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An Assessment of *Ipomoea asarifolia* Leaf Meal as Feed Ingredient in Grower Pig Diet

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Abstract: Thirty-two large white X Hamshire hybrid weaner pigs aged 7 weeks with average initial weights of 18kg were used in an 10 weeks feeding trial to study the performance of pigs fed varying levels of *Ipomoea asarifolia* leaf meal. The 32 weaner pigs were split into 4 groups and assigned to the dietary treatments containing 0%, 5%, 10% and 15% *Ipomoea asarifolia* leaf meal (IALM) respectively and further replicated four times in a completely randomized design. Feeding and potable water were supplied *ad libitum* while routine medication and sanitation were scrupulously observed. Live weights were measured at the start of the experiment but weekly thereafter. The initial weights daily weight gain, daily feed intake, feed conversion ratio, feed cost per pig were calculated. Final body weights 41.25kg, 40.00kg, 34.75 and 32.00kg for pigs on treatments 0%, 5%, 10% and 15% IALM respectively differed significantly ($P<0.05$) between treatments. Weights of pigs on diets 0% and 5% IALM did not significantly differ ($P>0.05$). Feed conversion ratio for pigs on diet 0% and 5% IALM were significantly superior ($P<0.05$) to those on 10% and 15%. Daily feed intake and feed cost per pig reduced with increasing amount of IALM in the diets and differences between treatment in each parameter were significant ($P<0.050$. it was found that IALM could be included in weaner pig diets up to 15% level without deleterious effect but optimally of 10% level.

Key words: Performance, weaner pigs, *Ipomoea asarifolia* leaf meal

Introduction

The sub-optimal animal protein intake among Nigerians has attained a crises status while urgent needs to revamp it is aptly imperative. This animal protein gap has been blamed on high cost of monogastric livestock production especially the feed cost which Opara (1996); Madubuike *et al.* (1999); Madubuike and Ekenyem (2001) had estimated at 70-80% for monogastric animal production arising mainly from protein concentrates. Nwakpu *et al.* (1999) have further stated that feed stuffs for pig such as soya bean and maize are costly due to cost of production while their demand is critical in early weaned pigs.

As a panaceae to the low animal protein intake, Ekenyem *et al.* (1999) have advocated for cheaper feed ingredients to reduce production cost and make the products affordable for the people while Madubuike (1984) had suggested the use of non-conventional sources to achieve lower feed cost. Esonu *et al.* (2002), advocated the use of cheap and indigenous sources of protein and energy preferably those not competed for between man and his livestock and therefore suggested the leaves of tropical legumes and browse plants. This trial seeks to assess the effects of varying dietary inclusion levels of *Ipomoea asarifolia* leaf meal (IALM) in the performance of grower pigs.

Ekenyem (2004) had stated that *Ipomoea asarifolia* (morning glory) belongs to the family convulvulaceae. It is a herbaceous plant found largely in South Eastern Nigeria having stems growing to the height of 1 metre which arise from stolons. They have purple flowers which develop three seeds for sexual propagation although asexual propagation can also be achieved by stolons.

In Nigeria, the leaf of *Ipomoea asarifolia* has no known food value and thus popularly used as compost material, mulch, as well as constituting weed in farms. Thus with a crude protein level of 32%, metabolizable energy 2768kcal/kg and good mineral profile *Ipomoea asarifolia* leaf has a potential as a cheap feed ingredient for pigs and therefore has the capacity to resolve the animal protein deficit in human diets, especially in Nigeria.

Materials and Methods

Preparation of the leaf meal: Fresh and blooming morning glory leaves *Ipomoea asarifolia* were harvested green from the 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 four days until they become crispy. The dried leaves were then milled using a hammer mill with a sieve size 3.15mm to produce the leaf meal (IALM).

The chemical composition of IALM (Table 1) was determined by the standard method of AOAC (1995) and mineral analysis by methods of Grueling (1966) while gross energy was determined with a gallen kamp oxygen adiabatic bomb calorimeter.

