ASSESSING THE IMPACT OF HIGH-QUALITY CASSAVA PEEL MEAL ON CARCASS CUTS, AND MEAT QUALITY OF GROWING PIGS

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ABSTRACT

The use of alternative feedstuff seldomly consider effects on carcass and meat quality. The study aimed to assess the impact of high-quality cassava peel meal (HCPM) on carcass cuts and meat quality of growing pigs. Thirty (30) male growing pigs (Landrace × Large white) were randomly distributed to five groups with six (6) animals per group in a completely randomized design. HCPM was incorporated into the diet at 0%, 10%, 20%, 30%, and 40%. The pigs fed 20% HCPM diets had higher carcass weight, resulting in an improved ham yield ($p<0.05$). The colour, flavour, tenderness, juiciness, texture, and overall acceptability were statistically superior ($p<0.05$) in the pigs fed diet 40%. HCPM diets enhanced the carcass weight and meat quality of growing pigs up to 40% inclusion translating to 100% replacement for maize.

Keywords: cassava peel, organ, pig, pork quality, primal cut

INTRODUCTION

Globally, Nigeria is ranked first on the cassava production scale with about 60 million tonnes. In Nigeria, cassava processing produces around fourteen (14) million metric tonnes of peels, woody tubers, undersized tubers, and stumps as by-products (FAOSTAT, 2019), which endangers human health due to environmental pollution. To mitigate the hazards associated with cassava by-products, livestock producers have identified cassava peels as a potential feed ingredient and incorporated them into livestock feed formulation. The potency of cassava peels for feeding animals has been demonstrated by several researchers, especially as an energy source and replacement for maize in pig ration (Adesehinwa *et al*., 2008).

Despite the potency of cassava peel as a livestock feed resource, its use is limited due to its low crude protein content, poor amino acid (AA) profile, high fibre, high level of hydrogen cyanide (HCN) and drying constraints during the wet period of the year (Ojediran *et al*., 2020). Hence, to utilize cassava peel judiciously in livestock ration formulation, especially monogastric, the peels must undergo some forms of treatment (Chauynarong *et al*., 2009). Researchers have experimented several methods, including sun-drying, ensiling, boiling, soaking, enzymatic treatment (Adesehinwa *et al*., 2011), biodegradation (Arowora *et al*., 2005), and fermentation (Ojediran *et al*., 2022), to improve the nutritional value of cassava peels. In 2015, the Consultative Group on International Agricultural Research (CGIAR) scientists developed an innovative method for transforming wet cassava peels into HQCP meal, which is safe and hygienic for livestock feeding (ILRI, 2015). The use of HQCP meal has been tested on different classes of pigs (Adesehinwa *et al*., 2017, 2018;, Ojediran *et al*. (2022) with varying levels of HQCP but the assessment focused on growth, cost-benefit, and blood biochemical responses Therefore, this study focused on examining the effect of substituting maize with HQCP on the carcass and meat quality of growing pigs.

MATERIALS AND METHODS

The swine facility of the Teaching and Research Farm at Ladoke Akintola University of Technology, Ogbomoso, Oyo State, Nigeria was used for this study. Fresh cassava peels were procured from a cassava processing centre within Ogbomoso, and processed to generate a high-quality cassava peel meal (HCPM) (ILRI, 2015). Thirty (30) male growing pigs (large-white × land-race) with an average weight of 23.85 ± 0.25 kg were allocated at random to five (5) treatments with six (6) replicates in a seven-week trial after a week of acclimatisation. Subsequent weighing occurred at weekly intervals. The pigs had unrestricted access to feed and fresh water for the whole duration of the feeding trial.

HCPM was used to formulate the diets by replacing maize in a maize-palm kernel cake-based diet. Five diets were compounded for the experiment as shown in Table 1. Diet 0% HCPM served as the control with maize-palm kernel meal-based and no HCPM. HCPM was incorporated into the diet at 10%, 20%, 30%, and 40%, substituting maize at 25%, 50%, 75%, and 100%, respectively.

