EFFECT OF ORGANIC AND INORGANIC MANURE ON CHEMICAL COMPOSITION AND *IN SACCO* DEGRADABILITY OF (*PENNISETUM PEDICELLATUM TRIN*) HARVESTED AT 4, 6 AND 8 WEEKS

ONWIH, E.E* MILLAM, J.J, AND RAMALAN, S. M*****
*Department of Animal Science, University Of Abuja.
**Department of Animal Science Adamawa State University Mubi
*** Veterinary Teaching Hospital University of Abuja
Corresponding Author: orokstar@gmail.com

ABSTRACT
An experiment was conducted to investigate the effect of organic and inorganic manure (control, cow dung, pig waste, poultry litter and npk15:15:15) on the chemical composition and *insacco* degradability of *Pennisetum Pedicelatum trin* harvested at 4, 6 and 8 weeks after regrowth (after cutback). the experiment was conducted at the teaching and research farm university of Ibadan between the month of March and September. Seedlings of *p.pedicellatum* were planted on a total land area of 1382.5m^2 which was ploughed and subdivided into 30 sub plots of 4m x 4m with 1m spacing within and between plots respectively. the experiment was laid out in a 5x3 factorial arrangement in a completely randomized design (CRD) of five manure treatments i.e. cow dung, pig waste, poultry litter, npk 15:15:15 and control with three harvesting stage of 4,6 and 8 weeks respectively. the manure type had significant effect p (<0.05) on the Ash, CF, ADF, NDF and shows no significant difference (p>0.05) on the EE, DM and CP while the harvesting stage had significant differences (p<0.05) on both the chemical composition and rate of disappearance from the nylon bag. it was recommended from this study that farmers should adopt the use of organic manure of animal origin such as poultry litter, pig waste and cow dung as a viable alternative for ease of establishment of this grass species as livestock feeds and harvesting at early stage of growth to enhances its nutritive value.
keyword: *p. pedicellatumtrim*, manure, harvesting, weeks and digestibility.

INTRODUCTION
The ability of ruminants to use fibrous material a wide available resources matched with the sharp increase in the population mainly in developing countries and therefore increasing the demand for food. in opposition to that in many developed countries foods that are suitable for human consumptions are very often used for both monogastric and ruminant animal feeding. as such, ruminant should be fed as far as possible on roughages and other feeds that are not in competition with human food (Orskov 1998) the most widely distributed groups of mammals on earth, are ruminants having adapted to arctic temperate and tropical environments. this global distribution is possible because of the unique ability of ruminants to digest a wide variety of temperate and tropical vegetation. the concentrations of nutrients according to McDowell *et al.*, (1983) in forage plants are dependent upon the interaction of a number of factors such as plant species, soil type, plant age, pasture management and climate. Most soil used to grow plants, including ornamentals, grass and vegetables, needs its basic nutrients replenished over time. Fertilizers boost the soil's reserves of elements essential to the healthy growth and development of plants. Although conventional and organic fertilizers both add needed nutrients to the soil Organic fertilizer differs because it is derived from natural sources as opposed to being synthetically manufactured. although organic and synthetic fertilizers add the same nutrients to the soil, organic fertilizers work in a different way . Organic fertilizers work double duty by providing required nutrients to growing plants while also feeding the soil. In Nigeria, forage species still serve as source of essential elements for grazing animals. However, little information is available on the nutrient status of grazing animals and of the forages upon which they subsist. It is vital to investigate how growth stage and seasonal variations influence the nutrient components of different forage grasses in tropical environment.

MATERIALS AND METHOD
The experiment was carried out at the teaching and research farm of the University of Ibadan. An area of 1382.5m^2 was mapped out ploughed and allowed to rest for a period of two weeks before harrowing. The area was divided into two blocks and each block was subdivided into 60 sub plots of

4m x 4m with 1m within and between plots respectively. The grass seedlings were planted at a depth of 2cm with a spacing of 1m x1m within and between rows with a total of 16 planting spots per plot. The grasses were planted in the month of March and were cut back to a height of 15cm for data collection in the month of July. Basal application of manures (treatment) was done three weeks after the emergence of the grass.

The experiment was laid out in a 5x3 factorial arrangement in a completely randomized design (CRD). Weed control was done manually with the use of a hoe throughout the experimental period.

Chemical Composition:

Crude protein, crude fibre, ash and ether extract were determined according to the method of Aoac (1990) and fibre analysis was carried out using the method of Van Soest *et al.* (1991).

Determination of degradability

In determining the degradability of the experimental grass, the rumen degradability study of the grass were carried out at the intensive care unit of the department of animal science University of Maiduguri using two fistulated bulls fitted with a stable cannulae.

Procedure.

