

ESTIMATION OF FORAGE BIOMASS AND CARRYING CAPACITY IN SEEDED AND UNSEEDED RANGE OF RAKH CHOTI DALANA, D. G. KHAN

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ABSTRACT

Data were collected from Rakh Choti Dalana of D.G.Khan to determine the Forage Biomass and carrying capacity in seeded and unseeded area to evaluate the current condition of the Rakh. Line transect method was applied and quadrat was used to collect the data. The study revealed that forage production was higher in summer season. The carrying capacity of the study area was higher in summer season, and carrying capacity was higher in reseeded range area than unseeded range area which shows that poor condition of the rangeland could be improved by reseeding techniques.

INTRODUCTION

Out of total area of 79.61 m.ha. of Pakistan, about 49.5m.ha.(62%) is under rangelands, these rangelands extend from alpine pastures in North to the coastal range in south and thus represent a wide variety of soil, climate and vegetation (Quraishi *et al.*,1993). These rangelands provide about 60 percent of the total feed requirements, for sheep and goats and 5 percent for the cattle and buffaloes. (Mohammad, 1989). There are several environmental factors such as water resources, temperature, soil fertility and management which are important for the yield of forage species (Mohammad and Naqvi,1987).

Rangelands are one of the important natural renewable resources of Pakistan on which prosperity of the country depends. This dependence is not only in the form of livestock production meat, milk, hides, skin, hair and farm yard manure but also as water producing areas, CO₂ sinks and as recreational areas of the country (Rafique,2005). The productivity of our rangelands per unit is very low than that of its productive potential. These rangelands are in deplorable condition due to over grazing in the past. The continuous heavy grazing is adversely affecting the quantity and quality of range forage, resulting in reduced quantitative and qualitative production of range livestock and their products. (Economic Survey, 2006).

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The objective of present study were to determine estimation of forage biomass and carrying capacity in seeded and unseeded range of Rakh Choti Dalana, D. G. Khan.

MATERIALS AND METHODS

The present study was conducted at Rakh Choti Dalana during the month of summer season 2009 and spring season 2010. This Rakh is situated in D.G.Khan Rangeland area of Punjab Province and is administrated by the Punjab Forest Department. Total area of Rakh Choti Dalana is 7608 ha, was divided into 10 compartments. The study was carried out in compartment 4B and 5 reseeded range area and compartment 3B and 6 unseeded range area in Rakh Choti Dalana.

The study area lies between the base of Suleman hills. Climate broadly characterized by cold winters and very hot summers. Flash floods are common. The flood water, however, runoff into river Indus rapidly (Quraishi, 1993; Muhammad, 1989).

Line transect method was applied to determine the Forage biomass and carrying capacity. Quadrates were used to collect the data. Random sampling was done during the present study so at sampling intensity 2.5% 68 transect lines each having 100m length were laid in the present 68 transect lines study area. On each transect line, 10 quadrats at every 10m interval on alternate side at that transect line in the compartment No.4B and compartment No.5 which was reseeded range area having area 40ha. 28 transect lines were laid in compartment 3B having area 612 ha and compartment No.6 having area 547 ha which was unseeded range area. In each quadrat present forage was clipped. Total forage production for the whole study area was considered for calculating carrying capacity (Rafique, 1992). Proper use factor (P.U.F) i.e. 50% of forage production was applied. Animal unit forage requirement was calculated on the basis of 2.5% of live body weight.

$$\text{Carrying Capacity (C.C.)} = \frac{\text{Animal Forage requirement Kg/Year} \times \text{ha/Au/4month}}{\text{Forage production kg/ha}}$$

RESULTS AND DISCUSSION

The study was conducted in reseeded and unseeded range of Rakh Choti Dalana, D. G. Khan during Summer season 2009 and spring season 2010 to estimate the forage biomass and carrying capacity.

FORAGE BIOMASS

Mean Forage biomass productions in compartment 5 and 4B in reseeded range area during summer and spring season across all transect. The mean forage biomass production in compartment 5 was (656.25 Kg/ha) in spring 2010 and (723.5 Kg/ha) in Summer 2009

Table 1.

Parameter	Season	Compartment	Value
Mean Forage Production (Kg/ha)	Spring	5	656.25
Mean Forage Production (Kg/ha)	Summer	5	723.5

Mean forage biomass production in compartment 4B was (503.5 Kg/ha) in spring 2010 and (595.25 Kg/ha) in summer 2009.

Table 2.

