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Nutritional evaluation of mixed forages (*Panicum maximum* and *Calopogonium mucunoid*) as feed resources on the haematological indices of pigs

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Abstract

A feed trial was conducted with a total of 30 pigs to evaluate the potential of mixed fresh forages (Panicum maximum and Calopogonium mucunoids) on pigs. The trial lasted for 63 days. Five diets were formulated which contains 0, 10, 15, 20 and 25% level of grass and legume forage. Each diet formed a treatment which was offered to the pigs. Each treatment was replicated thrice with 2 pigs per replicate, arranged in a completely randomized design (CRD). The pigs were fed 4% of their body weight and water was given ad-libitum. The blood composition of the pigs in terms of packed cell volume, haemoglobin, white blood cell, mean corpuscular haemoglobin and mean corpuscular concentration. Results showed significant differences (P<0.05) in white blood cell (17.70 – 23.30) and mean corpuscular heamoglobin (15.83 – 18.03) and mean corpuscular volume (48.00 – 53.16(mg/100ml) and there is no treatment effect on observed in packed cell volume (36.00 – 42.00%), haemoglobin (12.00 – 14.00) and mean corpuscular haemoglobin concentration (33.25 – 33.41%). Recommended level of inclusion of the mixed forage (Panicum maximum and Calopogonium mucunoids) in the diet of pigs should not exceed 20%.

Keywords: Mixed forages, pigs, haematological indices

Introduction

Insufficient quantity and quality of animal protein in the diets of the world population affect not only 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 adolescent, impaired health, reduced resistance to diseases and low working efficiency (Ojewola, 2010). Pig production has a fast link in solving animal protein deficiency problem, this is because of its highly prolific nature commonly farrowing (7-12) piglets and producing two liters per year (FAO, 2000).

The scarcity of conventional feed resources has ever continued to challenge livestock industries, especially monogastrics, hence, animal nutritionists have resort to alternative way of sourcing for feed resources 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 pig, it 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 feedstuffs that are of low human preference; also of little or no industrial usage which can meet the nutritional requirement of pigs without processing (Akinmutimi, 2001). However, the use of tropical forages (Legumes, grasses and browses) have been

recommended (Esonu, 2002). Forages, over the years are being used extensively in ruminant nutrition because of their ability to digest high fibre content and degradation of anti-nutritional factors. Not many investigations have been conducted in this regard due to this fear that monogastrics do not digest fibrous diets effectively. Studies have shown that pigs require some level of linocellulose which is the major component of forages (Kroismayr, 2008). Available findings showed that pigs thrive on diets containing forage and forage products such as cocoyam leaf (Rodriguez *et al*., 2006); wild sunflower leaf meal (Oluyemi *et al*., 2006) and Morning glory leaf (Ekenyem, 2006). The gastro intestinal tract of pigs has been found to contain some microbes which could also be found in ruminant (Bach-Knudsen *et al*., 2001).

Material and methods

Experimental design

A total of thirty (30) landrace crossed with large white strains of grower pigs were used for the feeding trials. The pigs were 120 days old with initial weight 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). The experimental model of the design is:

Table 1: Composition of concentrate diet fed to grower pigs

Ingredients (%)	**Composition**
Maize	50.70
Soyabean	27.60
Fishmeal	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; panthothenic 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, 50gm; Selenium, 0.16gm; L-Lysine 120g; and BHT 5gm.