Table 1 Gross composition of experimental diets

Ingredients (%)	0%	10%	20%	30%	40%
Maize	40.00	30.00	20.00	10.00	0.00
HCPM	0.00	10.00	20.00	30.00	40.00
Palm kernel cake	24.00	24.00	22.00	20.00	19.00
Wheat offal	7.00	7.00	7.00	7.00	7.00
Soybean meal	4.00	4.00	4.00	6.00	6.00
Full-fat soybean	4.00	4.00	6.00	6.00	7.00
#Fixed ingredients	21.00	21.00	21.00	21.00	21.00
Total	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**
Calculated Nutrient composition					
Crude protein	17.15	16.78	16.78	16.91	16.72
M.E. (kcal/kg)	2838.80	2791.37	2755.94	2720.50	2701.07
Ether extract	4.49	4.23	4.47	4.38	4.46
Crude fibre	6.00	6.24	6.35	6.46	6.58

#Fixed ingredients = Groundnut cake-8.00%, Corn bran-10.00%, Bone meal-2.00%, Lysine-0.25%, Methionine-0.25%, Premix-0.25%, Salt-0.25%, M.E. =Metabolizable energy;

Data Collection

Carcass evaluation: On terminating the experiment, two (2) pigs from each treatment group were randomly selected and transferred to the slaughterhouse where they had no access to feed but water for 12 hours before they were weighed, stunned, and slaughtered using traditional procedures. The bled weights, eviscerated weight, carcass weight and primal cuts were taken and expressed as a percentage of the live weight (Ojediran *et al*., 2021).

Meat quality: The ham samples from the slaughtered animals from each treatment were cut into pieces of similar sizes in a raw state for sensory evaluation of the meat quality. The meat sub-samples were cooked in boiled water for 15 minutes. Ten regular meat consumers served as panelists to evaluate the sub-samples as described by Akinwumi *et al*. (2013) using a 9-point hedonic scale as the descriptor

Statistical Analysis

The collated data were analyzed using a one-way Analysis of Variance (ANOVA) of SAS (2000), and Duncan's Multiple Range Test was used to separate the significant means.

RESULTS AND DISCUSSION

Carcass evaluation: Table 2 depicts the carcass characteristics of growing pigs fed high-quality cassava peel meal. The HCPM diets had significant effects ($P<0.05$) on the carcass parameters. The variations in all the parameters did not follow a particular trend, but the pigs fed diet 50% HCPM had the highest values for final live weight, carcass weight, buston butt, belly, and ham. The pigs fed diet 50% HCPM had the highest final live weight, while the least final live weight was recorded in animals fed diet 100% HCPM. The eviscerated weight was highest in the animals fed diet 0% HCPM and least in the pigs fed diet 30% HCPM. The jowl value was highest in animals fed diet 30% HCPM and significantly different ($p<0.05$) from the values of pigs fed other diets ($p>0.05$). The picnic shoulder value ranged from 10.29% to 12.62% as observed in pigs fed diets 30% and 0%, respectively. The buston butt values of animals fed diet 0% HCPM were not significantly different ($P>0.05$) from the values of animals fed diet 10% HCPM and 50%, however, differences ($p<0.05$) exist in the buston butt of animals fed diet 25% HCPM and 20% as well as those fed diets 20% and 30%. The loin value is highest in animals fed the control diet and least in the pigs fed diet 40% HCPM, which is similar to pigs fed diet 20% HCPM. The spare rib value ranged from 7.16% to

10.81% in pigs fed diets 20% and 30%., respectively. Pigs fed diets 0%-40% had related (p>0.05) ham values and differs (P<0.05) from pigs fed diet 400% HCPM.

