Forage Productivity of Gongoshi grazing reserve, Adamawa State, Nigeria.

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***Abstract*-Gongoshi grazing reserve (8^0N; 11^0N and 11.5^0E; 13.5^0E) lies in the Sudan Savannah zone of Nigeria. A field experiment was carried out to evaluate the yield and productivity of Forage in the reserve between the months of August and October, 2005 with seasonal and monthly variation in temperature and rainfall. Forage yield was determined from mean dry matter yield of forage in randomly selected $1m^2$ quadrats. The total forage yield for the three months for the area was found to be 2,130kgDM/ha. The month September was the most productive with monthly biomass of 63.1kgDm/ha and decreased towards the month of October. Reduction in grazing pressure, complete implementation of laws and range improvement practices such as reseeding were recommended for the reserve.**

Keywords-Grazing reserve, forage, productivity, yield, Gongoshi.

I. INTRODUCTION

Many studies made for the assessment of forage productivity suggest that the sustainability of the range depends upon a number of factors such as rainfall, edaphic features, grazing system and seasonal availability of forage (Mirzaclinov and Yakovelva, 1990; Omar, 1991; Grunzoaldt *et al.,* 1994; Farooq, 2003; Durrani *et al.*, 2005). Protection and proper management increased the total palatable vegetation cover in a range (Rafi, 1965).It is important for grazers to know the productivity of their pasture since it is a critical area of measuring the possible profit from forage. Having knowledge of the productivity of forage helps in determining if there is enough forage dry matter in the next pasture to be grazed, the number of days of forage that are available on the forage being fed and the regrowth rate of forage in the most recently grazed pasture.It is clear that any future management planning definitely requires a base line data about the existing rangeland productivity (Gou *et al*., 1997). The present study was therefore aimed at evaluating the yield and productivity of forage of palatable component to help range managers in the management of the reserve and its resources.

II. MATERIALS AND METHODS

The research was conducted in Gongoshi grazing reserve (8^0N; 11^0N and 11.5^0E; 13.5^0E) in Mayo-Belwa Local Government Area of Adamawa State, about 45km from Yola.Permanent vegetation transects were established in Gongoshi grazing reserve following the method outlined by Weeks (1996). This involves the division of the study area into large adjacent and parallel strips (each 2km wide). The strips were further sub-divided along their lengths using natural features such as roads, tracks or trees to give a number of blocks. Each block was sub-divided across its width into ten (10) sections and the central longitudinal axis of each section served as the main transect. The transects were numbered A – J. Using a table of random numbers, two transects were chosen per block and used as the sampling transects. Sampling of the vegetation at the herbaceous layer for productivity and yield was carried out using the transects.

Table 1: Mean Monthly Climatic Data of Yola (Nearest to Gongoshi grazing reserve) (Latitude $09^0$16')

Month	T max ^{0}C	T min ^{0}C	T mean ^{0}C	R.H %	Rainfall mm	Pan A Eo mm	Sunshine
January	33.9	18.4	26.1	30	0	269.5	234
February	37.0	20.4	28.7	27	0	294.6	217
March	39.4	27.3	29.3	33	4.8	334.9	205
April	39.6	26.9	33.3	44	40.3	282.0	224
May	36.6	25.4	31.0	58	138.8	209.5	238
June	33.9	24.2	29.1	69	127.2	142.0	222
July	31.4	23.4	27.4	79	192.5	138.8	184
August	30.9	23.4	27.2	79	215.2	134.4	187
September	31.2	23.2	27.2	77	147.4	115.4	202
October	33.8	23.2	28.5	66	42.1	160.7	248
November	35.5	19.7	27.6	44	2.7	226.4	263
December	34.3	18.2	26.2	34	0	262.0	255
Year					910.8		

Source: Adebayo (1997) Cited in Adebayo and Tukur (1999)

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III. Forage Productivity Determination

Productivity determination followed the method outlined by Kershaw (1979). The procedure involved clipping of desirable herbage within a series of quadrats ($1m^2$ in size) distributed randomly along the transects at two weeks interval; for a period of three months (August – October 2005). Cutting height varied from ground level to about 10cm about ground level. The cut herbage was weighed immediately to obtain fresh weight, and then put in a sample bag for subsequent drying and weighing in an oven at 65^oC in Forestry Laboratory of Federal University of Technology, Yola, Adamawa State, to a constant weight in order to obtain dry matter yield.

