC) and cassava peels together or separately in the diets resulted in better performance though insignificantly ($p>0.05$) compared to the control which has neither palm kernel cake nor cassava peels, even at level as high as 20% for both palm kernel cake and cassava peels respectively.

Keywords: Whole cassava plant, cassava flour, cassava peel, palm kernel cake, performance, economy of production.

DESCRIPTION OF PROBLEM

The increasing pressure on the use of cereals by human population and livestock feed millers, coupled with a deficit of animal protein intake especially in developing countries necessitate the use of unconventional feedstuffs for livestock production. One such feedstuff is cassava (flour, peels or leaves) which has been successfully incorporated into diets of non-ruminants to replace maize completely. (1) Previous attempts have been either the use of flour, peels or leaves as feedstuffs in the diets of pigs. The considerable information, which has accumulated, on the positive effects of cassava products in feeds for simple-stomached animals stimulated the current

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investigation. For instance, several researchers(1,2,3,)had worked on the suitability of cassava products for pigs feeding. The addition of whole cassava plant in the diets of pigs will reduce the cost of feeding(which has been put at 60-80% total cost of production for monogastrics) and possibly evolve a sustainable crop-livestock farming system in Nigeria. The object of the present study was to investigate the effect of inclusion of cassava products in a mix diets for pigs(at high levels)with every levels of palm kernel cake and cassava peel on the performance of growing pigs in the tropics.

MATERIALS AND METHODS

Eighteen Large White + Hampshire growing pigs with initial mean weight of 16.0+_{0.21}kg were assigned randomly to six levels of crude protein (ranging from 16.45-20.07%), two levels of palm lernel cake (0,20%) and three levels of cassava peels (0,10,20%). Cassava peels and palm kernel cakes were used to replace cassava flour. Cassava leaves plus tender stems were used at 25% in all the diets at a ratio of 3:1 of leaves to tender stems. The composition of the experimental diets used is as shown in Table 1. The study lasted twelve weeks.

Table 1: Composition of Experimental Diets

Ingredients(%)	DIETS					
	1	2	3	4	5	6
Cassava flour	50.0	30.0	40.0	20.0	30.0	10.0
Cassava leaves+tender stem	25.0	25.0	25.0	25.0	25.0	25.0
Cassava peels	-	-	10.0	10.0	20.0	20.0
Palm kernel cake	-	20.0	20.0	20.0	-	20.0
Groudnut cake	20.0	20.0	20.0	20.0	20.0	20.0
Fish meal	1.0	1.0	1.0	1.0	1.0	1.0
Bone meal	2.25	2.25	2.25	2.25	2.25	2.25
Oyster shell	1.0	1.0	1.0	1.0	1.0	1.0
Premix*	0.25	0.25	0.25	0.25	0.25	0.25
Salt	0.5	0.5	0.5	0.5	0.5	0.5
Total	100.0	100.0	100.0	100.0	100.0	100.0
Calculated analysis						
Energy ME. kcal/g	2.66	2.45	2.58	2.37	2.50	2.30
Crude protein(%)	16.45	19.57	16.72	19.73	16.97	20.07
Crude fibre(%)	7.84	11.09	11.06	12.22	12.99	12.55
Cost of feed/kg(N)	11.37	10.97	11.07	10.77	10.97	10.57

*Premix made by Roche Nig. Limited. Supplied the following vitamins and minerals per kg of diet: Vit A 4,000,000 I.U., Vit D 800,000 I.U., Vit E 12,000 I.U., Vit K 0.80g, Vit B 0.60g, Vit B6 1.40g, Nicotinic acid 12.0g, Calpantothenate 4.0g, Biotin 20.0mg, Vit B12 8.0mg, Folic acid 0.40g, Choline Chloride 120g, Zinc Bacitran 8.0g, Mn 40.0g, Iron 20.0g, Zinc 18.0g, Copper 0.30g, Iodine 0.62, Cobalt 0.09g, Selenium 0.04g, Labalocid(Avatec) 36.0g.

