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Nutritional evaluation of forage (*Pannicum maximum*) as feed resources on the haematological parameters of pigs

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Abstract

A feeding trial was conducted with a total of 30 pigs to evaluate the potential of fresh Pannicum maximum forage on pigs. The trial lasted for 63 days. Five diets were formulated which contained 0, 5, 10, 15 and 20% levels of the fresh grass forage. Each diet formed a treatment which was offered to the pigs. Each treatment was replicate, arranged in Completely Randomized Design (CRD). The pigs were feed 4% of their body weight and water was offered ad-libitum. The blood composition of pig in terms of packed cell volume, haemoglobin, white blood cell, mean corpuscular haemoglobin concentration significantly ($P<0.05$) improved even with the inclusion of fresh grass forage of 20%, while mean corpuscular volume did not significantly ($P>0.05$) differ from the control which contained 0% forage. It is therefore concluded that fresh Pannicum maximum forage could be used in pig ration at 25% inclusion level without any effect on the animal.

Keywords: Forage, *Pannicum maximum*, Feed Resources, haematology, pigs

Introduction

Insufficient quantity and quality of animal protein in the diets of the world population affects not only the health and efficiency of the present generation, but also those of future generation, because such deficiencies result in various clinical and subclinical conditions such as reduced growth rate, poor physical and mental development in children and adolescents, impaired health, reduced resistance to diseases and low working efficiency (Ojewola, 2013). Pig production has a fast link in solving animal protein deficiency problems, this is because of its highly prolific nature, commonly farrowing from 7-12 piglets and producing two litters per year (FAO, 2000), but this is being limited by high cost of feed due to competition between them and man/industries on the little available conventional feedstuffs (Akinmutimi, 2004 and Duru, 2010). The scarcity of conventional feed resources has ever continued to challenge livestock industries especially the monogastrics, that is the reason animal nutritionist have resorted to alternative way of sourcing for feedstuff, so as to sustain uninterrupted animal protein and other products from livestock and poultry. As a way of confronting the challenges in order to exploit the potentials of pigs, is either to increase the production of conventional feed sources that will be available to competitors at lower price, although the prevalent incident of disease and pests, high cost of fertilizer at the appropriate planting season may deter the objective, or to identify easily available feedstuff and cheaper that are of low human preference and also of little or no industrial usage that can meet the nutritional requirement of pigs without processing (Akinmutimi, 2001).
Furthermore, the use of tropical legumes,

grasses and browses have been recommended (Esonu, 2002). Forage over the years are being used extensively in ruminant nutrition, because of their ability to digest high fibre diets, but not much investigations have been made over the inclusion of forage in pig diets. There is this fear that monogastric animals do not digest forage effectively, reports have shown that pigs require some level of linocellulose, the major component of forages (Kroismayr, 2008). Available finding showed that pigs can thrive on diets containing forage and forage products such as cocoyam leave, (Rodriguez *et al*., 2006); wild sunflower leaf meal (Oluyemi *et al*., 2006) and morning glory leaf (Ekenyem, 2006).The gastrointestinal tracts of pigs have been found to contain some microbes which could also be found in ruminants (Bach-Knudsen *et al.*, 2001).

Materials and methods

Experimental design

A total of thirty (30) landrace crossed with large white grower pigs were used for the feeding trial. The pigs were 120 days old, with initial average weight of 18kg. They were randomly distributed into five dietary treatments replicated three times with two pigs per replicate in a completely randomized design (CRD).

Model: $Tij = u + Ti + eij$

where Tij = overall mean

μ = individual mean

Ti = Treatment effect

eij = Error

Procurement and processing of test ingredients

The grass forage used in the study was obtained from the university premises. The fresh forage cut at the bloom stage, was chopped into small sizes and mixed with the concentrate at 0, 5, 10, 15 and 20% supplementary levels in diets T_1, T_2, T_3, T_4 and T_5 respectively. Table 1 and 2 shows the composition of concentrate feed and its different level of inclusion with grass forage.

