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Effect of Dietary Inclusion of *Ipomoea Asarifolia* Leaf Meal on the Performance, Carcass and Organ Characteristics of Grower Pigs

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Abstract

Fifty-six day feeding trial was conducted to evaluate the effect of dietary inclusion of *Ipomoea asarifolia* leaf meal (IALM) on the carcass and organ characteristics of grower pigs. The 32 Largewhite x Hampshire weaner pigs, aged 8 –9 weeks with average initial liveweight of 18kg were assigned to four dietary treatments 1, 2, 3 and 4 containing 0%, 5%, 10% and 15% IALM respectively. Feed and potable water were supplied *ad libitum* at 700 hours and 1700 hours daily. On the 56th day, one pig was randomly picked from each replicate, starved of food but offered water for 24 hours before slaughter. The organs were separated and weighed while the carcass was cut into parts and weighed with salter weighing scale. Results show significant differences (P<0.05) between treatments in all the carcass parameters measured. However, T1 and T2 did not significantly differ (P>0.05) in most parameters measured. Lower values of the parameters were observed with increasing levels of IALM in both carcass and organ characteristics.

Keywords: *Ipomoea asarifolia* leaf meal, carcass, organ characteristics, grower pigs.

1.0 Introduction

The present global inflation and its crushing effect on the livestock industry have not only sharpened the critical competition between human and monogastric livestock for available food proteins (Tegbe, 1983), but have made animal protein scarce and too expensive for the average consumer. Nwakpu *et al*, (1999) reported that feedstuffs and ingredients used in pig ration formulation such as maize, groundnut cake and soya-bean have continued to be scarce and costly mainly due to their cost of production and competition between livestock and man. Consequently, high cost of feed has caused the collapse of many small and large scale pig enterprises, discouraging prospective farmers and limiting further expansion of small-scale piggeries, (Nwakpu *et al*, 2000). Pond and Manner (1974) had estimated that 55 – 85% of total cost of pig production was of feed component and for early-weaned pigs; the feed demand is more critical. There is therefore urgent need to source for locally available and cheap alternative feed materials which are not directly consumed by humans for monogastric animal production).

Among the alternative materials already studied are rubber seed Madubuike *et al* (2006), *Microdesmis puberula* leaf meal (Esonu et al, 2003) and *Ipomoea asarifolia* leaf meal (Ekenyem, 2006). The aim of this trial is to evaluate the responses of organ and carcass characteristics to varying replacement levels of *Ipomoea asarifolia* leaf meal for groundnut cake in grower pig diets.

2.0 Materials and Methods

2.1 Preparation of the Leaf Meal

The leaf meal was prepared by harvesting fresh *Ipomoea asarifolia* leaves from bush and fallow sections of Imo State University premises and environs, chopped to facilitate drying and spread on concrete floor of well-ventilated room for 4 days until they become crispy.

The dried leaves were then milled using a hammer mill with a sieve size of 3.15mm to produce the leaf meal (IALM), (Ekenyem, 2006). The chemical profile of IALM is presented in (Table 1) as determined by the standard methods of AOAC (1995) and mineral analysis by methods of Grueling (1966) while gross energy was determined with a gallen kamp oxygen adiabatic bomb calorimeter. The results of the proximate analysis of *Ipomoea asarifolia* leaf meal was the basis for the diet formulation. IALM was incorporated into the experimental diets 1, 2, 3 and 4 at 0%, 5%, 10% and 15% levels respectively with 0% level as control.

Table 1: Proximate composition of IALM

Nutrient	Value (%)
Crude fibre	16.90
Crude protein	32.00
Ash	7.10
Ether extract	7.60
Moisture	15.00
NFE	20.79
Minerals	Value (%)
Calcium	0.50
Magnesium	0.63
Sodium	0.29
Potassium	0.50

Table 2: Ingredient composition of experimental pig grower diets (100kg)

