



## **Organoleptic Qualities of Ham of Weaner Pigs Fed Graded Levels of Sundried Cassava Peel Meal**

**E. E. Adomeh<sup>1</sup>, E. T. E. Ehebha<sup>1</sup>, S. A. Eguaoje<sup>1\*</sup> and A. Iwegbu<sup>1</sup>**

<sup>1</sup>*Department of Animal Science, Faculty of Agriculture, Ambrose Alli University, P.M.B 14, Ekpoma Edo State, Nigeria.*

### **Authors' contributions**

*This work was carried out in collaboration between all authors. Author EEA designed the study, performed the statistical analysis, wrote the protocol, and wrote the first draft of the manuscript. Authors ETEE and SAE managed the analyses of the study. Author AI managed the literature searches. All authors read and approved the final manuscript.*

### **Article Information**

DOI: 10.9734/AFSJ/2018/41040

#### Editor(s):

(1) Charalampos Proestos, Assistant Professor, Department of Chemistry, National and Kapodistrian University of Athens, Greece.

#### Reviewers:

(1) Anand Kumar Pathak, Sher-e-Kashmir University of Agricultural Sciences and Technology, India.

(2) Wuanor Alexander Aza, University of Agriculture, Nigeria.

(3) Godfrey Adokiye Kalio, Ignatius Ajuru University of Education, Nigeria.

Complete Peer review History: <http://prh.sdiarticle3.com/review-history/24392>

**Received 4<sup>th</sup> February 2018**

**Accepted 16<sup>th</sup> April 2018**

**Published 30<sup>th</sup> April 2018**

**Original Research Article**

### **ABSTRACT**

A twelve-week feeding trial was conducted to evaluate the effects of Cassava Peel Meal(CPM) on the organoleptic properties of ham of (24) crossbred weaner pigs allocated to four dietary treatments replicated three times in a Completely Randomised Design(CRD) with each replicates having two pigs. Treatment I had 0% CPM while 2, 3 and 4 had (CPM) of 25%, 50% and 75% respectively. The pigs were allowed free access to feed and clean drinking water *ad-libitum* and routine management and medication were administered. The samples of the processed ham was scored on the 9-point Hedonic scale ranging from like, extremely like, dislike to extremely in order to test for the following: Appearance, flavor, juiciness, tenderness, fattiness and overall acceptability of the processed ham. Before the testing exercise, the members of the panel ate a piece of cracker biscuit and then rinsed their mouth with cold water provided in order to minimize flavor carry over after which they commented freely on each of the samples provided using a score form. The result of the organoleptic quality of the processed ham revealed that only fattiness score was significantly ( $P<0.05$ ) different among the treatment diets with

\*Corresponding author: E-mail: [eguaajeabiodunstanley@gmail.com](mailto:eguaajeabiodunstanley@gmail.com);

the highest value in treatment 4 and lowest in control. It was concluded therefore that sundried (CPM) can substitute maize in the diet of weaner pigs at 50% level of inclusion for better meat quality.

*Keywords: Organoleptic qualities; pigs; sundried cassava peel.*

## 1. INTRODUCTION

It has been established that pig performance in terms of weight and efficiency of gain and carcass leanness is clearly related to the intake levels and therefore intake of nutrients, particularly energy and protein. Feedstuffs such as maize, soybean meal, groundnut cake etc have continued to be scarce and costly due mainly to their low production and competition as food by human beings in Nigeria. This has caused the collapse of many small and large scale pig enterprises, discouraging prospective farmers and curtailing further expansion of small backyard piggeries. Nevertheless, the potential of many industrial by-products such as cassava peels, palm kernel meal, brewers spent grains, wheat offal etc., to serve as alternative, cheaper and readily available nutrient source for pigs has been recognised but not fully utilized [1]. It is in realization of the above intention coupled with the increased capital and foreign exchange rate that farmers and feed manufacturers are now changing their operations towards greater reliance on locally available feed stuffs [2]. Over the years cassava products have long been used as a major source of energy in place of cereal grains by both man and livestock [3]. It is not likely that, there would be a decrease in such competition even in the new millennium. Now that more people have realized the potentials of pig as quick source of animal protein with the following attributes: high litter size, short generation interval, high growth rate, high prolificacy, ability to convert kitchen waste into nutritious meat; there is every need to find ways of utilizing some of the domestic wastes like cassava peels in formulating swine diets [4]. This study was, therefore, planned to determine the organoleptic qualities of ham of weaner pigs fed diets containing sun-dried cassava peals meal (CPM) at varying levels of inclusion.

## 2. MATERIALS AND METHODS

### 2.1 Experimental Site and Duration

The experiment was conducted at the Piggery unit, livestock Teaching and Research, Farm,

Faculty of Agriculture Ambrose Alli University Ekpoma for a period of twelve weeks.