Table 1: Composition of concentrate diet fed to grower pigs

Ingredients (%)	**Composition**
Maize	50.70
Soyabean	27.60
Fish meal	1.50
Palm kernel Cake	16.00
Bone meal	3.50
Salt	0.25
*Premix	0.25
Methionine	0.10
Lysine	0.10
Total	**100.00**
Calculated Analysis (%)	
Crude protein	19.59
Metabolizable Energy (kcal/kg)	3046.33
Lysine	1.08
Methionine	0.38
Calcium	0.55
Phosphorous	0.51

***To provide the following per kg feed; vitamin A 10,000iu; vitamin D3 1500iu, vitamin E 4.8iu, vitamin K, 2mg; riboflavin 3mg; panthothemic acid 6mg; niacin, 15mg; choline 3mg; vitamin B12 0.08mg; folic acid 4mg; Mn 64mg;Zinc 0.5mg; iodine, 1.0mg; cobalt 125mg; copper 10mg; Iron, 20mg; flavomycin, 5mg; DL-methionine, 50mg; Selenium, 0.16gm; L-Lysine 120g; and BHT 5gm.**

Table 2: Composition of experimental diet supplemented with grass forage only

Ingredients	T_1	T_2	T_3	T_4	T_5
Concentrates (%)	100.00	95.00	90.00	85.00	80.00
Grass (%)	0.00	5.00	10.00	15.00	20.00
Total	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**
Analysed Composition					
Dry Matter (%)	86.16	86.70	86.98	86.34	85.33
Crude Protein (%)	20.18	19.54	18.90	18.25	17.61
Ether Extract (%)	3.76	3.86	3.96	4.61	4.17
Crude Fibre (%)	5.38	6.95	8.57	10.17	11.76
Ash (%)	9.5	9.63	9.75	9.88	10.00
Nitrogen Free Extract (%)	54.47	54.51	54.30	54.04	53.05
Gross Energy (kcal/kg)	4.00	3.97	3.94	3.90	3.87

Housing and management of experimental animals

The pigs were housed in an open house roofed with asbestos roofing sheet. The open sides of the building were covered with expanded metal and iron net to prevent flies and other insects from entering. Each pen measuring 2mx7m replicated into three, housed two pigs each. The pen had a dwarf wall each of height 120cm separating each other on a concrete floor. Each of the pens had a wallow, feeder and watering troughs. Two weeks before the commencement of the trial, the pens were washed, disinfected and fumigated with formalin. On arrival, the piglets were given formulated ration for a period of two weeks, within this period, broad spectrum antibiotics, multivitamin and de-wormer drugs were administered to keep the animal fit for the trial. The pigs had adjustment period of two weeks after which they were fed daily at 8.00 hours and 16 hours at 4% of the body weight. Water was provided both in the wallow and drinking trough throughout the management period.

Sample preparation for haematological study

At the end of feeding trial of 63 days, blood sample was collected from the pigs via the ear vein by the use of hypodermic syringe into a 10ml capacity clinical white plastic bottles containing EDTA (Ethylene Diamine Tetra Acetic acid) as anti-coagulant. The packed cell volume (PCV) was determined by the microhaematocrit method according to Dacie and Lewis (1991). Haemoglobin (Hb) concentration was determined by cyanomethamoglobin method of Kelly, (1979). Red blood cell (RBC) and white blood cell(WBC) counts were determined using improved Neubauerhaemocytometer as described by Jain, (1986).

The determination of other blood cells was counted under the microscope as follows:

Mean Corpuscular Volume (MCV) =

$$\frac{PCV \times 10}{RBC}$$

Mean corpuscular Haemoglobin (MCH) =

$$\frac{Hb \times 10}{RBC}$$

Mean corpuscular Haeoglobin concentration (MCHC) =

$$\frac{Hb \times 10}{PCV}$$

Data analysis

All the data collected were subjected to one way analysis of variance (Steel and Torrie, 1960) and significant differences between means were determined using standard error means.