Parameter	Season	Compartment	Value
Mean Forage Production (Kg/ha)	Spring	4B	503.5
Mean Forage Production (Kg/ha)	Summer	4B	595.25

In unseeded range mean forage biomass production in Compartment No.6 was (328.92 Kg/ ha) in spring 2010 and (501.07 Kg/ ha) in summer 2009

Table 3.

Parameter	Season	Compartment	Value
Mean Forage Production (Kg/ha)	Spring	6	328.92
Mean Forage Production (Kg/ha)	Summer	6	501.07

In compartment No.3B was (317.85 Kg/ha) in spring 2010 and (407.85 Kg/ha) in summer 2009

Table 4.

Parameter	Season	Compartment	Value
Mean Forage Production (Kg/ha)	Spring	3B	317.85
Mean Forage Production (Kg/ha)	Summer	3B	407.85

CARRYING CAPACITY

Carrying capacity of the study area was calculated based on data from 680 quadrats from compartments 5, 4B, 6 and 3B of Rakh Choti Dalana. The mean value for carrying capacity was 3.82ha/Au/4months and 0.63ha/goat/4months during spring season 2010 and 3.32 ha/Au/4months and 0.55 ha/goat/4months, 1.15 ha/goat/4month during summer season 2009.

Table 5.

Parameter	Season	Value
Carrying capacity (Au/ha/4 months)	Spring (Reseeded area)	3.82
Carrying capacity (Au/ha/4 months)	Summer (Reseeded area)	3.32

And 4.86 ha/Au/4month and 0.81 ha/goat/4months during summer 2009 and 6.91 (Au/ha/4 months) in spring season 2010 in unseeded range.

Table 6.

Parameter	Season	Value
Carrying capacity (Au/ha/4 months)	Spring (Unseeded area)	6.91
Carrying capacity (Au/ha/4 months)	Summer (Unseeded area)	4.86

The lower production of rangeland is mainly due to over grazing. This shows that reseeding is an important practice for Pakistan rangelands (Khan *et al.*, 1999)

CONCLUSION

It is concluded from the study area Rakh Choti Dalana D. G. Khan based on forage biomass and carrying capacity of the area is low which shows the miserable condition of the rangeland due to heavy grazing pressure, but could be

improved by range improvement techniques like reseeding, planned grazing system and appropriate stocking rate.

RECOMMENDATION

Based on the findings of the research studies the present miserable condition of the rangeland can be improved by adopting suitable range improvement techniques that is reseeding, protection from grazing and planned grazing system. Rangelands may be grazed according to a suitable stocking rate. Adjustments in carrying capacity can be made for maintaining proper range condition and forage resources of D. G. Khan rangelands.

REFERENCES

- Afzal, J., M.A. Ullah and M. Anwar, 2007. Assessing carrying capacity of Pabbi Hills Kharian Range Journal of Animal and Plant Science. 17(1/2): 27-29.
- Ashfaq, R. M and S. M. Rafique, 1999. A Guide to Range Analysis. Pakistan Forest Institute Peshawar.
- Azhar, R. K., 1992. Comparison between seeded and unseeded range area at Jamrud. Thesis summary, Pak. J. Forest 42(1). 56.
- Chaudhry, A. A., M. Mushtaque and B. A. Awan, 2000. Assessing carrying capacity and vegetation cover of rakhdagarkotli (Thal), Pak.J. forest.50(1-2):37-42.
- Chaudhry, A. A., C. M. Muslim and M. Mushtaque, 2004. Assessing range vegetation and carrying capacity of Rakhgoharwala (Thal), Pak.J. Forest. 54(1):57-63.
- Economic Survey, 2006. Government of Pakistan, Finance Division, Economic Advisor's Wing, Islamabad.
- Holecheck, J. L., R. D. Pieper and C. H. Herbel, 2004. Range Management Principles and Practices Fifth Edition. Regents/Prentice Hall, Englewood Cliffs, New Jersey.
- Malecheck, J. C. and C. L. Leinweber, 1972. Forage selectivity by goats on lightly and heavily grazed ranges. J. Range Management, 25: 105-111.
- Pardini, A., P. Lombardi, F. Longhi and L. Ongaro, 2000. Animal stocking rate in tropical and subtropical rangelands, Pastoral value of the forage species. Journal of Agriculture and Environment for International Development. 94(4): 237-256.

Rafique, S. M., 1992. Carrying Capacity and range condition of Hazarganji-Chilton National Park. Pak. J. Forest. 42(1): 36-43.

Society for Range Management (SRM) 1974. A glossary of terms used in Range Management. 2nd Edition.

Young, C. C., 1998. Defining the range: the development of carrying capacity in management practice. Journal of the History of Biology. 31(1): 61-83.