

GROWTH OF YEARLING HEIFERS UNDER DIFFERENT SYSTEMS OF GRAZING ON *CENCHRUS - ELEUSINE - ARISTIDA* PASTURE IN ARID REGION

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ABSTRACT

Annual variations in body weight gain of yearling heifers (breed Nagauri) on *Cenchrus - Eleusine - Aristida* dominated range-land (1.2 ha/heifer) ranged from 30.5 to 41.0 kg/animal in continuous grazing and 52.21 to 59.58 kg/animal in deferred rotational grazing in arid western Rajasthan. Seasonal qualitative variation of the forage influenced the seasonal body weight gain. Weight gain was maximum during September - October and minimum during March - April.

INTRODUCTION

An efficient range-land management aims at maximum utilisation of the forage with minimum interference in the growth and vigour of the major forage species. This is possible by improved grazing practices with regulated number of animals according to the carrying capacity of range-land. Bhimaya and Ahuja (1969) characterized different range-lands in arid regions and specified their carrying capacities. Earlier workers (Kackar, 1983; Bawa, 1985; Mertia 1985) have used rather high stocking rates of 1.44 to 3.0 ha/heifer in arid range-lands with a view to optimize the landuse. The present study delved into the growth of yearling heifers under deferred rotational grazing v/s continuous grazing systems at a low stocking rate of 1.2 ha/heifer.

MATERIAL AND METHODS

The four-year studies were conducted at the range management and soil conservation area of the Central Arid Zone Research Institute at Borunda (26.30°N Latitude, 73.05° E longitude) during July 1979 to June, 83. The climate is arid with severe winter (minimum temperature 0°C) and hot summer (maximum temperature 47°C). The average annual rainfall of the area during study period was 488.05 mm (range 270.9 to 1028.1 mm), 80.85% of which was received during June to September. The soils were sandy loams. *Cenchrus ciliaris*, *C. setigerus*, *C. biflorus*, *Eleusine compressa*, *Aristida funiculata*, *Eremopogon foveolatus*, *Cymbopogon jwarancusa* and *Indigofera* sp. were the major grass species.

Sixteen yearling heifers of 'Nagauri' breed with initial body weight 80-90 kg were selected each year for experimental grazing. Animals were allowed to graze for 8 h daily, watered morning and evening and gain in body weight recorded by fortnightly weighment in the morning. Variations in gain in body weight under the two systems of grazing were analysed by students 't' test.

The experimental area (24 ha) was divided into five equal sized (4.8 ha) paddocks called A, B, C, D and E. Continuous grazing @ 1.2 ha/animal throughout the year was followed in paddock 'E' by keeping four heifers; deferred rotational grazing was followed in paddocks A to D. In the paddocks meant for deferred rotational grazing, one paddock by turn was treated as 'reserved' in a year (no grazing) and grazing was allowed in rest of the three paddocks to 12 heifers in each paddock for a month by rotation (Table 1).

Table 1. Grazing schedule of heifers under two grazing systems

Year	Deferred rotational grazing				Continuous grazing
	Jul, Oct, Jan, Apr,	Aug, Nov, Feb, May,	Sept, Dec, Mar, June,	Reserve paddock	
1979-80	A	B	C	D	E
1980-81	B	C	D	A	E
1981-82	C	D	A	B	E
1982-83	D	A	B	C	E

In each grazing paddock in September-October every year per cent ground cover was estimated by line intercept method from the linear transects in clusters permanently fixed in each grazing paddock; dry forage production was estimated by harvesting of different grass covers in 20 permanent quadrates of 10 m² in each paddock.

RESULTS AND DISCUSSION

Variations in annual body weight gained by heifers under two systems, i.e. continuous and deferred rotational grazing, were statistically significant (Table 2).

In order to examine the growth of heifers during different seasons, the year was divided into six periods, i.e. July - August, September - October, November - December, January - February, March - April, May - June (Table 3). The body weight gains were higher during July-August and September-October in both the systems due to availability of palatable and nutritive forage during this period. This is in conformity with earlier studies reported by Verma et al. (1978), Kackar et al. (1983 and Bawa (1985). The higher gain in weight during this period is attributed to better feed quality and utilization (Chakravarty et al., 1970).

Table 2. Body weight gain (kg/heifer) during different years under two grazing systems

Grazing system	Heifer No.	Year			
		1979-80	1980-81	1981-82	1982-83
Continuous grazing	1	49.0	41.0	45.0	41.0
	2	19.0	44.0	43.0	34.0
	3	33.0	36.0	34.0	42.0
	4	21.0	38.0	42.0	41.0
	Mean	30.5	39.75	41.0	39.5
Deferred rotational grazing	5	35.0	60.5	75.0	46.0
	6	68.0	53.0	77.0	51.0
	7	65.0	51.5	37.0	51.0
	8	55.0	63.0	66.0	40.5
	9	62.0	81.5	61.0	52.0
	10	50.0	62.5	56.0	54.0
	11	71.0	68.0	43.0	55.0
	12	29.5	32.0	50.0	50.0
	13	75.0	51.0	51.0	59.0
	14	92.0	52.5	50.0	65.0
	15	61.0	62.0	45.0	53.0
	16	51.5	55.0	72.0	50.0
	Mean	59.58	57.71	56.91	52.21
't'	3.06**	2.92*	2.31*	3.88**	

