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Full Length Research

Dietary assessment of high energy ingredients of *Pannicum maximum* on growing pigs

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ABSTRACT: The management and production of monogastric are becoming very expensive due to the high cost of conventional feeds. There is need for cheaper feed ingredients to reduce the cost of production and make pig meat affordable for the populace. The objective of this study is to evaluate the dietary assessment of high energy ingredients of *Pannicum maximum* on growing pigs. A total of 45 young pigs between 18 and 19 kg live body weight on average, were used in a completely randomized design (CRD) experiment. The pigs were obtained from a landrace x large white crosses. There were five treatments of nine animals each replicated three times with three pigs per replicate. Pigs in treatment 1 (T_1) were taken as the control group fed only formulated basal diet while pigs in treatments 2, 3, 4, and 5 were fed basal diet in addition to 15%, 20%, 25% and 30% of Pannicum Maximum Meal (PMM) *ad libitum* respectively. The whole experiment lasted for 60 days. The result revealed that pigs fed 15% PMM had significant ($p<0.05$) increase on their final body weight than the control and other pigs that fed PMM. Alternatively, inclusion of PMM above 15% did not have significant ($p>0.05$) increase in the body weight of experimental pigs than control. It was therefore concluded that PMM have a significant ($p<0.05$) effect on the performance of growing pigs especially at 15% level of inclusion as well as on the feed conversion ratio and daily feed intake. It was therefore recommended that Pannicum Maximum Meal (PMM) be included in pigs' feed at 15%.

Keywords: Growth performance, guinea grass, pigs, *Pannicum maximum*.

INTRODUCTION

Over the years, the management and production of monogastric are becoming very expensive due to the high cost of conventional feeds. According to Madubuike and Ekenyem (2001), 70 to 80% of the total cost emanated from high cost of these concentrates. Due to this, the use of cheaper feed ingredients to reduce the cost of production and make pig meat affordable for the populace has been advocated (Ekenyem, 2004). There is the need to search for feed ingredients that are not competed for by both man and animals. To reduce cost, Esionu *et al*. (2002) suggested the use of leaves of tropical legumes, grasses and browse plants to feed monogastric animals. Interestingly, guinea grass (*Pannicum maximum*) grows in abundance in the Southern region of Nigeria and have been found to be a good replacement of maize feed. It can be growing in fodder banks, established pastures and in the wild.

Though, guinea grass is used extensively in ruminant nutrition because of their ability to handle high fiber in their diets much attempt has not been made to include grasses in pig diets (Adetunji *et al*., 2020; Olayeni *et al*, 2006). There is this fear that monogastric animals do not digest fiber effectively. Recent reports have shown that pigs require some level of lignocelluloses, the major component of fiber (Kroismayr, 2008). Some research showed that pigs can thrive on diets containing forage and forage products such as cocoyam leaves (Rodriguez *et al*., 2006), wild sunflower leaf meal (Olayeni *et al*., 2006) and morning glory leaves (Ekenyem, 2006). Ekenyem (2004) reports showed that small scale pig farmers allow their pigs access to green forage as supplement. However, empirical review from previous researchers did not report the amount of the forage required for pig diets. Therefore, the objective of this study is to determine the energy values of high energy fiber dietary ingredients of *Pannicum maximum* fed to growing pigs.

MATERIALS AND METHODS

Site of study

The study was carried out at the Swine Unit of the Teaching and Research Farm, University of Uyo, Uyo, Akwa Ibom State, Nigeria. It is located in the coastal southern part of the country, lying between latitudes 4°32'N and 5°33'N, and longitudes 7°25'E and 8°25' E. The state is located in the South-South geographical zone, and is bordered on the east by Cross River State, on the west by Abia State, and on the south by the Atlantic Ocean and the southmost tip of Cross Rivers State.

Collection and preparation of guinea grass meal (GGM)

The grass was obtained from an established pasture of the research farm. The age of the pasture was not established. However, the grass was cut at its bloom stage during the June - July period of the year. Cutting of grass was done every evening (1700 hrs), chopped into small pieces and washed with clean water. The grasses were dried and was then stored in a clean plastic container (silage).