IV. Forage Yield Determination

Yield determination followed the method by Kershaw (1979). The procedure involved clipping of desirable herbage within a series of quadrats ($1m^2$ in size) distributed randomly along the transects at two weeks interval and for a period of three months (August – October 2005). Cutting height varied from ground level to about 10cm about ground level. The cut herbage was weighed immediately to obtain fresh weight, and then put in a sample bag for subsequent drying and weighing in an oven at 65^oC to a constant weight in order to obtain dry matter yield. The figure obtained from the sample quadrats was summed and divided by the number of quadrats used to obtain the mean yield of the desirable herbage per quadrat. The yield for the entire area was determined from the mean yield per quadrat.

V. Results and Discussion

Table 2 shows the mean yield per block. Block J had the highest mean yield of 264kgDM/ha while block A has the lowest mean yield of 160kgDM/ha. Blocks B, C, D, F, and I had forage yield of between 205kgDm/ha and 260kgDM/ha. And Blocks E, G and H had forage yield of between 165kgDM/ha and 197kgDM/ha.

Table 2: Mean Forage Yield (kgDM/ha

Blocks	Dry Weight (kgDM/ha)
A	160
B	209
C	239
D	213
E	197
F	264
G	166
H	166
I	260
J	266
Total	2,130kgDM/ha
Mean	213.0kgDM/ha

Table 3 shows the productivity of the desirable species in the reserve. The results indicated that the productivity is highest in the month of September with a mean productivity of 63.1kgDM/ha but decreased at the end of October, with a mean of 32.3kgDM/ha while in August, the mean was 40.9kgDM/ha.

Table 3: Monthly Forage Productivity (kgDM/ha)

Blocks	Dry Matter in kg/ha per month		
	August	September	October
A	32	80	23
B	59	108	25
C	66	31	69
D	17	50	9.0
E	17	91	32
F	50	28	74
G	52	48	13
H	38	12	21
I	61	135	22
J	17	48	38
Total	409	631	323
Mean	40.9	63.1	32.3

VI. Discussion

The study was undertaken to evaluate the forage yield and forage productivity of Gongoshi grazing reserve. Kefa and Oche (1989) reported that the amount of moisture available for plant growth affects both the yield and chemical composition of plants, while temperature is important in determining rate of development, phenology and total yield of many plants.The forage yield data of 2,130kgDM/ha, from this study falls within the range of 1000 – 3500kgDM/ha reported by Kefa and Oche (1989) for the Sudan zone. This suggests a high productivity of the forage plants in the grazing reserve.

VII. Conclusion

The study evaluated the yield and productivity of forage plants in Gongoshi grazing reserve. Forage productivity was correlated with rainfall, temperature and relative humidity which were found to be part of the indices influencing forage productivity. The result of the forage yield calls for proper management of the resources of the range in order to meet up the amount of 3500kgDM/ha reported by Kefa and Oche (1989). The result also suggests the need for manipulation and use of improvement practices on the range sites.

VIII. RECOMMENDATIONS

In view of the findings of the study, the following recommendations are made: -

1) Wildfire should be prevented through the construction of fire lines and the use of prescribed burning.
2) Reseeding of the range sites with desirable plant species should encouraged.
3) Reactivation of the earth dams and construction of irrigation and water spreading systems should be done.
4) Extension agents should enlighten the nomads/settlers on the above points so as to boost livestock production in the area.

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