

## **Agronomic feature occurrence, forage utilisation and grazing pattern of University of Port Harcourt grazing lawn in Niger Delta, Nigeria**

Lamidi, A.A.

Department of Animal Science, University of Port Harcourt, Port Harcourt, Rivers State, Nigeria

Email: akeem.lamidi@uniport.edu.ng , adr.lamidi@yahoo.com

### **ABSTRACT**

Agronomic Feature Occurrence (AFO), Ruminant Forage Utilization (RFU) and grazing pattern of sheep and goat grazed on UNIPORT grazing lawn was studied for 8 weeks. Weather conditions were monitored, forages were identified and physically counted after casting 1m x 1m quadrat twenty times at different spots, samples were cut and analysed, 16 mature small ruminant animals namely 8 sheep and 8 goats were monitored for grazing pattern. Results showed that minimum and maximum temperatures were 26.53<sup>0</sup>C and 34.0<sup>0</sup>C respectively, and relative humidity was 60.1%. The AFO in terms of relative abundance of forage (plant/m<sup>2</sup>) showed that grasses were dominants (68.75%) among the forage species followed by legumes (18.75%) and forb (12.50%). Majority (56.25%) of the forage were annual. Sexual, asexual methods of propagation, tap, fibrous root systems and herbaceous stem system were 62.50%, 37.50%, 25.00%, 75.00% and 87.50% respectively. The RFU revealed that DM was 93.15%, CP (15.21)%, ash (13.14%), OM (86.86%), NFE (73.11%) while the value for Ca, P, Mn, Cu, Zn were 3.15%, 1.58%, 2.68 mg/kg, and 2.41 mg/kg respectively. Final Grazing Time (FGT) and Active Grazing Time (AGT) was higher in sheep (440.00 and 370.20 minutes) compared to goat (315.10 and 320.46 minutes), while goat recorded higher value (96.24 minutes) for Non Grazing Time compared to sheep (63.39 minutes). Grazing Distance Time (GDT) for sheep was 390.28 (meters) and 325.30 meters for goat. The AFO, RFU and grazing pattern of sheep and goat were in conformity with good features of grazing paddock. Thus, the grazing lawn will sustain ruminant production in the area.

**Keywords:** Agronomic features, forage utilization, grazing pattern, pasture, ruminant

### **INTRODUCTION**

Ruminant animals form a major group of the important livestock species in the animal industry in the tropics. Ruminants play an important role in the livelihood of farmers in developing world, providing sustenance as milk and meat animal traction, manure for crop production, cash income from sales of their products as well as capital assets to face risks and misfortune in harsh times or periods (Lamidi, 2009). Production of

ruminant animal have been peasantry and managed on the natural pasture.

Natural pastures and rangeland has been the cheapest form of ruminant feed available in Nigeria (Muraina *et al.*, 2015). Pasture and rangeland plays a crucial role in economic development of a nation because it provides a sustainable feed for ruminant, pseudo-ruminant animal (rabbit, pig etc.) and poultry which in turn provide for human needs. To meet the increasing demand for

ruminants' products by a hungrier world, the increasing demand for quality and sufficient quantity of feed by the animals must be given utmost consideration.

Agronomic Feature Occurrence (AFO) is defined as all the properties of a plant species that help the forage species to adapt and succeed on rangeland environment. The Ruminant Forage Utilization (RFU) is defined as the nutritive attributes of the forage species (Nweze *et al.*, 2012). The two parameters are fundamental in pasture and rangeland management which have positive effect on the performance of the animals.

Rangeland resources inventory is necessary to provide data for viable rangeland planning. Such planning is very crucial now in Nigeria due to the danger posed by global climate change (Nweze *et al.*, 2012), and other challenges of pastoral farming such as continuous communal conflicts between the Fulani herdsmen and arable/host farmers (Lamidi and Ogunkunle, 2015a), and cattle rustlers.

Port Harcourt is a prominent city in Niger Delta, Nigeria. It is located in the coastal area with a trace of pasture for grazing activities. This study intended to determine the agronomic feature occurrence of pasture, ruminant forage utilization and grazing pattern of ruminant animals on the grazing lawn of the University of Port Harcourt, Port Harcourt, Rivers State, Nigeria.

## MATERIALS AND METHODS

### Study area

The study was carried out for a period of 8 weeks on the grazing lawn in the University of Port Harcourt, Choba, Port Harcourt, Rivers State. Port Harcourt is a coastal city located in the Niger Delta region of Nigeria within latitudes  $6^{\circ} 58' - 7^{\circ} 60'E$  and

longitudes  $4^{\circ} 40' - 4^{\circ}55'N$ . The monthly rainfall in Port Harcourt follows a sequence of increase from March to October before decreasing in the dry season months of November to February.