Results and discussion

The mean value of the proximate composition of pannicum maximum forage is shown in Table 3. The Pannicum forage contains an average of 37.30% crude fibre

on dry matter basis, which seem to be higher when compared with other forages. This suggests that it is a potential source of nutrient since fibre could be used to maintain a healthy gastrointestinal tract of monogastric animals.

Table 3: Chemical composition of *Pannicum maximum*

Constituents	Composition
Dry matter %	85.96 ± 0.69
Crude protein %	7.35 ± 0.69
Ether extract %	5.73 ± 0.73
Crude fibre %	37.30 ± 0.94
Crude ash %	12.00 ± 0.58
Nitrogen free extract %	23.53 ±1.17
GE (kcal/kg)	4.87 ± 0.17

Data on the effect of grass on the haematological parameters of pigs is shown on table 4. There are significant ($P<0.05$) differences among all parameters considered in the haematological values of pigs except on the red blood cell (RBC). The packed cell volume (PCV), white blood cell (WBC), mean corpuscular haemoglobin (MCH) and Mean Corpuscular Haemoglobin concentration (MCHC), were significantly ($P<0.05$) higher than the control but these values are within the range as reported by Ezee*t.al*, (2010) and did not affect the performance of the animal.

The higher concentration values of PCV and Hb in the blood of animal with forage containing diets, suggests that the forage did not have any toxic effect on the animal, since PCV can be used as an index for toxicity. This result is in agreement with the report by Oyewoye and Ogunkunle (1988), who observed that reduction in the concentration of PCV is as a result of the presence of toxic factors which has adverse effect on blood formation. The haemoglobin content of animals determines the oxygen carrying capacity. The increased value of RBC could be due to the presence of provitamin- A in the fresh forage which may have suppressed the effect of anti-nutritional factor present in the forage.

The value of WBC did not follow a trend that could be traced to the effect of the test feedstuff. However, the values are in the normal range as established by Eze *et al.* (2010). Moreover, there was not microbial infection during the trial occasioned by test diets. White blood cells have been reported to be responsible for the protection of the body against microorganisms (Seeley *et al*., 2002). The higher values obtained in MCH and MCHC may be an indication of quality nutrients balance in the diets. This may have also led to the general better growth performance observed in the animals during the trial.

Table 4: Effects of grass forage on haematology of pigs

Parameters	T_1	T_2	T_3	T_4	T_5	SEM
Packed Cell Volume (%)	38.33^{b}	40.20^{ab}	43.50^{ab}	44.80^{a}	39.30^{ab}	0.90
Haemoglobin (g/100ml)	10.5^{b}	12.20^{ab}	$12.^{ab}$	$13.^{ab}$	14^{ab}	0.44
White Blood Cell ($x10^3/mm^3$)	18.20^{c}	20.10^{ab}	21.00^{ab}	22.50^{a}	19.50^{b}	0.43
Red Blood Cell ($x10^6/mm^3$)	8.20	8.80	9.00	8.30	8.40	0.81
MCH (%)	12.80^{d}	14.88^{c}	15.49^{b}	16.00^{b}	17.56^{a}	0.42
MCHC (%)	27.3^{b}	37.82^{d}	33.13^{c}	34.23^{b}	37.56^{a}	0.67
MCV (%)	28.15^{a}	26.45^{ab}	27.71^{a}	27.78^{a}	22.59^{b}	0.78

a-d means along the same row with different superscripts are significantly (P<0.05) different. SEM = Standard Er ror of Mean, MCH = Mean Corpuscular Haemoglobin, MCHC = Mean Corpuscular Haemoglobin Concentration, MCV = Mean Corpuscular Volume

Conclusion

The results of the present study indicate that *pannicum maximum* grass forage can be included in pig ration at 20% level, and this will not have any deleterious effect on the animal and will also enhance growth performance.

