

CARRYING CAPACITY OF MARGINAL SEMI-ARID GRAZING LAND AT RAJKOT

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Grazing land development is based on number of criteria such as grazing land inventory and assessment of primary productivity, seasonal complementarity, and socio-economic constraints subject to the large fluctuations in space and time. However, the carrying capacity of land ought to be assessed in order to meet requirement of feed on long term sustained basis (Le Houreou 1988). Most of the aspects of Rajkot grazing land have been studied by Pandey et al. (1977, 1986). Therefore, an attempt was made to determine the carrying capacity of grazing land.

The study was conducted in the post-monsoon and winter season (September-February) 1989 in the fenced plot (2x2 ha) located at Khirasara village 18 km southwest to Rajkot town (lies between Lat N 20°58' and 23°8' and Long E 70°28' and 71°40'). Climate is tropical arid to marginal semi-arid with 518 mm mean annual rainfall. Topography is undulating, with few hillocks having gradual slope and lowlying flat land. Underlying rock is basalt (Deccan trap). Soil is black and sandy clay type with pebbles intermixed with varying thickness from 15 to 50 cm.

The study plot was divided in two equal (2x1 ha) subplots. One of the subplots was used for vegetation study and other one for grazing. Quadrat method was employed to study the composition and structure of the grazing land, Diversity index was calculated using equation given by Shannon and Weaver (1949) as follows ;

$$H = - \sum_{i=1}^S P_i \log_2 P_i$$

Where, S is the total number of species,
P_i is the observed proportion of individuals
that belong to the i-th species.
(P_i = n_i/N).

The above-ground biomass was calculated by harvest method. Twenty quadrats (1x1 m) were randomly harvested in both the seasons and the mean value for the above-ground biomass was calculated.

Three heifers of age group between 2.5 and 3 years with an average body weight 117.6 ± 7.3 kg were undertaken for grazing study. Each heifer was allowed to graze freely from 8 A.M. to 7 P.M. for three consecutive days. Thus nine days grazing period was entertained in each season as observation period and before observation period heifers were given 6 days each to get adjusted to the conditions. Time budget for grazing on different plant species was recorded at the interval of ten minutes. A separate experiment was conducted for stall feeding with same heifers. The treatment for adjustment and observation period was similar as under grazing condition. Most preferred four plant species were fed to the animals to determine forage use efficiency factor. The known amount of preferred species was given to the animals and the left-over, was collected weighed and deducted from the initial value of the feed. The average of percentage intake was considered as forage use factor. Carrying capacity of grazing land was calculated on the basis of above-ground biomass according to Brown (1954).

$$\text{Carrying capacity (animal/ha)} = \frac{\text{Total forage production/ha} \times \text{Forage use factor}}{\text{Animal requirement}}$$

Total twenty seven plant species were recorded at the study site out of which 14 species showed the frequency of occurrence at 5% or above (Table 1). *Aristida royleana*, *Indigofera cordifolia*, *Sehima nervosum*, *Borreria stricta*, *Andropogon pumilis*, *Themeda quadrivalvis*, *Hylandia latidrosa*, *Panicum antidotale* exhibited greater frequency. The value of species diversity was 2.41. The air dried above ground biomass was at an average of 630 g/m². *Apludu mutica*, *Sehima nervosum*, *Themeda quadrivalvis*

Table 1. Frequency of occurrence of various plant species

Plant species	Frequency of occurrence (%)
<i>Apluda mutica</i>	40
<i>Aristida royleana</i>	70
<i>Achyranthus aspera</i>	7
<i>Andropogon pumilis</i>	15
<i>Borreria stricta</i>	20
<i>Blepharis indica</i>	10
<i>Eragrostis ciliaris</i>	10
<i>Eragrostis tenella</i>	5
<i>Hylandia latibrosa</i>	35
<i>Panicum antidotale</i>	30
<i>Lepidogathis trinervis</i>	15
<i>Indigofera condifolia</i>	70
<i>Sehima nervosum</i>	55
<i>Themeda quadravalvis</i>	40

and *Andropogon pumulis* were the most preferred species by heifers. In stall-feeding the average intake was 2.86 kg/day/animal. Forage utilization factor was found to be 86%. On the basis of biomass production, animal requirement, forage utilization and body weight conversion factor the carrying capacity of the grazing land was computed to be 0.44 cow/hectare. Results are in conformity with the finding of Bhimaya and Ahuja (1969); Gupta and Saxena (1970) for *Cenchrus ciliaris* and *Lasiurus indicus* rangeland in north west dry region of Rajasthan.

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