Experimental diets and proximate analysis

A based dry mash diet was formulated using trial and error method according to Olomu and Oboh (1995) for pigs in the warm humid tropics. Proximate analysis of both the diet and the grass was carried out according to the procedure described by AOAC (1990).

Experimental animals

Forty-five (45) landrace x large white grower pigs with a live body weight range of 18 to19 kg were obtained from a commercial breeding farm. On arrival at the farm, they were quarantined and monitored for seven days. After the quarantine, the animals were dewormed with Mebendazole and vitamin drugs were prophylactically administered for 5 days. At the end of 14 days, the pigs were divided into five dietary groups of nine animals. Each dietary group formed a treatment, each having three replicates with three animals per replicate. They were housed in an open sided building with a 1.2 m cemented dwarf wall. The building was partitioned into pens of 6 m^2 representing a replicate. Both feed and water were provided *ad libitum* in a concrete feed bunk and water trough. Dry mash feed was made wet by adding water, thoroughly mixed with the grass each morning before feeding. Feeding was between 7.30 to 8.30 hrs. Good hygiene was maintained throughout the experiment.

Experimental design

The experimental design adopted was a completely randomized design (CRD). There were five treatments. Treatment 1 which was the control animals were fed a basal diet. Treatment 2, 3, 4, and 5 groups of animals were fed the basal diet in addition to 15%, 20%, 25%, and 30% of their daily ration respectively as chopped guinea grass, mixed thoroughly with the daily basal ration. Each treatment of nine animals was replicated three times with three pigs per replicate.

Data collection

Data of body weight and feed intake were recorded. Pigs were weighed on weekly basis. Feed intake was determined on daily basis, by subtracting the leftover feed every morning from the amount fed the previous day and recorded. At the end of the week, the total feed intake for the week was divided by 7 to determine the average daily feed intake. Data on body weight and feed intake were used to calculate:

Body weight gain = Final body weight - Initial body weight.

Feed conversion ratio = Feed Intake ÷ Weight gain.

Feed efficiency = Weight gain ÷ Feed intake.

Statistical analysis

Data were subjected to analysis of variance using the procedure outlined by SAS (2002). Means that were significantly different were separated by Least Significant Difference (LSD).

RESULTS AND DISCUSSION

The basal diet used in this study (Table 2) contained nutrients similar to those reported for the tropics by Olomu and Oboh (1995). The protein content (5.85%) of the fresh guinea grass used in the present study (Table 1) was lower than that reported (7.9%) by Babayemi (2007). This could be due to the fact that the nutritive value (nutrients content) of forages is affected by the soil, age of the forage, season and level of lignifications among others (Ekenyem, 2006; Rodriguez *et al*. 2006). Inclusion of *Pannicum maximum* in grower pig diets influenced body weight and feed intake significantly and ability of the pigs to convert feed to meat.

Pigs that fed 15% grass significantly had better final body weight (33 kg) than the control (30 kg) and other groups (Table 3). Within the groups that fed grass, as the level of grass was increased above 15% their body weight progressively decreased. There was increase in feed

Table 1. Proximate composition of fresh guinea grass.

Parameter	Percentage (%)
Dry matter	25.65
Crude protein	5.85
Crude fibre	40.40
Ether extract	4.50
Ash	6.50

Table 2. Ingredients and nutrients composition of basal diet.

Ingredients	Compositions (%)
Cassava tuber meal	20.00
Soya bean	10.00
Fish meal	1.30
Palm Kernel cake	30.00
Brewers dried cake	35.00
Bone meal	3.00
Salt	0.25
Lysine	0.10
Methionine	0.10
Mineral/Vitamins Premix*	0.25
Total	100.00
Calculated Composition (%)	
Crude protein	17.58
Digestible energy (Kcal/kg)	27626
Calcium	1.61
Phosphorus	0.91
Lysine	1.04
Methionine	0.50

*Premix to supply per kg: Vitamin A (10,000iu; Vitamin D3 (1500iu); Vitamin E. (4.8iu); Vitamin K (2 mg); riboflavin (3mg); panthotemic acid (6mg); niacin (15mg); choline (3mg); Vitamin B12 (0.08mg); folic acid (4mg); manganese (64mg); zinc (0.5mg); i dine (1.0mg); cobalt (125mg); copper (10mg); iron (20mg); flavomycin (100mg); spiramycin (5mg); OL-methionine (50gm); Lysine (120gm); selenium (0.16gm) and butylated-hydroxy-toluene (5 gm).

