CARCASS QUALITY AND LIPID PROFILE OF GROWING BOARS FED AVOCADO AND GUAVA LEAF MEAL

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ABSTRACT

This study was carried out to assess the carcass quality of growing boars fed avocado and guava leaf meal. Twelve (12) crossbred (LW X LR) boars aged 8 weeks and weighed 24.23 ±0.17kg were used for the study. Three balanced diets formulated with avocado leaf meal (T2) and Guava leaf meal (T3) added at 3% body weight of the animal while T1(without leaf meal) remained as control. The 12 pigs were allotted randomly to the three dietary treatments each comprising of 4 pigs per treatment and two per replicate. At the end of the 56 days feeding trial, blood samples were collected from two pigs per replicate to evaluate the lipid profile while a total of 12 pigs (2 per replicate) were randomly selected, starved for 12 hours and slaughtered to carry out Carcass evaluation. The loin cut was cooked and used for sensory evaluation. Results of serum Lipid profile showed significant ($p<0.05$) reduction in cholesterol for T2(82.57), T3(98.54) and low density lipoprotein T2(14.66), T3(16.86) compared to T1(102.46) and (22.90) while high density lipoprotein increased significantly ($P < 0.05$) in T2(60.30) and T3(63.63) compared to T1(57.53). Dressing percentage showed significant increase, 71% in T2 65% in T3 compared to T1(61%). The same trend was obtained in meat-to-bone ratio. Abdominal fat reduced significantly ($P < 0.05$) in T3(5.00) and T2(6.00) compared to T1(12.00) while sensory evaluation parameters indicated no significant ($p>0.05$) difference among treatments except for tenderness which increased for T2 and T3. Avocado and guava leaves significantly increased Carcass yield, improved lipid profile, reduced fat without any adverse effect on sensory parameters of the pigs.

Keywords: Boars, Avocado, Guava leaf meal, Trial, Carcass,

INTRODUCTION

Pork, the meat from pigs can be eaten in processed forms. Lean pork can be an excellent addition to a healthy diet (Holness, 1991). Consumers have a negative view of pork as containing excess fat. Research has proven that pork contains more polyunsaturated fatty acids which makes it more susceptible to oxidation (Gema and Gasper,2012). Lipid oxidation causes the development of rancidity which negatively affects sensory characteristics (colour, texture and flavour). Inclusion of antioxidants in pigs' diets may counteract the process of lipid oxidation. Avocado and guava leaf meal in pig diets have the potential to improve carcass and sensory quality of pork meat (Angulo-Lopez *et al*,2023). The inherent antioxidant compositions of these leaves could avert the effects of oxidations of lipids and fat in pork which is usually associated with intrinsic and extrinsic quality degradation, reduced nutritional value and general deterioration of pork organoleptic traits. The aim of this study is to assess the effects of avocado and guava leaf meal on carcass, Sensory properties and serum lipid profiles of growing pigs

MATERIALS AND METHODS

Experimental site:

The study was carried out in the Piggery unit of the Department of Animal Science, Akwa Ibom State University, Obio Akpa Campus. The farm is located on lat N and 5o27'N and longitude 7°21'E and 7°58'E with a monthly temperature range between 24 to 26°C. The relative humidity varies between 60 to 90 % and the annual rainfall from 3500 to 5000 mm (AKSU-MET 2024).

Source of Experimental Material and preparation of diet

Twelve (12) grower Pigs were acquired from the piggery unit of Akwa Ibom State University, Obio Akpa Campus for the experiment Avocado leaf and Guava leaf were manually harvested from the avocado and guava trees respectively in the university environment. The leaves were air-dried and chopped into meals before being added to the formulated diet at 3% body weight of the animal. Conventional feed ingredients (rice bran maize, palm kernel cake, soybean and bone meal) were used to formulate the pig diet. Diets formulated were: diet 1(without leaf meal). diet 2(formulated diet + Avocado leaf meal). Diet 3: (formulated diet + Guava leaf meal).

Experimental design and management of experimental animals

Twelve (12) crossbred (Landrace x large white) young boars aged 8 months and weighed 24.23 ±0.17kg were acquired from the piggery unit of the Department of Animal Science, Akwa Ibom State University and used for the study. The pigs were weighed at the start of the trial to obtain initial body weight before being randomly assigned to three (3) dietary treatments in a completely randomized design. Supply of clean water and feed *ad libitum* were carried out throughout the period of the experiment. The study lasted for 56 days.