Preparation of the experimental diets: With the results

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
Metabolizable Energy kcal/kg	2768.00
Minerals	**Values %**
Calcium	0.50
Magnesium	0.63
Sodium	0.29
Potassium	0.50

of the analysis *Ipomoea asarifolia* leaves were then incorporated into the experimental diets 1, 2, 3 and 4 at levels 0, 5, 10 and 15% respectively with 0% level as the control (Table 2).

Siting, procurement and rearing of weaner pigs: Thirty two large white X Hamshire weaner pigs, aged 7-8 weeks with average initial weights of 18kg were procured from a commercial pig breeder farm and reared at the pig production unit of the Imo State University Teaching and Research Farm, Owerri, Nigeria for 10 weeks to determine the effects of varying dietary inclusion levels of grower pigs. Owerri is located on longitudes 7°01', 06"E and 7°03' 00"E and latitudes 5°28' 24"N and 5°30'00"N.

The weaner pigs were assigned to four dietary treatments containing 0, 5, 10 and 15% levels of IALM and each treatment was further replicated 4 times in a completely randomized design with 2 pigs per replicate. The pig house has walls 1.5m high asbestos roof and concrete floor and partitioned into pens of 4sqm each and protected from flies with wire netting. The roof is suspended by metal pillars to a height of 3 meters to facilitate adequate ventilation and temperature moderation. Feeding and water supply were *ad libitum* and usually done at 700 hours and 1700 hours daily and spread in such a manner that each pig had adequate access to feed and water. Medication and other standard management practices such as regular washing and disinfection of pens were observed. Initial weights were taken and subsequently live weight was measured on weekly basis using a hanging spring balance. The final weight was measured at the 10th week of the trial. The initial weight was subtracted from the final weight to get the weight gain. The feed intake, feed cost per broiler (Aggregate cost of feed ingredients consumed by each bird).

All parameters were subjected to one way analysis of variance as outlined by Steel and Torrie (1980) while differences between means were separated using the Duncan's multiple range test as outlined by Onuh and Igwemma (1998).

Results and Discussion

The result of the performance of grower pigs fed varying levels of IALM is shown in Table 3.

The experimental pigs had similar initial body weights of 18.1kg, 18.2kg, 17.81kg and 18.0kg for treatments 0% IALM, 5% IALM, 10% IALM and 15% IALM respectively. The final Live weights were 41.25kg, 40.00kg, 34.75kg and 32.00kg for treatments 0%, 5%, 10% and 15% IALM levels respectively which showed significant differences ($P<0.05$) between treatments. Though the final Live weights for pigs on 0% and 5% IALM did not differ ($P>0.05$), but were higher than those of 10% and 15% IALM.

This suggests that inclusion of IALM beyond 5% reduced growth rate of grower pigs. Furthermore, the live weight gain showed that pigs on control diet (0%IALM) had the highest live weight gain 23.15kg followed by those in 5% IALM with 21.80kg and both treatments did not differ significantly ($P>0.05$). The live weight gain of pigs on 10% IALM 17.18 and 15% IALM 14.05kg were significantly lower than the values for 0% and 5% levels of IALM and differed between each order ($P<0.05$). This result differs with Iyayi (2001) who observed that supplementing basal concentrates with cassava leaves up to 20% improved food intake and weight gain of pigs. He attributed the significant decrease above that level to higher crude fibre level and lower digestibility of cassava leaves by animals on this leaf.

Conversely, the result is consistent with reports on poultry in which Esonu *et al.* (2002) observed that 15% level of *Microdesmis purberula* leaf meal depressed growth and also agrees with general observations elsewhere that at high leaf meal inclusion levels in poultry diets growth is depressed, D'Mello and Acamovic (1989); Opara (1996); Ash *et al.* (1992).