Table 2: Composition of diet supplemented with grass + legume forage at the ratio of 2:3

Ingredients	T_1	T_2	T_3	T_4	T_5
Concentrates (%)	100.00	90.00	85.00	80.00	75.00
Grass + Legume (%)	0.00	10.00	15.00	20.00	25.00
Total	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**
Analysed Composition					
Dry Matter (%)	85.44	86.53	85.94	87.23	85.58
Crude Protein (%)	20.18	19.49	19.15	18.81	17.96
Ether Extract (%)	3.76	3.93	4.02	4.04	4.19
Crude Fibre (%)	11.13	12.81	13.66	14.49	15.34
Ash (%)	9.50	9.81	9.79	10.12	10.28
Nitrogen Free Extract (%)	45.74	43.99	43.09	42.29	41.84
Gross Energy ((kcal/kg)	4.00	3.94	3.92	3.90	3.88

Housing and management of experimental

The pigs were housed in an open house roofed with asbestos 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 2m x 7m replicated into three, housed two pigs each. The pen had a dwarf wall of 120cm height, separating each other on a concrete floor. Each of the pens had a wallow, feeder and watering trough.

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 antibiotic, multivitamins and dewormer drugs were administered to keep the animal fit for the study. The animals had adjustment period of two weeks after which they were fed daily at 8:00hours and 16 hours at 4% of their body weight. Water was provided both in the wallow and drinker throughout the management period.

Sample preparation for haematological study

At the end of the 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) anti-coagulant. The packed cell volume (PCV) was determined by microhaematocrit method according to Dacie and Lawis (1991) Haemaglobin (Hb) concentration was determined by cyanomethamoglobin method of Kelly (1979). Red blood cell (RBC) and white blood cell (WBC) counts were determined using improcved Neubauer Haemocytometer 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 heamoglobin (MCH) = $\frac{Hb \times 10}{RBC}$

Mean corpuscular haemoglobin concentration

$$(MCHC) = \frac{Hb \times 10}{PCV}$$

Data analysis

All the data collected were subjected to one-way analysis of variance (Steel and Torrie, 1980) and significant difference between means were separated using Duncan's Multiple Range Test (Duncan, 1955) according to Steel and Torrie (1980).

Results and discussion

The result of the haemotological parameters of pigs fed combination of grass and legume forage is presented in Table 3. Results show significant differences ($P < 0.05$) in white blood cell (WBC), mean corpuscular haemoglobin (MCH) and mean corpuscular volume. There were no treatment effects observed in packed cell volume (PCV), haemoglobin (Hb) and mean corpuscular haemoglobin concentration (MCHC). The value of WBC did not follow a trend that could be traced to the effect of the test ingredients. However, the value is within the normal range as established by Eze *et al.* (2010). Moreover, there were no microbial infections during the trial occasioned by test diet. White blood cells have been reported to be responsible for the protection of the body against microorganisms (Seeley *et al.,* 2002). The high values of the mean Corpuscular Volume (MCV) may be an indication of quality protein and other nutrient balance in the diet. This may have also led to the general better growth performance observed in the animal during the trial. However, the values of the haematological parameters were still within the normal range as reported by Eze *et al.* (2010).

Table 3: Effect of grass + legume forage combination on haematological parameters of pigs

Parameters	T_1	T_2	T_3	T_4	T_5	SEM
Packed Cell Volume (%)	36.00	40.00	42.00	41.00	39.00	0.97
Haemoglobin (mg/100ml)	12.00	13.30	14.00	13.70	13.00	0.36
White Blood Cell ($x10^3/mm^3$)	17.70^{b}	18.90^{ab}	19.80^{b}	23.30^{a}	19.00^{ab}	0.53
Red Blood Cell ($x10^6/mm^3$)	7.50	7.60	7.90	7.90	7.90	0.08
MCH (%)	15.83^{b}	17.50^{ab}	18.03^{a}	17.30^{ab}	16.40^{ab}	0.30
MCHC (%)	33.33	33.25	33.33	33.41	33.33	0.40
MCV (mg/100ml)	48.00^{c}	52.63^{ab}	53.16^{a}	51.90^{b}	49.37^{bc}	0.67

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

Conclusion

The combination of *calopogonium mucunoid* and *Panmicum maximus* fresh forage improved the growth performance and can therefore be included in the ration of pigs at 20% level without any deleterious effect.

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