Ingredients	Treatments		
	0%	5%	10%
Cassava chips	25.00	25.00	25.00
Groundnut cake	15.00	10.00	5.00
Leaf meal IALM	0.00	5.00	10.00
Soya bean meal	3.00	3.00	3.00
Palm kernel cake	10.00	10.00	10.00
Deoiled palm kernel cake	15.35	15.35	15.35
Brewers dried grains	20.00	20.00	20.00
Fish meal	5.00	5.00	5.00
Oyster shell	3.00	3.00	3.00
Lime stone	3.00	3.00	3.00
Common salt	0.30	0.30	0.30
L-lysine	0.06	0.06	0.06
DL-methionine	0.04	0.04	0.04
* Premix	0.25	0.25	0.25
Total	100	100	100
Calculated Nutrient Compositions			
Dry matter %	84.10	83.75	83.40
Crude protein %	18.64	17.99	17.34
Metabolisable energy (kcal/kg)	2388.85	2395.25	2400.00
Ether extract %	4.36	4.45	4.53
Crude fibre %	9.38	9.98	10.57

* Premix supplied per kg of feed. Vit. A 10,000 iu, Vit D_3 2,000 iu, Vit E 5 iu, Vit K 2mg, Riboflavin 420mg, Vit. B_{12} 0.01mg, panthotenic acid 5mg, nicotinic acid 20mg, folic acid 0.5mg, chlorine 3mg, mg 55mg, Fe 20mg, Cu 10mg, Zn 50mg, iodine 0.8mg.

2.2 Siting, Procurement and Rearing of the Weaner Pigs

A total of 32 weaner pigs of Largewhite x Hampshire hybrid aged 8 – 9 weeks, having average initial weights of 18kg and procured from a commercial pig breeder farm were used in a 8-weeks feeding trial at the Piggery unit of Imo State University Teaching and Research Farm, Owerri, Nigeria, to determine the effects of varying dietary inclusion levels of IALM in diets of grower pigs. Owerri is located on longitudes 7^o01`, $06^o$E and $7^o03$`, 00`E and latitudes $5^o28$`, 24`N and $5^o30$`, 00N.

The experimental pigs were assigned to four diets containing 0%, 5%, 10% and 15% levels of IALM in a completely randomized design (CRD) and each treatment further replicated four times with 2 pigs per replicate. Feed and water were offered *ad libitum* usually at 700 hours and 1700 hours daily. Medication and other management practices such as regular washing and disinfection of pens were observed.

Initial liveweights were measured at the beginning of the experiment while the final weights were measured at the end of the experiment. On the 56th day of the experiment, one pig was randomly picked from each replicate, starved for 24 hours but supplied with adequate water before slaughter. The pig was slaughtered by stunning (hitting a rod on its forehead) to render it unconscious before cutting the jugular vein. It was then allowed to bleed to death. Scalding was done with hot water before evisceration. Several meat parts were cut and weighed to determine carcass characteristics. Internal organs such as heart, liver, kidney were measured as percentage of the liveweight.

Data collected were analysed by one-way analysis of variance according to the methods of Steel and Torrie (1980) and differences in means separated by Duncan's multiple range test as outlined by (Onuh and Igwemma, 1998).

3.0 Results

The results of this experiment are hereby presented (Table 3). There were significant differences ($P<0.05$) between treatments in all the carcass characteristics. However, T_1 and T_2 had similar values ($P>0.05$) in most parameters except in body length and dressing percentage where significant differences ($P<0.05$) were found between them. The results showed lower values of the parameters with increasing levels of IALM.

Table 3: Carcass characteristics of pig fed different levels of IALM

Parameters	T_1	T_2	T_3	T_4	SEM
Initial liveweight (kg)	18.10^a	18.20^a	17.80^a	18.00^a	0.21
Final liveweight (kg)	41.25^a	40.00^a	34.75^b	32.00^b	1.50
Shrunk weight (dead weight) (kg)	37.00^a	36.00^b	32.00^c	28.00^d	0.11
Warm carcass weight (kg)	26.13^a	25.00^b	22.00^c	19.20^d	0.19
Dressed weight (kg)	21.25^a	20.25^a	17.88^b	15.83^c	0.51
Dressing percentage (%liveweight)	51.21^a	50.62^b	50.11^b	49.47^c	0.04
Body length (cm)	83.38^a	79.50^b	73.75^c	70.00^{cd}	1.45
Rough ham (kg)	6.55^a	6.28^a	5.45^b	4.90^c	0.14
Rough Picnic shoulder (kg)	3.10^a	2.98^a	2.70^b	2.40^c	0.07
Fat back (cm)	2.05^a	2.03^a	1.68^b	1.28^c	0.09
Rough Boston butt (kg)	2.93^a	2.88^a	2.65^b	2.68^c	0.04
Weight of head (kg)	3.55^a	3.28^{ab}	3.08^{bc}	2.95^c	0.09
Weight of feet (kg)	1.48^a	1.40^{ab}	1.20^b	0.90^c	0.09

abcd: means within same row with different superscripts are significantly different ($P<0.05$).