The result of the experiment showed that feed intake was higher in pigs on control experiment but decreased in 5, 10 and 15% levels implying that additional levels of IALM in diets reduced feed consumption. Non-significant differences were observed between the feed intake of pigs on 0, 5 and 10% IALM but they all differed from that of 15% IALM. Feed conversion ratio (1.74) was best with pigs on control diet followed by those on 5% IALM (1.88) both of which did not differ significantly ($P>0.05$) but fed more efficiently ($P<0.05$) than pigs on 0 and 15% IALM. The cost of diets with 0% IALM and 5% IALM were significantly higher ($P<0.05$) than the cost of diet with 15% IALM. Thus the inclusion of higher levels of IALM in pig diets reduced cost of production. However, the 15% IALM was also tolerated by pigs, a pointer to the fact that potential value of IALM in reducing cost of pig production which in turn can make pork affordable by the average consumer thus helping to bridge the animal-protein gap (Madubuike, 1992).

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

Ingredients	Treatments			
	0%	5%	10%	15%
Cassava chips	25.00	25.00	25.00	25.00
Groundnut cake	15.0	10.50	5.00	0
Leaf meal (IALM)	0	5.0	10.0	15.0
Soya bean meal	3.0	3.0	3.0	3.0
Palm kernel cake	10.0	10.0	10.0	10.0
Deoiled palm kernel cake	15.35	15.35	15.35	15.35
Brewers dried grains	20.0	20.0	20.0	20.0
Fish meal	5.0	5.0	5.0	5.0
Oyster shell	3.0	3.0	3.0	3.0
Limestone	3.0	3.0	3.0	3.0
Common salt	0.3	0.3	0.3	0.3
L-lysine	0.06	0.06	0.06	0.06
Dl-methiame	0.04	0.04	0.04	0.04
Premix	0.25	0.25	0.25	0.25
Total	100	100	100	100
CALCULATED NUTRIENT COMPOSITIONS				
Dry matter %	84.10	83.75	83.40	83.05
Crude protein %	18.64	17.99	17.34	16.69
Metabolizable energy (kcal/kg)	2388.85	2395.25	2400.00	2408.05
Ether Extract %	4.36	4.45	4.53	4.61
Crude fibre %	9.38	9.98	10.57	11.17

Table 3: Performance characteristics of Grower pigs fed varying levels of IALM

Parameters	Treatments				
	0%	5%	10%	15%	SEM
Initial live weight (kg)	18.1^{a}	18.2^{a}	17.8^{a}	18.0^{a}	0.212
Final live weight (kg)	41.25^{a}	40.00^{a}	34.75^{b}	32.00^{b}	1.504
Live weight gain (kg)	23.15^{a}	21.80^{a}	17.18^{b}	14.05^{c}	0.872
Daily weight gain (kg)	0.41^{a}	0.39^{a}	0.31^{b}	0.25^{c}	0.016
Daily feed intake (kg)	0.81^{ab}	0.79^{ac}	0.79^{bc}	0.76^{d}	0.007
Feed conversion ratio	1.74^{b}	1.88^{b}	0.29^{a}	2.62^{a}	0.125
Feed cost per pig (N)	1246.92^{ab}	1138.17^{bc}	1065.46^{acd}	936.93^{d}	59.42

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

Conclusion: The result of the experiment has shown that *Ipomoea asarifolia* leaf meal could be used as a feed ingredient in pig production. It also shows that though the leaf meal could be included up to 15% in diets of pigs without deleterious effect, the optimal level of inclusion is between 5% and 10%. The inclusion of IALM in the diet reduced the cost of each diet thus satisfying one of the objectives of the trial. The performance of pigs were depressed by higher levels of IALM in diets. The implication of this result is that IALM possesses the potential to contribute to animal protein production, thus making animal products affordable for the masses with the attendant benefits. Further work should be done to determine the anti-nutritional and toxic factors available in *Ipomoea asarifolia*.

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