3g of the milled sample were weighed into a nylon bag each measuring 5x10cm with a pore size of 50microns. The nylon bags with the samples were inserted in to the rumen via the cannulae with the use of a sample holder. The sample holder was perforated to allow the movement of rumen Microbes in and out of the sample holder as well as coming in contact with the feed sample but not the sample bags out of the holder. The sample holder serves as a confinement for the nylon bags for easier evacuation /removal of the bags from the rumen after incubation. The nylon bag with the sample is incubated for a period of 6, 12, 18,24,36,48 and 72 hours respectively to be incubated (digested) then evacuated. after evacuation of the nylon bag from the rumen of the bull, the cannulae and area surrounding it was cleared of rumen content, spillage and disinfected with the use of a disinfectant (dettol) the nylon bag with the sample was rinsed under tap water immediately to stop further fermentation. The residue was the oven dried at 60^{o}c for 24 hours and weighed. The degradability was calculated as the difference in weight between the initial weight of the sample and the final weight of the sample before and after incubation respectively (McDonald 1995). Dry matter disappearance was determined as

$$\% \text{ DMD} = \frac{a - b}{a} \times 100$$

Where a= initial weight before incubation, b= final weight after incubation.

Statistical Analysis.

Data obtained were subjected to analysis of variance (ANOVA) using SAS(2010) and means were separated using Duncan Multiple Range Test of the same package.

Table 1. Shows the main effect of manure type and age at harvesting on the chemical composition of *pennisetum pedicellatum trin* (g/100g

Treatment	ADF	NDF	Ash	DM	CP	CF	EE
Control	73.6333^{ab}	76.4278^{a}	5.10222^{a}	34.1667^{ab}	9.8111^{a}	23.8078^{a}	6.5622^{a}
NPK	72.0667^{c}	75.0333^{bc}	4.81556^{b}	34.4444^{ab}	9.6222^{a}	23.1867^{c}	6.7000^{a}
Cd	74.0333^{a}	76.0167^{ab}	4.8000^{b}	34.0222^{b}	9.7889^{a}	23.3678^{bc}	6.6067^{a}
Pl	71.6167^{c}	74.2500^{c}	4.8000^{b}	34.4000^{ab}	9.7333^{a}	23.4256^{bc}	6.7811^{a}
Pw	72.7333^{bc}	75.2000^{bc}	4.5222^{c}	34.6000^{a}	9.6889^{a}	23.5444^{ab}	6.7722^{a}
4wac	65.1700^{c}	68.4367^{c}	3.19667^{c}	27.6267^{c}	11.9000^{a}	17.6320^{c}	8.8933^{a}
6wac	71.8800^{b}	73.0900^{b}	4.86333^{b}	32.0800^{b}	9.8200^{b}	23.8820^{b}	6.5733^{b}
8wac	81.400^{a}	84.6300^{a}	6.42400^{a}	43.2733^{a}	7.4667^{c}	28.8853^{a}	4.58667^{c}
SEM	0.39951	0.36974	0.04379	0.1643	0.1423	0.0991	0.0851
p- value							
Trt	0.0007*	0.0022*	0.0001*	0.1258	0.8832	0.0021*	0.2845
Wks	0.0001*	0.0001*	0.000*1	0.0001*	0.0001*	0.0001*	0.0001*
Trt*wks	0.0002*	0.0001*	0.3145	0.1764	0.7670	0.5718	0.0357*

a,b,c: means on the same column with different super superscript are significantly different($p<0.05$). WAC: weeks after cutback, cd= cow dung, pw= pig waste, PL= poultry litter, NPK fertilizer, SEM= standard error of mean.

RESULTS AND DISCUSSION

Chemical composition.