### Sampling of forages and weather monitoring

The Agronomic Feature Occurrence (AFO) and Ruminant Forage Utilization (RFU) were based on definition of Nweze *et al.* (2012). Forage species were sampled and identified using quadrant; the identified forages were physically counted after casting the quadrat twenty (20) times. The cut forage species were then grouped into grasses, legumes and forbs species and other variables for AFO were observed. The samples of forages were cut 5 - 10cm above the ground level from different twenty (20) spots on the grazing lawn, pulled together and replicated into five (5) for nutrients profile for RFU (AOAC, 1995).

Weather conditions were monitored from the Weather Observatory Unit, Department of Geography and Environmental Management, Faculty of Social Sciences, University of Port Harcourt, Port Harcourt, Rivers State, Nigeria throughout the period of experiment.

### Grazing pattern and data analysis

The grazing pattern was evaluated by observational method, three (3) times weekly. Field grazing time (FGT) which is the time between the onset and end of grazing was recorded as described by Nweze (2003). Active grazing time (AGT) is the time the animal spends grazing the forage materials of its choice to satisfy its appetite and it was determined with the aid of a stop watch. Non-active grazing time (NGT) is the time spent on some other activities such as grooming, rumination etc. which was calculated as  $NGT = FGT - AGT$ . The AGT

and NGT constitute the total time spent on field by animal while grazing. Grazing distance travelled (GDT) was measured with

tape rule. Data collected were statistically analyzed using simple percentage, least square computer analysis (Harvey, 1971).

## RESULTS

### Weather Conditions of the Study Area

Table 1 shows the average metrological condition of the University of Port Harcourt, Rivers State, Niger Delta, Nigeria. The minimum and maximum temperatures during the experimental period were 26.53<sup>0</sup> and 34.0<sup>0</sup>C and respectively. The relative humidity was 60.1% while the average wind direction, rainfall, Sunrise and Sunset were 3.48mm, 6.22am and 18.25pm, respectively.

**Table 1: The average metrological condition of the of Port Harcourt City, Port Harcourt, Niger Delta, Nigeria**

Climatic factors	Value/ Description
Temperature (°C) Max	34.0
Min	26.53
Humidity (%)	60.1
Wind Direction	NE
Rainfall (mm)	3.48
Sunrise (am)	6.22
Sunset (pm)	18.25

Source: Department of Geography and Environmental Management Weather Observatory Station (November 2014 – January 2015)

### Agronomic Feature Occurrence

The average Agronomic Feature Occurrence (AFO) in terms of relative abundance of forage (plant/m<sup>2</sup>) on UNIPORT grazing lawn is indicated in Table 2. Grasses were dominants (68.75%) among the forage species followed by legumes (18.75%) and forb (12.50%). Majority (56.25%) of the

forage were annual while 37.50% was perennials. The sexual, asexual method of propagation, tap and fibrous root systems were 62.50%, 37.50%, 25.00% and 75.00% respectively. Majority (87.50%) of the forage had herbaceous stem system while (12.50%) had woody stem system.

**Table 2: Average Agronomic Feature Occurrence (AFO) in terms of relative abundance of forage (plant/m<sup>2</sup>) on University of Port Harcourt grazing lawn**

<b>Variables</b>	<b>No (plant/m<sup>2</sup>)</b>	<b>Percentage</b>
<b>Forage species</b>		
Grasses	22	68.75
Legume	06	18.75
Forb	04	12.50
<b>Total</b>	<b>32</b>	<b>100</b>
<b>Life cycle</b>		
Perennial	02	06.25
Biennial	12	37.50
Annual	18	56.25
<b>Total</b>	<b>32</b>	<b>100</b>
<b>Propagation method</b>		
Sexual (seed)	20	62.50
Asexual	12	37.50
<b>Total</b>	<b>32</b>	<b>100</b>
<b>Root system</b>		
Tap root	08	25.00
Fibrous root	24	75.00
<b>Total</b>	<b>32</b>	<b>100</b>
<b>Stem system</b>		
Woody	04	12.50
Herbaceous	28	87.50
<b>Total</b>	<b>32</b>	<b>100</b>

### **Ruminant Forage Utilisation**

The Ruminant Forage Utilization of University of Port Harcourt grazing lawn in Niger Delta, Nigeria is indicated in Table 3. The value of DM was 93.15%, CP (15.21)%, EE (3.12%), CF (21.17%), ash

(13.14%), OM (86.86%) and NFE (73.11%) while the value for Ca, Mg, K, P, Mn, Fe, Cu, Zn were 3.15%, 1.38%, 1.15%, 1.58%, 0.36 %, 2.68 mg/kg, and 2.41 mg/kg respectively.