The cassava leaves plus tender stems and cassava peels used for this study were obtained from neighbouring farms around University of Ibadan Teaching and Research farm.

Cassava flour was obtained from Bodija Market, Ibadan while other ingredients were obtained from Adom Enterprises, Ibadan. The cassava products were sun-dried to about 10% moisture content before milling and subsequent incorporation into diets.

The animals were housed individually on a concrete-floored pens equipped with watering and feeding facilities. The animals were usually visited every morning and their pens were cleaned and served with fresh clean water every day. On a daily basis, the animals were fed restrictedly and individually usually at 9.00-10.00am, 12.00-1.00pm and 3.00-4.00pm. Water was supplied to the animals *ad libitum*.

The approximate analysis of the diets and test ingredients were carried out using the procedure of AOAC(4). The proximate composition of the test ingredients is shown in Table II while that of the diets is shown in Table III.

Table II: Chemical Composition of Test Ingredients

Components(%)	Palm cake kernel	Cassava peels	Cassava tender stems+	Cassava flour
Dry matter	94.92	93.33	95.94	95.75
Crude protein	18.38	5.25	23.64	2.5
Crude fibre	13.5	18.98	14.42	3.4
Ether extract	5.20	1.02	4.46	1.4
Ash	5.50	4.90	7.89	2.5
NFE	57.42	69.85	49.59	90.2

Table III: Chemical Composition of Experimental Diets

Components(%)	DIETS					
	1	2	3	4	5	6
Moisture content	7.64	8.74	7.45	8.31	7.34	6.97
Dry matter	92.36	91.26	92.55	91.69	92.66	93.03
Crude protein	14.60	16.89	15.40	18.15	15.90	18.46
Crude fibre	9.70	13.30	10.06	12.28	10.56	13.84
Ether extract	1.16	1.36	1.14	1.34	1.12	1.31
Ash	16.5	18.20	19.50	19.30	18.40	19.40
NFE	58.04	50.25	53.90	48.93	54.02	46.99

Records of feed consumption and weight gain for each week were kept on treatment basis. The economy of production was calculated based on the performance of the animals in each treatment.

All results were subjected to analysis of variance using completely randomized design(5).

RESULTS AND DISCUSSION

Performance characteristics:

All the pigs appeared healthy before, during and after the study. There was no lesion or physical disability arising from treatment effect. The animals were given IVOMEC before the commencement of the study to take care of endo-and ecto-Parasites.

As shown in Table II, the percentage dry matter of the test ingredients ranged from 93.33% to 95.94%. The crude protein values are 2.5%, 5.25%, 18.38% and 23.64% for cassava flour, cassava peels, palm kernel cake and cassava leaves plus tender stems, respectively. The percentage crude protein of the diets ranged from 14.60% to 18.46% (Table III). The percentage dry matter ranged from 91.26% to 93.03% with the highest value occurring in diet 6 while the lowest value occurred in diet 2.

The feed intake on DM bases ranged from 0.66kg to 0.84kg per day. The highest feed intake occurred in diets 3 which had 10% cassava peels and 0% palm kernel cake. The highest body weight gain of 260g/day was recorded by pigs on diet 2 that contained 0% cassava peel and 20% palm kernel cake. The least body weight gain of 260g/day was recorded by pigs on diet 1 that contained 0% cassava peels and 0% palm kernel cake. The diet 1 serve as control. The best feed to gain ratio of 2.92 was recorded by pigs on diet 6 while the least value of 3.94 was recorded by pigs on diet 1 which served as control.