Carcass and Sensory Evaluation

At the end of the 56 days feeding trial, a total of 12 pigs (2 per replicate) were selected for carcass assessment. Pigs were randomly selected, weighed and starved for 12 hours then stunned and slaughtered by severing the Jugular vein. This was followed by scalding and evisceration. Carcass cut parts and organ weights were taken. The dressed weight obtained was used to calculate dressing percentage as the ratio of dressed weight to live weight multiplied by 100. Each of the organs (heart, liver, kidney and lungs) as well as the abdominal fat were removed and weighed using electronic scale (AS3101) manufactured by Adventurer OHOUS. Organ weights were expressed as percentage of live weight. The carcass was fabricated into different primal cuts. Meat sample (Loin cut) was obtained, cooked before subjected to sensory evaluation. Meat to bone ratio was determined by weighing the sample(left thigh cut) before deboning(separating meat from bones) and weighing each component then divided meat weight by bone weight and multiplied by 100. Sensory evaluation of samples of cooked pork was assessed by ten (10) trained panelists using a 9-point hedonic scale as described by Ekpo and Okon (2023). Meat quality parameters assessed were colour, juiciness, flavour, tenderness, overall acceptability. Bite size portions of 10g each were served to panelists who were asked to comment freely on each sample served.

Data collection

On the final day of the experiment, total of twelve pigs (2 per replicate) were bled after puncturing the jugular vein. 5mls of blood were collected into labeled sterile sample bottles without anticoagulant to determine the serum lipid profile.

Statistical Analysis

Completely randomized design (CRD) will be used. Data collected were subjected to one-way Analysis of Variance (ANOVA) as outlined by Zar (1984) while the means were separated using New Duncan's Multiple Range Test (Duncan,1955).

RESULTS AND DISCUSSION

Table 1: Serum Lipid Profile of Pigs fed *Persea americana* and *Psidium guajava* leaves meal

Parameter	T_1 (Control)	T_2 (PALM)	T_3 (PGLM)	SEM
Cholesterol (mg/dl)	102.46[a]	82.57[c]	98.54[b]	1.32
Triglycerides (mg/dl)	96.33[a]	85.23[c]	86.87[b]	0.18
HDL-C (mg/dl)	57.53[c]	60.30[ab]	63.63 [a]	0.66
LDL-C (mg/dl)	22.90[a]	14.66[c]	16.86[b]	1.90
VLDL-C (mg/dl)	19.27[a]	17.05 [b]	16.04[bc]	1.18

[abcd]: *Means across treatments bearing different superscripts are significant (P<0.05).*

The results of Cholesterol showed T_2 was significantly (P<0.05) lower than all the treatments. This was followed by T2 while T1 had the highest. Results of Triglyceride showed T_2, T_3 while T1 had the highest. Cholesterol and Triglycerides reduction in T2 and T3 enhanced lipid metabolism. Dabas *et al* (2013), reported that guava leaves are rich in antioxidants particularly polyphenols, which can reduce oxidative stress and improve lipid metabolism. Studies have shown that feeding guava leaves to pigs leads to lower levels of total cholesterol, triglycerides, and LDL while increasing HDL levels, indicated improved cardiovascular health (Gutierrez *et al*., 2008). High density lipoprotein was significantly ($P < 0.05$) higher in T_3 than T_2 and T_1. Low-density Lipoprotein shows that T_2 and T_3 were significantly ($P < 0.05$) lower than T_1. VLDL-C shows that T_2 was significantly lower than T_1 and T_3 as shown in Table 1. HDL indicated that T_3 showed higher HDL levels, suggesting guava leaves contain hypocholesterolemia factors such as the flavonoids. For LDL, both T_2 and T_3 showed significantly ($p<0.05$) reduced LDL-C compared to the control, reflecting the beneficial effects of both leaf types. VLDL, T_2 exhibited the lowest levels, reinforcing its positive impact on lipid health and this finding is in line with Dabas *et al., (*2013) and Ekpo and Okon (2022). This suggests that polyphenols and antioxidants like vitamin C and E present in guava and avocado leaves could have caused reduction in low density lipoprotein, very low density lipoprotein and triglycerides while improving high density lipoprotein observed in T_2 and T_3. These results indicate that the inherent antioxidant compositions of guava and avocado leaf meal could avert the effect of oxidations of lipid in pig serum which is usually associated with quality degradation in pork.