References

Akinmutimi, A. H. 2001. The effect of potash-cooked lima bean (Phaseoluslunatus) on Broiler starter diets. *Nig. Agric J.* 32:109-118.

Akinmutimi, A. H. 2004. Evaluation of sword bean (Canavallia gladiate) as an alternative feed resources for broiler chicken. Ph.D Thesis Michael Okpara University of Agriculture Umudike, Nigeria.

Bach-knudsen, K. E., Jensen, B. B. and Hansen, I. 2001. Digestion of polysaccharides and other major components of the small and large intestine of pigs fed diets consisting of oat fractions rich in β D-glucan. *British J. of Nutr*. 70:537-556.

Dacie, J. C. and Lewis, S. M. 1991. Practical haematocopy, 8th Edition. Longman group Ltd., London.

Duru, O. A. 2010. Response of young pigs to raw trypsine inhibitor soyabeans and source of dietary protein. *Journal of Animal Science*. 50:725-730.

Esonu, B. O., Iheukwumere, C. C., Emenalom, O. O., Uchegbu, M. C. and Etuk, E. B. 2002. Performance, Nutrient Utilization and organ characteristics of broilers fed *Microdeomuspuberula* leaf meal. Livestock Res. Rural Develop. 4(6) 45-49.

Eze, C. C., Lemchi, J. I., Ugochukwu, A. I., Eze, V. C., Awulonu, C. A. O. and Okon, A. X. 2010. Agricultural financing policies and rural development in Nigeria. A paper presented at the 84th Annual Conference of the Agricultural Economics Society, Edinburgh. 29th to 31st March 2010

F. A. O, 2000. Information Bulletin on Animal Genetic Resources (In Spanish) UNEP. Roma.

Jain, N. C. 1986. Schalm's Veterinary Haematology. 4th edn. Lea and Febigir. Philadephia.

Kelly, W. R. 1979. Veterinary Clinical Diagnosis 2nd edition Balliere, Tindall, London.

Kroismayr, A. 2008. Lignocellulose-fresh wood as dietryfibre. Pig progress 4(24). 33-35.

Madubuike, F. N. and Ekenyem, B. U. 2006. Haematology and Serum Biochemistry Characteristics of Broiler Chicks Fed Varying Dietary Levels of Ipomoea asarifolia Leaf Meal. *International Journal of Poultry Science*, 5, 9-12.

Ojewola, G. S. 2013. Fibre in layers diets effect on performance and digestibility of cell wall constituent. Proc. 27th Annual conf. Nig. Society for Animal Production (NSAP) Pp.5-6.

Oluyemi, T. B., Farimik, G. O., Togun, V. A., Adedeji, O. S. and Ademola, A. O. 2006. Performance and haematological characteristics of weaner pigs fed wild sunflower (*Tithoniadiversifolia* Hems A Gray) leaf meal.

Oyawoye, E. O. and Ogunkunle, M. 1998. Physical and chemical effects of raw jack bean on broiler. NSAP proceedings, Abeokuta. Pp. 141-142.

Rodriguez, L., Peniche, I. and Preston, T. R. 2006. Digestibility and Nitrogen balance in growing pigs

feed a diet of sugar can juice and fresh leaves of new cocoyam (*Xanthosomasagitifolium*) as partial or complete replacement for soyabean protein. Workshop on forage for pigs and rabbit. Mekarn-CelAgril Santander-sur Columbia. Pp 1-7.

Seeley, **2006**. Modeling and analysis of nest-site selection by honey bee swarms: the speed and accuracy trade-off. Behavioral Ecology and Sociobiology 59:427-442. 108.

Steel, R. G. D. and Torrie, J. H. 1980. Principle and Procedure of Statistics. McGraw Hill Int. Book

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