* Significant at 5% ** Significant at 1%

The annual and perennial grasses matured and became less palatable and nutritive during Nov-Dec and heifers gained comparatively less body weight. During this period annual grasses such as *A. funiculata*, and *C. biflorus* obtained rank growth and because of awns and burrs on their inflorescence heifers avoid eating them. During Jan-Feb, the range-land was completely devoid of palatable grasses and exposure to severe cold resulted in low body weight gain of heifers. The heifers gained lower body weight during March-April and May-June due to poor quality and paucity of forage and simultaneous exposure to hot conditions.

Table 3. Increase or decrease (—) in body weight (kg/animal) of heifers during different periods of the grazing year

	Period					
	Jul-Aug	Sept-Oct	Nov-Dec	Jan-Feb	Mar-Apr	May-June
Continuous grazing						
1979-80	15.75	10.25	3.0	5.75	-3.50	-0.75
1980-81	17.25	10.75	6.25	4.37	0.88	0.25
1981-82	10.50	11.25	12.75	1.00	6.00	-0.50
1982-83	3.50	19.50	10.75	0.75	-0.25	5.25
Total	47.0	51.75	32.25	11.87	3.13	4.25
Mean	11.75	12.94	8.06	2.97	0.78	1.06
Deferred rotational grazing						
1979-80	17.16	18.50	9.17	15.83	-4.83	3.75
1980-81	23.45	14.54	9.46	9.21	2.09	-1.04
1981-82	11.92	20.50	17.00	2.33	5.99	-0.83
1982-83	10.75	17.67	16.00	1.58	2.50	3.71
Total	63.28	71.21	51.63	28.95	10.58	5.59
Mean	15.82	17.80	12.91	7.24	2.64	1.40

Distribution pattern, rather than the absolute quantity of rainfall more affects the range vegetation production. The rainfall during 1979 was unusually high (1028.1 mm) with 79.9% (821.6 mm) occurring within 5 days in July (15-19 July 1979). This caused flash floods and damaged the vegetation. Rest of the year remained practically under drought and it affected the forage production adversely. The precipitations during 1980, 1981, 1982 were well distributed.

Per cent ground cover by grass was more or less similar in two systems, but forage production was higher in deferred rotational grazing paddocks as compared to continuous grazing paddock (Table 4). This is amply reflected in the higher body weight of heifers in deferred rotational grazing system.

Table 4. Forage production (q/ha) in paddocks in two grazing systems under different years

Year	Deferred rotational grazing paddocks					Total	Mean	Continuous grazing paddock E
	A	B	C	D	E			
1979-80	16.77	13.94	18.64	9.25	53.64	13.41	6.81	
1980-81	23.75	14.00	17.56	14.70	70.01	17.50	14.49	
1981-82	13.57	14.47	13.40	10.65	62.09	13.02	8.93	
1982-83	19.97	17.68	14.49	15.25	67.30	16.85	15.74	
Per cent ground cover of paddocks in two grazing systems under different year								
1979-80	4.24	7.32	8.87	7.43	27.86	6.965	6.93	
1980-81	7.35	10.52	7.21	7.85	32.93	8.2325	7.67	
1981-82	6.84	6.73	7.08	6.17	26.82	6.705	6.18	
1982-83	7.45	7.21	6.50	6.31	27.47	6.8675	6.53	

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REFERENCES

- Bawa, A.K. 1985. Growth pattern of heifers under different systems of grazing on *Lasiurus sindicus* rangeland. *Annals of Arid Zone*. 24 (3): 237-240.
- Bhimaya, C.P. and Ahuja, L.D. 1969. Criteria for determining condition class of rangelands in western Rajasthan. *Annals of Arid Zone*. 8(1): 73-79.
- Chakravarty, A.K., Ratan Ram and Singh, K.C. 1970. Grazing studies in the arid and semi-arid zone of Rajasthan VII. Utilisation of vegetation cover, grazing behaviour of sheep and seasonal variation of crude protein content of plants in different pastures. *Annals of Arid Zone*. 9(1): 10-16.
- Kackar, N.L. and Bawa, A.K. 1983. Growth of yearling heifers under different systems of grazing on sewan *Lasiurus sindicus* grassland. *Annals of Arid Zone*. 22 (1): 53-57.
- Mertia, R.S. 1985. Growth of yearling heifers grazing on *Cenchrus-Aristida* grassland. *Annals of Arid Zone*. 24(4): 358-360.
- Verma, C.M. and Ahuja, L.D. 1978. Growth performance of heifers under different systems of grazing on *Dicanthium - Aristida* pasture in semi-arid region of Rajasthan. *Annals of Arid Zone*. 81 (1&2) 13:20.