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PRODUCTIVE PERFORMANCE AND CHEMICAL COMPOSITION OF GROWERS PIG MEAT FED WITH *Terminalia mantaly* LEAVES

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AUTHORS' CONTRIBUTIONS

This work was carried out in collaboration with authors POA and CDO contributed in the designed of the study, draft of the manuscript, wrote the protocol, performed the statistical analysis and managed the analyses of the study. While author CDO managed the literature searches. Both authors read and approved the final manuscript.

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ABSTRACT

This investigation was conducted at the piggery breeding unit of the faculty of agriculture, Delta State University, Asaba, for 56 days to assess the effect of *Terminalia mantaly* leave inclusion in pig feed and its effect on carcass and meat quality. A total number of unsex forty weaner pigs were used for the study. Animals were put into four treatments groups with two replicates each (10 pigs per replication) *using completely randomized design*. The control group was fed without *Terminalia mantal*y leaves inclusion. Research work revealed significantly ($P<0.05$) different in all parameters, except the Moisture content of the chemical composition that showed no significant ($P>0.05$) different. Treatment 1 that received concentrate diet had a significant ($P<0.05$) increase in their Body length, Girth Circumference and Length of Ham although not significantly different from treatment 2 when compared with treatment 3 and 4 carcasses. Treatment 4 carcass exerted a significantly ($P<0.05$) higher increase in Breath of Ham cults, as compared with Treatment 1 and 2, the list was Treatment 3. Results obtained from the chemical composition of carcass cut of the weaner pigs fed processed *Terminalia mantaly* leaves showed that Treatment 1 had significant ($P>0.05$) higher content of all the parameters evaluated although not significantly ($P>0.05$) different from Treatment 2, Treatment 4 value of Ether extract and Ash are not statistically different from Treatment 1 and 2. By this feeding trials, *Terminalia mantaly* leaves fed to the pigs had no effect on their meat quality and quantity of the pigs and *Terminalia mantaly* leaves could be used as an alternative feed stuff for feeding pigs in order to attain cheaper meat that is rich in nutrient to Nigerians.

Keywords: Pigs meat; carcass weight; muscle; crude protein; crude fibre.

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1. INTRODUCTION

One major aim of swine industry in the world has been to improve the carcass meat percentage, CAMERON et al. [1] and JIANG et al. [2]. One major factor that have fetched dramatic enhancement into the carcass quality and quantity of swine industry is selection LATORRE et al, [3]. Presently, pig meat quality has become a major challenge to pig meat producers in Nigeria. One major technology applied in pig production to increase extensively the total efficiency of pig production is the use of crossbreeding techniques NEWCOME, et al. [4]. Accordingly, when selecting the best animal for crossbreeding strategy, it is important to recognize the fact, that carcass and meat quality parameter depend on the crossbreed.

The Nigerians swine industry is large enough in Africa compared to other African countries. FAO [5] reported above 7 million pig production in Nigeria.

There are about 25 local swine breed in Nigeria, and these have high production rates, good meat quality good adaptability to feeding and management, and the ability to utilize various flesh leaves. Conversely, due to their unwanted traits such as low dressing percentage and pure local breeds have not been used for commercial farms in Nigeria. Most modern pig farms make use of entirely imported breed and the most popular among them are the land race, Yorkshire and Duroc. It is very important to have the complete data of carcass meat quality and quantity traits of these breed of pigs used currently in our pig's industry. Hence, this study is aimed at investigating the carcass characteristics and meat quality traits among the representative of breed and crossbreeds that are in used in our commercial pig, s industry in Nigeria.

2. MATERIALS AND METHODS

The present study was carried at the piggery breeding unit of the Teaching and Research Farm, Delta State University, Asaba. Asaba is located at latitude 06^0 14 N and longitude 06^0 49E. Asaba has its rainy season from March to September, with the mean annual rainfall of 1500mm to 1849mm and monthly sunshine of about 4.8 bars and mean annual temperature of 28^0C – 32^0C. Asaba is located in the rainforest Agro-ecological zone in Oshimili South Local Government Area of Delta State.