The growth rate, feed intake and feed conversion were not significantly ($P > 0.05$) influenced by the levels of palm kernel cake and cassava peels in the diets. However, the results obtained showed that pigs on diets containing either palm kernel or cassava peels both tended to perform better than the diet that has neither palm kernel cake nor cassava peels. The present finding supports earlier finding by Babatunde et al.(6)Iyayi and Tewe(1) Jegede et al.(7)

The increase in average daily feed consumption with increasing palm kernel cake and cassava peels is probably related to a lowering of the energy concentration of the diet. Analytical values of these materials showed the total ash of palm kernel cake to be 5.5% and cassava peels 4.9%. The crude fibre of palm kernel cake is 13.5% and cassava peels 18.98%. Crude fibre is known to be low in available energy and ash fraction, which may be predominantly silica, contains none(8)

Nonetheless, the results obtained in this study were not satisfactory. This could be as a result fibrous nature of the diets due to the presence of cassava leaves and soft stems in high quantity. This observation has been reported by Alhassan and Odoi(9) and Ravindran(3). Fibre, for example pectin may form gels thereby obstructing the access of digestive enzymes (10,11). Besides this, the proximate analysis of the diets showed that crude protein value are less than 19%. This falls below the one recommended by Balogun and Fetuga(12) for growing pigs in the tropics. This may have contributed to the poor performance of the animals but this study is an on-farm situation in Nigeria. Most pig farmers in Nigeria are ready to embrace research findings that will not make them spend to much money on feeds and feeding of the animals.

ECONOMY OF PRODUCTION

The economy of production is shown in Table V. The results obtained showed that it is more economical to include palm kernel cake in the diets that contain cassava products though the economy of feed utilization for the treatment showed no significant difference ($p>0.05$). The feed cost per kg weigh gain was highest (N39.48) for diet 1 which contained neither palm kernel cake nor cassava peels while it was lowest for diet 6 (N30.91) which contained 20% cassava peels and 20% palm kernel cake. The least revenue was generated by control diet which had neither palm kernel cake nor cassava peels. This present findings support earlier finding by Tewe and Oke(2)and Tewe et al(13).

Table IV: Performance Characteristics of Growing Pigs fed Experimental Diets

Parameters	DIETS						SEM	Remark
	1	2	3	4	5	6		
Ave. initial liveweight(kg)	15.67	16.17	16.23	16.00	15.73	16.009	+_0.21	NS
Ave. final liveweight(kg)	32.70	37.00	36.83	34.00	35.83	37.17	+_1.68	NS
Ave. total weight gain(kg)	17.03	20.83	20.60	18.00	20.10	21.17	+_1.55	NS
Ave. daily DM intake(kg/day)	0.70	0.77	0.81	0.66	0.75	0.73	+_0.05	NS
Ave. daily feed intake(kg/day)	0.76	0.84	0.88	0.72	0.81	0.79	+_0.05	NS
Ave. daily gain(kg)	0.201	0.260	0.234	0.203	0.229	0.251	+_0.05	NS
Feed:Gain	3.49	2.95	3.44	3.24	3.28	2.92	+0.22	NS

NS- No significant different among the treatment at($p>0.05$).

Table V Economic of Production of Growing Pigs fed Cassava based Diets

Parameters	DIETS					
	1	2	3	4	5	6
Feed consumed(kg)	176.90	193.54	202.86	165.56	189.50	184.97
Cost of feed consumed(N)	1,998.97	2,123.13	2,215.95	1,783.08	2,215.95	1,955.13
Cost of animals(N)	3,000	3,000	3,000	3,000	3,000	3,000
Labour, rent and exigencies(N)	4,000	4,000	4,000	4,000	4,000	4,000
Total cost of Production(N)	5,398.97	5,523.13	5,665.95	5,183.08	5,478.82	5,355.15
Waight gain(kg)	50.65	65.52	58.97	51.16	57.71	63.25
Total revenue/Treatment(N)	6,905.50	7,946.40	7,487.95	6,941.20	7,399.70	7,787.50
Net revenue/ treatment(N)	1,506.53	2,423.23	1,821.95	1,758.12	1,920.88	2,432.29
Feed cost/kg weight gain(N)	39.47	32.40	38.43	34.85	36.02	30.99

Cost/kg live weight was fixed at N 70.00

CONCLUSION AND RECOMMENDATION

In conclusion, the results obtained showed that high levels of cassava products inclusion in the diets of growing pigs cannot support satisfactory performance of the animals in the tropics.

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