### 2.2 Sources and Preparation of Basal Diet

Fresh cassava (*Manihot esculenta*) peels were collected from local cassava processing centers or in-house cassava processors in Ekpoma Esan West local government area of Edo state. The cassava peels were soaked in water inside a metal drum for three days, after which they were removed and drained with a basket and sun-dried for five days to reduce the moisture content and improve the protein content. The process also reduced the hydrogen cyanide HCN content of the peel which is hazardous to the health of animals before milling to fine particles of 2 mm in diameter, using a hammer mill. The resultant product was taken to the Animal Science Laboratory for proximate analysis after which it was incorporated into broiler's diets at varying levels stipulated in the study.

### 2.3 Design and Management of Experimental Pigs

Twenty four crossbred (Large white and Landrace) weaner pigs were used for the experiment. Two pigs each were selected based on their average initial weights and each group of pigs were allotted to each of the four treatment diets (1, 2, 3 and 4) in a completely randomized design (CRD). Each treatment group contained 3 replicates of two pigs each. Known quantities of feed were offered to the animals twice daily with clean drinking water provided throughout. Animals were housed in suitable pens adapted for pig production with wallows attached. IVO-MERC with a small syringe dose 0.2 ml per 10 pounds of body weight via feed was given as a dewormer for the pigs before commencement of the feeding trial. Daily and weekly records of feed intake and weight gain were taken while feed conversion ratio and protein efficiency ratio were estimated as well as mortality rate was recorded.

## 2.4 Experimental Diets

A total of four treatment diets (1, 2, 3 and 4) pig rations were formulated. Diet 1 was formulated to contain 0% (CPM) as the (control diet), while diets 2, 3 and 4 were formulated by replacing the 100% of maize in diet 1 with 25, 50 and 75% levels of (CPM) respectively. The rations formulated were of equal nitrogen (18%) and caloric values of (3000 kcal ME/kg).

## 2.5 Organoleptic Qualities of Weaner Pigs (ham) Fed the Treatment Diets

From the carcass collected during the slaughtering process one thigh muscle (Ham) each was collected from each treatments making a total of 4 thigh muscles and 12 aliquots of 150g were cut from each ham and was well labelled. The samples (ham) were taken to the Meat Science and Technology Laboratory of Animal Science Department, Ambrose Alli University Ekpoma where they were cured using common salt and curry and the resultant products were oven dried. Each of the treatments were served to twelve persons who were randomly selected and trained in sensory perception for the experiment. Samples were scored on the 9-point Hedonic scale ranging from like, extremely like, dislike to extremely according to [5] in order to test for the following:

Appearance, flavor, juiciness, tenderness, fattiness and overall acceptability. Before the testing exercise, the panel was asked to eat a piece of cracker biscuit and then rinse their mouth with cold water provided in order to minimize flavor carry over and were also asked to comment freely on each of the samples provided using a score form.

## 2.6 Statistical Analysis

All the data collected were subjected to analysis of variance (ANOVA) and differences between means and treatments were separated using Duncan's multiple range test (DMRT) at 5 percent level of probability as outlined by [6] with the aid of [7] package.

**Table 1. Proximate and energy composition of cassava peel meal and maize**

Constituents (%)	Cassava peel meal	Maize
Dry matter	29.60	88.90
Crude protein	4.00	9.80
Crude fibre	16.6	2.70
Ether extract	1.30	2.40
Crude ash	68.50	74.90
NFE	5.90	1.90
ME (kcal/kg)	3005.50	3315.45

Source: [8,9]

**Table 2. Percentage compositions of experimental diets**

Ingredients	Inclusion levels of cassava peels (%)			
	0	25	50	75
	Diets			
	1	2	3	4
Maize	50.00	40.00	30.00	20.00
Sundried cassava peel meal	0.00	10.00	20.00	30.00
Palm kernel meal	19.00	23.00	25.00	29.00
Wheat offal	25.00	20.00	17.00	12.00
Fish meal	2.00	3.00	4.00	5.00
Lime stone	1.00	1.00	1.00	1.00
Bone meal	2.00	2.00	2.00	2.00
Premix	0.30	0.30	0.30	0.30
Methionine	0.25	0.25	0.25	0.25
Lysine	0.25	0.25	0.25	0.25
Salt	0.20	0.20	0.20	0.20
<b>Total</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>
<b>Calculated analysis:</b>				
Crude protein	18.33	18.41	18.74	18.63
ME (kcal/kg)	2957.62	2983.44	3005.50	2951.98

\*Estimated

**Table 4. Organoleptic qualities of weaner pigs (Ham) fed dietary treatments**

<b>Organoleptic qualities</b>	<b>0%</b>	<b>25%</b>	<b>50%</b>	<b>75%</b>	<b>SEM</b>
Juiciness	7.83	7.73	7.64	7.69	0.23
Tenderness	8.06	8.02	8.11	8.04	0.08
Fattiness	8.12 <sup>c</sup>	9.04 <sup>b</sup>	9.23 <sup>b</sup>	10.21 <sup>a</sup>	0.02
General acceptability	7.08	7.06	7.19	7.11	0.13