2.1 Management of Experimental Animals

A total of forty pig's male and female purchased at 5 weeks of age were used for the study which lasted for 56 days. After two weeks of adaptation they were distributed randomly into four treatment groups (T1, T2, T3 and T4) with two replicate consisting of ten pigs per replicate. Each groups replicate was allocated to a separate concrete floor and block walls pen. The basic diet of all the groups consisted of soybean meal (SBM) cassava peels, wheat offal, palm kernel cake (PKC), *Terminalia mantaly* leaves, vitamin/mineral premix and sodium chloride. Each group was fed 6kg of their respective diets daily in two divided rations at 9 am and 2 pm. Progressively, the ration of the pigs was increased according to their live weight gain. Water was provided *ad libitum*.

The test Feed ingredient (*Terminalia mantaly)* were collected from the University premises.

Processing Techniques: *Terminalia mantaly* leaves used in mixing the concentrate before feeding to the animal were processed as follows.

Fresh Green: *Terminalia mantaly* leaves was harvested fresh and added to the ration.

Air drying: the samples meant for air drying (i.e. indoor drying) was spread in a well ventilated laboratory at the Animal Science Department Laboratory, Asaba Campus, at a room temperature of 28^0C for 48 hours.

Sun drying: The fresh leaves of *Terminalia mantaly* samples were spread on a special drying platform at the university premises at a mean temperature of 33.2^0C for two days.

2.2 Collection and Preparation of Cassava Peels

The cassava peels were collected from Delsu Investment Limited (DIL) cassava mill within the school premises. Cassava peels was bagged for 48hours before it was used to mix the concentrates.

The pigs were assigned to dietary levels as follow:

- Treatment 1 (T1): Concentrate only
- Treatment 2 (T2): Concentrate + fresh *Terminalia mantaly* leaves + treated cassava peels
- Treatment 3 (T3): Concentrate + air dried *Terminalia mantaly* leaves + treated cassava peels
- Treatment 4 (T4): Concentrate + sun dried *Terminalia mantaly* leaves + treated cassava peels.

2.3 Data Collection and Analysis

2.3.1 Parameters of carcass measurement

From the medial splitting surface of the left carcass, measurements like length of carcass, chest girth, Ham length, Ham Width, Hind foot were determined according to the procedures described by DEBOER et al. [6].

Body length: – is the length of the body measured from the anterior edge of symphysis pubis to the center of the anterior edges of the visible part of the first rib, as reflected in Fig. (A-B).

Ham Length: – It was measured from the medial malleolus of the tibia in a straight line to the anterior edge of the symphysis pubis (F-A).

Ham width: - This is the horizontal distance between the outer most point on the medial and the lateral surface of the leg (G-H).

2.3.2 Carcass evaluation

Four (4) pigs were randomly selected from each treatment for carcass evaluation, they were slaughtered and the weight of the various cut-up parts were taken and analyzed for carcass yield.

2.4 Experimental Procedure/Chemical Composition of Meat Analysis

Meat samples for Chemical Composition were obtained from the semi membranous (left Ham) muscle of the different treatment (T_1 T_2 T_3 and T_4) which was determined by the usual methods according to AOAC [8].

2.5 Chemical Composition of Meat Analysis

Two gram each of representative meat samples were analyzed for crude fibre determination (CFD) Moisture content determination (MCD) Ash content determination (ACD) crude protein determination (CPD) ether extract determination (EED) and Nitrogen free extract determination (NFED). The CFD and MCD was oven drying at 105^{0C} for 24 hours, crud protein of the sample was determined by using the micro-kjeldahl technique. Ash content determination was done by aching at 500^{0-C} in a muffle furnace for about 16 hours according to AOAC [9]. Ether Extract was determined by using the van soest techniques Van SOES et al. [10].

2.6 Data Analysis

All data obtained were analyzed using of analysis of variance (ANOVA) in a completely randomized design (CRD). The statistical package of SPSS [11] was used to analyzed the data. Duncan's Multiple Range Test (DMRT) was used to assess significant differences between means.