Dressing Percentage indicated that T_2 was significantly ($P < 0.05$) higher followed by T_3 while the least T_1. The higher dressing percentage obtained in T_2 and T_3 may be attributed to effect of antioxidants present in diets 2 and 3. This is because antioxidants could improve nutrient utilization thereby improve meat yield of T_2 and T_3. This report is in agreement with earlier reports by Ekpo and Okon (2024) and Onyimonyi and Ugwu (2007). For Meat to Bone ratio, T_2 indicated significant increase ($P < 0.05$) followed by T_3 while the least was obtained in T_1. This reflected the dressing percentage (%). The increase may be linked to the antioxidant effect on meat yield. Antioxidant can indirectly improve meat yield and quality by not only reducing stress, and enhancing animal health, but also improving feed efficiency and better nutrient utilization which may result in higher meat to bone ratio and improved carcass yield observed.

Table 2: Carcass characteristics of Pigs fed *Persea americana* and *Psidium guajava* leaves meal

Parameter	T_1 (Control)	T_2 (PALM)	T_3 (PGLM)	SEM
Pre-slaughter (kg)	32.00[c]	34.00[b]	38.00[a]	1.86
Dressing weight (kg)	19.40[c]	24.00[b]	26.00[a.]	1.80
Dressing %	61.00[c]	71.00[a]	68.24[b]	2.00
Head	8.60	8.70	9.20	1.05
Shank/Trotter (kg)	1.50	1.50	2.10	1.08
Belly (kg)	1.80	2.10	1.25	1.10
Breast (kg)	3.40	3.40	4.31	1.12
Thick Rib chop (kg)	5.90[bc]	6.20[b]	9.30[a]	1.18
Rib Chop (kg)	2.30	2.80	3.40	1.09
Loin (kg)	2.10	2.60	2.50	1.05
Chump Chop (kg)	2.80	2.80	3.70	1.10
Leg fillet end (kg)	3.90	3.70	4.30	1.08
Leg Shank End (kg)	3.35[b]	4.70[a]	3.50[b]	1.11
Kidney (% of LW)	0.30	0.37	3.40	1.08
Lungs (% of LW)	0.80	0.90	1.50	1.04
Liver (% of LW)	1.50	2.50	0.28	1.07
Spleen (% of LW)	0.10	0.10	0.10	1.50
Heart (% of LW)	0.30	0.40	0.40	0.19
Meat to bone ratio	1.72[c]	4.00[a]	2.00[b]	0.06
Abdominal fat(g)	12.00[a]	6.00[b]	5.00[b]	1.06

[abcd] *Means across treatments bearing different superscripts are significant (P<0.05)* LW- Live weight

The significant ($p<0.05$) increasing weight of some cut parts (head, thick rib chop and shank end) is strongly connected to the dressed weight and seemed to follow some trend. For the organs weight, the non-significant ($p>0.5$) differences observed suggest improved physiological functions as well as the non-adverse effect of the test diets due to anti nutritional factors.

Abdominal fat reduced in T_2 and T_3. This implies that PALM and PGLM drastically reduced fat in the carcass suggesting that the test diets were hypolipidemic. Antioxidants in combination with dietary fibre present in the test diets could reduce the fat content. Ekpo *et al*. (2022) had reported that carcasses are less fattened when fed with diets that have high fiber. The authors also observed that as carcass are less fattened, leanness increase in meat.

Table 3: Sensory Qualities of Pigs fed *Persea americana* and *Psidium guajava* leaves meal

Sensory parameters	T_1 (CONTROL)	T_2 (PALM)	T_3 (PGLM)	SEM
Flavor	7.40	7.77	8.07	1.20
Juiciness	7.10	7.93	6.77	1.32
Tenderness	6.03[b]	8.10[a]	6.83[a]	1.35
Texture	7.07	7.77	6.43	1.35
Overall acceptability	7.10	6.53	7.40	1.82

[abcd] *Means across treatments bearing different superscripts are significant (P<0.05)*
PALM=*Persea americana* leaf meal. PGLM= *Psidium guajava* leaf meal

There was no significant ($p>0.05$) difference among treatments with respect to flavor, juiciness, texture and overall acceptability. However, a significant ($p<0.05$) difference was observed in tenderness as T_2 and T_3 which were statistically similar ($p>0.05$) scored higher than the T_1 (control). The increasing score obtained in T_2 and T_3 could be attributed to the antioxidants like vitamins E, and C and polyphenols present in the guava and avocado leaf meal which help maintain structural integrity of muscle proteins. This action helps maintain the natural tenderness of meat during cooking (Harris *et al* 2001). Generally, supplementing animal feed with natural antioxidant ensures better oxidative stability postmortem, leading to improved tenderness of meat.

CONCLUSION

This study has revealed that Avocado and guava leaf meal significantly improved carcass yield, and lipid parameters without any adverse effect on sensory properties of pork. From the study, it could be recommended that supplementing pig diets with guava and avocado leaves meal should be adopted by farmers. More so, higher levels of inclusion are recommended.

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