**Table 3: Ruminant Forage Utilization of the University of Port Harcourt grazing lawn in Niger Delta Nigeria**

Organic nutrients Parameters (%)		Inorganic nutrients Parameters	
Dry matter	93.15±0.87	Ca (%)	3.15±0.02
Crude protein	15.21±1.02	Mg (%)	1.38±0.01
Ether extract	31.20±0.28	K%	1.15±0.01
Crude fiber	21.17±0.12	P (%)	1.58±0.01
Ash	13.14±0.03	Fe (%)	0.36±0.01
Organic matter	86.86±1.27	Cu (mg/kg)	2.68±0.01
Nitrogen free extract	73.11±0.66	Zn (mg/kg)	2.41±0.00

**Grazing Pattern**

The average grazing pattern of sheep and goat grazed on University of Port Harcourt grazing lawn in Niger Delta, Nigeria is shown in Table 4. The average FGT for goat and sheep was 315.10 - 440.00 minutes respectively. Active grazing time for sheep

was 370.20 minutes while goat recorded 320.46 minutes, NGT and GDT for sheep were 69.39 (minutes) and 390.28 (meters) respectively for sheep, while they were 95.24 (minutes) and 325.30 meters for goat respectively.

**Table 4: Average grazing pattern of sheep and goat grazed on University of Port Harcourt grazing lawn in Niger Delta, Nigeria**

Parameters	Sheep	Goat
Final grazing time (minutes)	440.00 ± 13.20	315.50 ± 10.26
Active grazing time (minutes)	370.20 ± 7.16	320.46 ± 6.56
Non-grazing time (minutes)	69.80 ± 3.78	95.24 ± 5.37
Grazing distance (meters)	390.28 ± 11.43	325.30 ± 3.86

**DISCUSSION**

Weather and climate data play very significant role in weather forecasting, and in socio economic activities throughout Nigeria (Olofintoye and Sule, 2010). The experimental period of the study has well defined weather patterns especially rainfall and temperature. These variables are known to affect the physiological and developmental processes that control the elaboration of chemical constituents in plants (Fasae, 2014), and invariably affect the ruminant forage utilization. Though NRC (2000) indicated that thermal neutral zone of 15 – 25°C for body temperature maintenance of cattle which invariably affected the performance of animal, the relative humidity and other weather

conditions monitored were still favourable for grazing of animal.

The abundance of grasses among the forage species recorded in this study is in line with the report of Nweze *et al.* (2012) who reported similar finding, though higher legume were reported in this study contrary to previous findings. This might be attributed to different in the ecological zones. The grazing lawn possessed majorly annual life cycle plant species, sexual method of seed propagation method, fibrous root systems which are the characteristic features of good pasture species as reported by Ekwe *et al.* (2006). This could be a reason why Fulani herdsmen and other livestock from different communities were

continuously grazed on the lawn as observed.

The grazing lawn shows appreciable dry matter (DM) ( $93.15 \pm 0.87$ ) which can be favourably compared with the reports of Arigbede *et al.* (2002) on forages. Also, crude protein (CP) % DM (15.21) recorded was a bit higher; this might be attributed to the percentage of legume forage species on the grazing lawn (18.75%). The CP contents recorded for the grazing lawn will be adequate for ruminant nutrition. Gatenby (2002) indicated 10 – 12 % CP as moderate level for ruminant production. However, NRC (1980) and ARC (1980) recommended 10 and 9.5% CP respectively as being adequate in meeting the maintenance requirements of sheep and goat. However, the University of Port Harcourt grazing lawn would provide adequate nitrogen requirement for the rumen microorganisms and will encourage efficient digestion of the main components of dietary fiber, leading to production of volatile fatty acid (Trevaskis *et al.*, 2001; Lamidi, 2009) which in turn will facilitates microbial protein synthesis (Lamidi and Aina, 2013).

The amount of minerals recorded in this study is favourably compared to those of Nigerian forages and feedstuffs used for ruminant animal production (Lamidi and Ogunkunle, 2015b). The high level of ash content is indicative of high mineral content inherent in the grazing lawn which is essential in the formation and function of blood and bones (Animashahun *et al.*, 2006).

The FGT recorded for Sheep: 440 minutes (7.33hrs) and goat: 315.50 minutes (6.93hrs) in this study favourably compared with the findings (sheep: 514.20 minutes 8.57 hrs; goats: 515.40 minutes, 8.59 hrs.) reported by Pokorná *et al.* (2013). The higher NGT

recorded for goat compared to sheep in this study is in line with the findings of Pokorná, *et al.* (2013). George *et al.*, (2007) reported that the time spent for grazing depends on forage quality, thermal balance and forage availability as livestock are attracted to vegetation patches and plant communities where they can fill their rumen with high quality forage. This might be attributed to the longer (590.28 meters) grazing distance covered by sheep compared with grazing distance covered by goat. Also, Fasae (2014) observed that animals showed a relationship between forage density and grazing time suggesting that, where the density of forage is high, there is a tendency to find more forages desired by the ruminants and so animal will spend more time in feeding them. All these justify the quality of the forages from the University of Port Harcourt grazing lawn.

The Agronomic Feature Occurrence (AFO) of the grazing lawn indicated majorly annual life cycle plant species, sexual method of seed propagation, fibrous root systems, which are the characteristics features of good pasture. Ruminant Forage Utilization (RFU) and grazing pattern of the sheep and goat grazed on the grazing lawn of University of Port Harcourt, Niger Delta, Nigeria were also in line with ruminant requirements. The grazing lawn will sustain ruminant production in the Niger Delta, Nigeria.

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