The fibre component of the grasses differ significantly($p<0.05$) with respect to fertilizer treatment. The neutral detergent fibre (NDF) which is a measure of the plant cell wall content is the chemical component of the feed that determines its rate of digestibility. NDF is inversely related to plant digestibility (Mc Donald *et al*.1995; Gillespie 1998.) Babayemi *et al*., (2006) the higher the NDF the lower the plant digestible energy the value obtained at 8 weeks was higher than the value reported by Babayemi and Odedire (2008) for guinea grass. this may be due to early production of stem and consolidation of fibrous tissue to support the plants in advance stage for exposure to needed sunlight. but lower than the 75% reported by Barth 1970.and 78% reported by Richard *et al*.,(1989) at 4 and 6 weeks of harvest although there was no specification on the stage (weeks) of harvesting by the cited authors. ADF consists of mainly the lignin and cellulose. ADF value of 62.80- 82.80% obtained was higher than 47.4 reported by Barth (1970) this variation may be due to the fact that the complete plant at each harvesting period was chopped and milled together for the analysis. Bamikole and Babayemi *et al.,(*2006) also reported that stages of harvesting , storage, fertilizer application, soil fertility, climate and region could affect chemical composition . The proximate composition differs significantly ($p<0.05$). The dry matter ranges from, 30.27- 50.80%. The DM content was higher than that reported by Bartha (1970) who reported DM value of 26.3% on fresh aerial part and lower than the value reported by Richard *et al.*,(1989) on dry basis. it shows that the plants were able to utilize more of the atmospheric carbon dioxide by converting it in to useful products during process of photosynthesis. (Bogdan 1977). the crude protein content of the grasses were significantly different ($p<0.05$) the crude protein value obtained in this study ranges between 7.10- 12.07% which was higher than the value reported by Waziri *et al.,* (2013) on *p. pedicellatum* and higher than the value reported by Bartha (1970) who reported CP of 6.5 and 4.0 reported by Richard *et al.*,(1989) the variation in CP with that of the cited authors could be as a result of change in the stage of maturity, climate as well as the nitrogen content of the soil. the crude fiber content varies significantly ($p<0.05$) which ranges between 17.34- 29.29% the value was lower than that reported by Mohammed *et al* ., (2002) who reported 31% CF in hay of A, Gayanus. Waziri *et al*.,(2013) reported that CF increases as plant matures this makes the plant tensile, strong, erect for exposure to needed sunlight , maturation of seeds and easy harvesting. The ether extract varies significantly ($p<0.05$) across the treatments with respect to harvesting stage (Maturity). The value obtained in this study ranges between 4.15- 9.10%. The value at 8 weeks was lower than 8,53 reported by Waziri *et al* .,(2013) and higher than 1.1 and 1.5 reported by Richard *et al.*,(1989) on aerial dry part and Bartha (1970) on aerial part fresh. Ether Extract found mainly on the leaves of plants assists in the formation of protective layers constituent of many membrane and major source of stored energy. The ash content value ranges from 2.99- 6.84% which was lower than 9.5% reported by Bartha (1970) . Although there was no specification on the stage of maturity for the determination of their Ash values. The difference could be due to high absorptive capacity of mineral elements from the soil by the plant and its perennial nature. these study observe that the ash value tends to increase as the plant matures since the organic matter content of plants are determined by the difference in ash content in percentage from 100. It's a clear indication that the lower the ash content the higher the organic matter.

Treatment	6hrs	12hrs	18hrs	24hrs	36hrs	48hrs	72hrs
control	56.940[a]	63.103[a]	68.237[a]	77.535[a]	82.958[a]	87.842[a]	89.710[a]
NPK	54.971[a]	60.879[a]	65.663[a]	74.539[a]	79.599[a]	84.182[a]	85.909[a]
GD	55.123[a]	61.066[a]	65.859[a]	74.680[a]	79.751[a]	84.338[a]	86.142[a]
PL	57.025[a]	63.257[a]	68.408[a]	77.670[a]	83.068[a]	87.912[a]	89.950[a]
pw	56.990[a]	63.223[a]	68.378[a]	77.665[a]	83.062[a]	87.913[a]	89.902[a]
4wac	59.701[a]	67.711[a]	73.424[a]	81.180[a]	85.190[a]	90.901[a]	93.224[a]
6wac	55.143[b]	60.058[b]	66.147[b]	73.570[b]	79.009[b]	83.511[b]	86.452[b]
8wac	53.785[b]	59.148[b]	62.357[c]	74.503[b]	80.864[ab]	84.900[b]	85.291[b]
SEM	1.2297	1.4145	1.6438	1.9243	2.1282	2.2978	2.4075
p- value							
Trt	0.5672	0.5696	0.5708	0.5739	0.5682	0.5666	0.5587
Wks	0.0003*	0.0001*	0.0001*	0.0019*	0.0366*	0.0147*	0.0109*
Trt*Wks	0.6446	0.6368	0.6430	0.6537	0.6486	0.6484	0.6530

Effective dry matter degradability:
the digestibility of a feed stuff is defined by the potential degradability of the material, the rate of degradation of this potential degradable fraction and its residence time in the rumen (Orskov *et al., 1980*). the highest dry matter disappearance was obtained in 4 weeks harvested *p pedicellatum* treated poultry litter. this was in line with the report of Ososanya *et al.,(2013)* who stated that high NDF and ADF which was observed in the forages harvested at 8 weeks may have a profound effect on grit for mastication and ruminal function. the dry matter disappearance observed in these study was within the range of 79.032- 82.961% the 72hr period of incubation was the period in which grasses were expected to reach their potential degradability as reported by Orskov and Mc Donald (1979).

CONCLUSION

These study shows that *p pedicellatum* can be cultivated in south western Nigeria with the use of organic manure to obtain a high quality yield that can meet the nutrient needs of grazing animals at a lower cost and higher yield compare to the use of inorganic manure which has high cost and low long time effect on the soil. these study shows that *p. pedicellatum* responds well to organic manure and yields high nutritional content and digestibility. this was observed in the rate of disappearance from the nylon bag with respect to incubation period with organic manure treated forages showing the highest rate of potential degradability.

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