*abc: Means in the same row with varying superscript differ significantly (P<0.05)*

### 3. RESULTS AND DISCUSSION

#### 3.1 Organoleptic Qualities of Weaner Pigs (Ham) Fed Dietary Treatments

Sensory score for juiciness was statistically ( $P>0.05$ ) comparable with the highest mean value of 7.83 in pork meat raised with the control diet, followed by 7.73 in those raised with 25% CPM and lowest 7.64 in porks raised with 75% CPM. The similarity in the juiciness value of the pork meat fed the treatment diet indicated that no substantial (CPM) effect on pig meat eating qualities. Previous observation by [10] indicated that dietary effect of their treatments on colour, texture, juiciness, flavour and tenderness of broiler chicken was not significant. Tenderness is a very important quality attribute by which consumers judge meat quality [11]. Based on the objective tenderness values as measured with the hedonic scale showed no significant difference ( $P>0.05$ ) in the pork meat (ham) from all the pigs fed the different dietary treatments. This implies that the various treatment has no substantial (CPM) effect on the tenderness value of the meat. This negates the findings of [12] who reported a significant variation in the tenderness of broiler chicken fed dietary inclusion levels of ginger root meal. Fattiness score was significantly ( $P<0.05$ ) influenced by the treatment diets with higher value of 10.21 in those fed 75% CPM, followed by 9.23 in those fed 50% CPM, while least mean score of 8.21 was recorded in control. The fattiness of the meat increases with the increasing level of (CPM) and this could be a pointer to the fact that the increasing inclusion level of the cassava peel meal increases the fat level of the pigs compared to the control. General acceptance score was also similar ( $P>0.05$ ) among the weaner pigs meat (ham) under the varying treatment diets this similarity obtained could be due to the comparable values recorded for juiciness and tenderness score which are major sensory factors in determining the quality of the processed meat could have influenced the general acceptability of the processed pork meat by the various panelist.

### 4. CONCLUSION

It is concluded therefore that sundried cassava peel meal can substitute for maize at 50% level of inclusion for better meat quality.

### COMPETING INTERESTS

Authors have declared that no competing interests exist.

### REFERENCES

1. Nwakpu PE, Omeje SSI, Odo BI. Performance of weaner pig fed diet containing different proportion of derided cassava peel and whole maize. *Tropical Journal of Animal Science*. 1999;2:81-87.
2. Bratte L, Amata IA, Omeje SI, Egbunike SI. The effects of partial replacement of dietary maize with seeds of the African pear (*Dacryode edulis* Don G, Lam HJ) on semen characteristics of broiler breeder cocks. *Asian Journal of Animal Science*. 2011;5:71-79.
3. Ikurior SA, Akem JD. Replacing maize with cassava root meal or its mixture with brewers yeast slurry in rabbit diets. *Nigerian Journal of Animal Production*. 1998;25:31-35.
4. Sriroth K, Chollakup R, Chotineerant S, Piyachomkwan K, Oates CG. Processing of cassava waste for improved biomass utilization. *Bioresources and Technology*. 2000;71:63-69.
5. Larmond EI (1982). Laboratory methods for sensory evaluation of food. Food research institute, Ottawa, Canada Department of Agriculture Publication. 1937;73.
6. Steel RGB, Torrie JH. Principles and procedures of statistics. A Biochemical Approach 2nd ed. Mcgraw Hill Book Co. NY; 1990.
7. SAS Institute. SAS User's Guide: Statistics. Version 9.1 ed. SAS Inst. Inc., Cary, NC; 1999.

8. Onyimonyi AE, Agwu GC. Performance of growing pid fed cassava (*Manihot esculenta* crantz) Peel meal. Tropical Journal Animal Science. 2009;7(2):29-53.
9. Lala AO, Bamgbose AM, Eruvbentine D, Bemji M, Oso AO, Osundare TO. Effects of Instant noodles waste based diets as a replacement for maize on haematological parameters of broiler chickens. Proceedings. 15th Annual Conference of Animal Science Association of Nigeria. (ASAN). 2010;5-7.
10. Ayanwale BA, Adama TZ and Jiya EZ. Meat yield and meat composition of Broiler chickens fed sodium chloride treated rice bran as replacement for corn offal. Tropical Journal of Animal Science. 2003;6(1):27-32.
11. Ashie INA, Sorensen TL, Nielsen PM. Effects of papain and a microbial enzyme on meat proteins and beef tenderness. Journal of Food Science. 2002;67(6):2138-2142.
12. Agu EC, Okeudo NJ, Aladi NO, Okoro VMO (2017). Effect of dietary inclusion of ginger meal (*Zingiber officinale* Roscoe) on performance, serum cholesterol profile and carcass quality of broilers. Nigerian Journal of Animal Production. 2017;44(1):254-266.

© 2018 Adomeh et al.; This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

*Peer-review history:*

*The peer review history for this paper can be accessed here:*  
<http://prh.sdiarticle3.com/review-history/24392>