Table 2 Carcass characteristics of growing pigs fed high-quality cassava peel meal

Parameters (%)	Treatments						
	0%	10%	20%	30%	40%	SEM (±)	P-value
Final live weight (kg)	50.70^{b}	50.40^{c}	55.50^{a}	45.90^{d}	44.40^{e}	1.05	0.00
Eviscerated weight	89.74^{a}	84.9^{d}	88.11^{b}	79.74^{e}	85.81^{c}	0.91	0.00
Carcass weight	65.09^{d}	69.05^{b}	72.25^{a}	63.40^{e}	68.02^{c}	0.44	0.00
Jowl	2.76^{b}	3.17^{b}	3.06^{b}	3.68^{a}	3.60^{b}	0.92	0.04
Picnic shoulder	12.62^{a}	11.51^{c}	12.07^{b}	10.29^{d}	11.82^{b}	0.21	0.00
Buston butt	8.54^{ab}	8.23^{b}	9.01^{a}	6.28^{d}	7.09^{c}	0.27	0.00
Loin	15.29^{a}	12.40^{c}	11.89^{d}	14.37^{b}	11.60^{d}	0.39	0.00
Spare rib	10.26^{b}	7.54^{d}	9.73^{c}	7.16^{e}	10.81^{a}	0.39	0.00
Ham	19.04^{a}	19.25^{a}	19.94^{a}	18.69^{a}	16.43^{b}	0.33	0.01

SEM= standard error of means; a,b,c,d,e =means with different superscripts along a row are significantly different (P<0.05)

In the study of growing pigs fed cassava peel-based diet, Adesehinwa *et al*. (2011) reported comparable dressing percentage of pigs across the dietary groups while not affecting the carcass weights of the pigs. In this study, it is evident that the maize replacement with HCPM influenced the carcass characteristics of grower pigs without following a particular trend. The final live weight recorded in this study agrees with that of Olayeni (2016), where the author studied the nutritive value of cassava root meal supplemented with or without activated charcoal in weaning-growing pig diets. Nevertheless, the weights of the picnic shoulder, ham, loin, and buston butt obtained in this study were superior. The improved carcass yield in animals fed HCPM diets might be due to the multi-processing technique of generating HQPM.

Meat quality: The meat quality of growing pigs fed high-quality cassava peel meal is illustrated in Table 3. The colour, flavour, tenderness, juice, texture, and overall acceptability were all significantly affected (P<0.05) by the HCPM diets. The pigs fed diet 40% HCPM had the most superior meat quality and sensory parameters.

Table 3 Meat quality of growing pigs fed high-quality cassava peel meal

Parameters	Treatments						
	0%	10%	20%	30%	40%	SEM(±)	P-value
Colour	4.00^{b}	4.20^{b}	6.90^{a}	4.90^{b}	7.20^{a}	0.27	0.00
Flavour	4.40^{c}	3.70^{c}	6.20^{b}	5.10^{ab}	8.40^{a}	0.32	0.00
Tenderness	5.90^{b}	4.30^{c}	6.30^{b}	4.20^{c}	8.00^{a}	0.29	0.00
Juice	4.70^{c}	5.50^{ab}	6.10^{b}	5.90^{ab}	7.80^{a}	0.23	0.00
Texture	5.40^{ab}	5.90^{ab}	5.70^{ab}	4.60^{b}	7.00^{a}	0.25	0.04
Overall acceptability	6.50^{b}	7.20^{ab}	6.90^{b}	6.40^{b}	8.20^{a}	0.19	0.01

SEM= standard error of means; a,b,c =means with different superscripts along a row are significantly different (p<0.05)

Meat colour affects consumers' preferences and is the first judging criterion for meat quality and acceptability (Ojediran *et al*., 2022). Meat flavor tends to develop with age, while juiciness depends largely on the carcass fat content. Intramuscular or subcutaneous fat improves the flavor, juiciness, and tenderness of fat (Ikeme, 1990). In this study, a total replacement of maize by HCPM in the pigs' diet had the greatest positive influence on the panelists' judgment of the meat quality as the highest scores for all the sensory parameters as well as the overall acceptability were recorded in the diet 40% HCPM.

CONCLUSION

Conclusively, HCPM diets enhanced the carcass weight at 50% HCPM replacement for maize and meat quality of growing pigs at 100% HCPM replacement for maize.

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