3. RESULTS AND DISCUSSION

The results of carcass measurement from the carcass cut of pigs fed *Terminalia mantaly* processed leave are presented in Table 1. The results from Table 1 indicated that pigs in Treatment 1 had highest in live body weight but not significantly (P>0.05) different from Treatment 2 that were fed fresh *Terminalia mantaly* leave and lowest in Treatment 3, pigs that received processed *Terminalia mantaly* leave. This finding were consistent to those reports of MANAYE et al. [12] and GEBREGIORGIS et al. [13] who

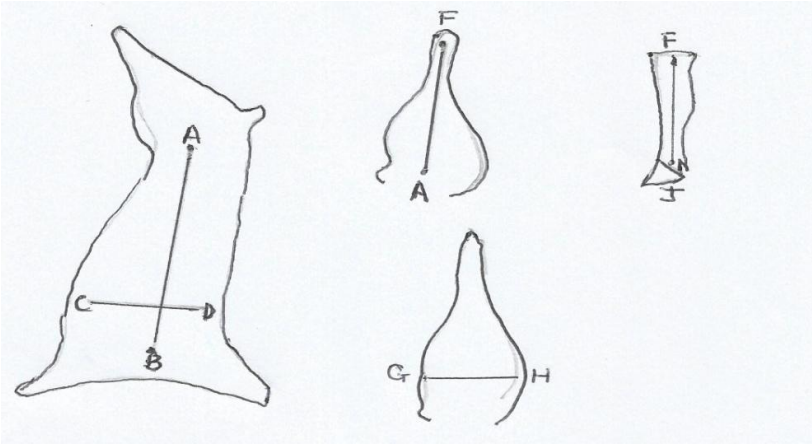

Fig. 1. Procedures for carcass measurements

Source: ATTAH et al. [7]

A - B = Body Length; C - D = Chest Girth; A - F = Ham Length; G - H = Ham Width

reported increased body weight values in sheep receiving supplement containing *M. stenopetala* leaf, likewise dressed weight and dressing percentage were significantly (P<0.05) different among treatment group. Treatment 2 had highest dressed weight and dressing percentage but not statistically (P>0.05) different from Treatment 1, and treatment 4 not significantly different from Treatment 1. The least dressed weight and dressing percentage was recorded in Treatment 3, diet supplemented with air dried *Terminalia mantaly* leaf. Studies by ENEJI et al. [14] also indicate linear increase in dressed weight of West African Dwarf (WAD) goats supplemented with cassava peel meal when fed a basal diet of elephant grass and Rhodes grass.

Pigs in Treatment 1 that received concentrate diet showed a significant (P<0.05) increase in their body length and length of Ham as compared with Treatment 2,3 and 4 carcasses. While, Treatment 4 carcass exerted a significantly (P<0.05) higher values in girt circumference and Ham length of carcass, as compared with Treatment 1, 2 and 3 carcasses. The elevated values experienced by the Treatment 4 for girth circumference and length of Ham indicated that feeding pigs with processed *Terminalia mantaly* had no significant (P>0.05) effect on girt circumference and length of ham carcass cut of the pigs. These results are in line with those reported by JIANG et al. [2] for China Yanan pigs raised on *ad libitum* feeding.

Results of proximate composition of Weaner pig's carcasses fed *Terminalia mantaly* leave are shown in Table 2. The result showed significant (P<0.05) different in all parameters except the moisture content which was not significantly (P>0.05) different from each others. The results indicated a high crude protein (CP) content for Treatment 1 and 2 closely followed with Treatment 4. The least was Treatment 3. The significantly (P<0.05) high crude protein recorded by Treatment 1 and 2 was expected as pigs in Treatment 1 which served as control was fed with concentrate while pigs in Treatment 2 were fed with fresh *Terminalia mantaly* leave as no heat was applied

Table 1. Composition of concentrate diet

Ingredient%	Control (T_1)0%	Fresh (T_2)0.5%	Airdried (T_3)0.5%	Sundried (T_4)0.5
Cassava peel	40	40	40	40
Soya bean meal	25	24.5	24.5	24.5
Palm kernel cake	15	15	15	15
Wheat offal	10	10	10	10
Bone meal	9.5	9.5	9.5	9.5
Salt	0.5	0.5	0.5	0.5
Terminalia mantaly leaves	-	0.5	0.5	0.5
Total	100	100	100	100