Table 3. Effect of diets supplemented with guinea grass on growth performance of grower pigs.

Parameters	Levels of inclusion (%)					SEM (±)	P value
	T1 (0)	T2(15)	T3(20)	T4(25)	T5(30)		
initial weight(kg)	19.32	18.34	19.39	19.33	19.20	1.05	1.05
final weight(kg)	30.02^{b}	34.00^{a}	29.00^{b}	27.00^{c}	26.01^{d}	1.50	1.50
Ave. daily weight gain(kg)	180.50^{b}	224.40^{a}	161.06^{c}	127.81^{d}	113.69^{cd}	4.11	4.11
Total Feed intake(kg)	35.00^{b}	41.10^{a}	43.03^{c}	44.09^{c}	46.12^{cd}	2.14	2.14
Feed conversion ratio	2.41^{c}	2.06 ^{d}	2.69 ^{b}	2.80^{b}	2.96^{a}	10.11	10.11
Average daily fed intake (kg)	632.61^{b}	684.49^{c}	717.50^{bc}	734.33^{ab}	768.83^{a}	0.40	0.40
Feed gain ratio	3.50^{d}	2.79^{c}	4.45^{c}	5.77^{b}	6.89^{a}	0.80	0.80

^{a,b,c,d,e} means along the same row with different superscripts are significantly ($p< 0.05$) different from each other, Ave: Average, SEM: Standard error of mean.

intake with a decreased in the body weight. The efficiency of conversion of feed into muscle was best achieved with 15% grass. In the body weight examined, pigs fed 15% of PMM performed better than other groups. Better performance of pigs fed 15% grass may be attributable to extra protein, energy and vitamins which might have been

supplied by the fresh green grass. This green forage crops contain carotene (precursor of vitamin A) and they are also rich in other vital vitamins in their green form. Vitamins are cofactors in metabolic processes during which energy in form of ATP (Adenosin triphosphate) is formed (Ekenyem, 2006). Adequate metabolic energy favours protein deposition and hence muscle development is accelerated (Kroismayr, 2008). Esionu (2002) had stressed the importance of green forages whether grass, legume or browse plants for pigs. In the same vein, Kroismayr (2008) maintained that pigs require lignocellulose but not above 2.5% especially for older pigs. Poor growth with increased feed intake as the level of grass was increased especially for 25 and 30% grass, may be due to high fiber (Ekenyem, 2004). There is negative correlation between fiber and energy, and low energy could lead to increase in feed intake (Maynard *et al*., 1981; Steel *et al*., 1980). Increased feed intakes supposed to be associated with growth, but it was not so in this case because fiber is known to be poorly utilized by monogastric animals. Certain minerals (Zn, Cu, Fe etc) are masked by fiber and protein digestibility is negatively influenced by fiber and protein digestibility is negatively influenced by fiber (Kroismayr, 2008).

Conclusion

The result obtained from this study revealed that 15% PMM had significant increase on the final body weight of pigs than the control group and other experimental groups that were fed PMM. However, inclusion of PMM above 15% did not have significant increase in the body weight of experimental pigs than control. It was therefore concluded that PMM have significant ($p<0.05$) effect on the performance of growing pigs at 15% but as it is continuously increased the effect decreased. It is therefore recommended that Pannicum Maximum Meal can be included into pigs feed formulation at 15% due its positive effect on daily feed intake and feed conversion ratio.

CONFLICT OF INTERESTS

Author declares not conflict of interest.

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