The organ weights (Table 4) were measured as percentages of liveweight. Weight of liver for T_1, T_2, T_3 and T_4 which were 2.15%, 2.20%, 2.45%, 2.85% respectively differed significantly between treatments.

However, T_1 and T_2 were not significantly (P>0.05) different from each other. The values increased with increasing levels of IALM. The heart also showed significant difference between T_4 (0.93) and the rest. T_1 (0.083), T_2 (0.80), T_3 (0.083). The results of kidney were not statistically different (P>0.05) between treatments.

4.0 Discussion

The results show that the dressed carcass weights of pigs were 21.25kg, 20.25kg, 17.88kg and 15.83kg for treatments T_1, T_2, T_3 and T_4 respectively (Table 3) which showed significant differences (P<0.05) between treatments 1, 3 and 4.

However, T1 and T2 did not differ (P>0.05). The very low values of carcass characteristics of pigs on T4 is closely related to their low final liveweight which decreased with increasing levels of IALM in the diets. Dressing percentages were 51.21, 50.62, 50.11 and 49.47 for treatments 1, 2, 3 and 4 and they were significantly different (P<0.05) from each other. Madubuike and Ekenyem (2001) had stated that well-finished pigs may yield up to 76% of dressed carcass. The pigs in this trial ran grossly short of this estimation.

All carcass parameters showed significant differences (P<0.05) between treatments as values reduced with increasing levels of IALM in diets. This anthropometric phenomenon shows there is positive relationship between liveweight and the weights of various carcass components. The body lengths, weight of Ham, fat back, weight of Boston Butt, weight of head and weight of feed showed significant differences (P<0.05) between treatment means, with pigs on T_1 and T_2 showing superiority over those of T_3 and T_4. There were generally decreased values of the parameters with increasing values of IALM.

The organ weighs were measured as percentage of liveweight, weight of liver for the control (T_1) pigs was 2.15%, T_2, T_3 and T_4 had 2.20%, 2.45% and 2.85% respectively. Though the liver significantly varied (P<0.05) between treatments, those of T_1 and T_2 were similar (P>0.05). It is therefore apparent that inclusion of IALM in this study increased the liver size of experimental pigs. Also enlarged liver is an indication that the material contain toxic substances as the higher the inclusion level of IALM, the higher the value of the liver. This result disagreed with Esonu *et al.* (2002), who found reduction in the organ weights of broilers with additional *Microdesmis puberula* leaf meal.

Table 4: Organ weights (% body weight) of grower pig fed varying levels of Ipomoea asarifolia leaf meal.

Parameters	T_1	T_2	T_3	T_4	SEM
Final liveweight	41.25^a	40.00^a	34.75^b	32.00^b	1.50
Liver (%)	2.15^c	2.20^c	2.45^b	2.85^a	0.04
Heart (%)	0.83^{cd}	0.80^{bd}	0.83^{bc}	0.93^a	0.02
Kidney (%)	0.70^a	0.60^a	0.60^a	0.63^a	0.04

abcd: means within same row with different superscripts are significantly different (P<0.05).

The weight of heart (% body weight) showed significant differences (P<0.05) in the treatments T_1, T_2 and T_3 over T_4. The control (T_1) was 0.74%, T_2 0.72 indicating a reduction in value as 5% IALM was added to diet. For T_3, the value increased to 0.79% but still lower in T_4 which had 0.78% thus revealing no definite pattern. The implication is that inclusion of IALM in diets of grower pigs had no effect on the weight of heart in pigs.

This trend was also observed in the weight of kidney as no significant difference (P>0.05) was observed between treatments.

5.0 Conclusion

The carcass characteristics of grower pigs were influenced by inclusion of IALM. However, the liver weights increased with increasing values of IALM while other organ characteristics did not seem to be influenced by additional levels of IALM in the diets. Therefore, IALM was highly tolerated by the pigs as feed ingredient without any deleterious effects on the organ and carcass characteristics.

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