Table 2. Productive performance of weaner pig fed with various level of *Terminalia mantaly*

Parameters	Control (T_1)	Fresh (T_2)	Airdried (T_3)	Sundried (T_4)
Live weight (kg)	28.67 ± 0.67^{a}	28.33 ± 0.33^{ab}	21.00 ± 0.58^{d}	24.33 ± 2.33^{bc}
Dressed weight (kg)	12.33 ± 3.67^{ab}	16.33 ± 0.58^{a}	9.17 ± 0.44^{c}	10.83 ± 1.09^{ab}
Dressing percentage	45.01	57.64	43.67	44.51
Body length (cm)	17.33 ± 0.33^{a}	16.00 ± 0.58^{b}	15.33 ± 0.33^{b}	15.67 ± 0.33^{b}
Ham length (cm)	11.00 ± 0.58^{a}	10.00 ± 0.58^{a}	9.33 ± 0.33^{b}	9.00 ± 0.58^{b}
Girt circumference (cm)	13.00 ± 0.58^{a}	12.67 ± 0.33^{ab}	11.00 ± 0.58^{c}	14.00 ± 0.58^{a}
Ham width (cm)	10.00 ± 19.50^{b}	7.00 ± 0.00^{c}	5.67 ± 0.33^{d}	16.50 ± 0.50^{a}

^{abc}: Means in the same row with varying superscripts differed significantly.

Table 3. Chemical composition of weaner pig (meat) fed *Terminalia mantaly*

Parameters	Control (T_1)	Fresh (T_2)	Airdried (T_3)	Sundried (T_4)
Crude Protein	22.80 ± 0.31^{a}	22.15 ± 0.31^{a}	19.30 ± 0.35^{c}	20.40 ± 0.35^{b}
Ether E	0.16 ± 0.00^{a}	0.17 ± 0.01^{a}	0.07 ± 0.03^{c}	0.12 ± 0.01^{a}
Fibre	0.02 ± 0.00^{b}	0.07 ± 0.01^{a}	0.02 ± 0.00^{b}	0.02 ± 0.00^{b}
Moisture	69.77 ± 0.15	69.72 ± 0.84	71.63 ± 1.47	69.75 ± 0.59
Ash	1.08 ± 0.01^{a}	1.10 ± 0.01^{a}	0.90 ± 0.06^{b}	1.01 ± 0.02^{a}

^{abc}: Means in the same row with varying superscripts differed significantly.

during processing. The low level of crude protein in Treatment 3 was as a result of heat applied to the fresh leave during processing.

Pigs fed concentrate and fresh *Terminalia mantaly* leaves contained significantly (P<0.05) higher amount of Ether Extract (EE 22.80 and 22.15) in their meat sample compared with the pigs fed air dried and sun dried *Terminalia mantaly* leaves (Table 2). This result corroborates with the findings of XIAO et al. [15] who reported significant increase on finisher pig's carcass that were fed ractopamine at different dietary protein levels on carcass traits and growth performance. They observed that feeding ractopamine at *ad libitum* resulted in more fat in the body compared with the restricted feeding regime. Fibre content of carcass cut of pigs in Treatment 2 was significantly (P< 0.05) higher than in other cuts respectively, but it was comparable between diets. This observation was similar to work of Murray and Slezacek [16] they reported that in lambs, at the same dissected side weight, the amount of muscle, bone and total fat was similar for three different feeding levels. Likewise, the feeding tried had no significant (P>0.05) effect on moisture and Ash content of meat pigs fed processed *Terminalia mantaly* leave. XIAO et al. [15] also reported that the dietary protein concentration had no effect on the composition of the empty body weight (EBW) of pigs.

4. CONCLUSION

Terminlia mantaly leaves can be used in pig diet as an alternative feed stuff for feeding pigs as a growth promoter. It has resulted better body parts, growth performance and meat quality and quantity of pig meat. Nevertheless, more study should be conducted to establish the optimal level of inclusion and duration of investigate to get more benefit from meat type of pig production.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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