

INFLUENCE OF SUPPLEMENTAL FEEDING LOCATION IN RIPARIAN AREAS OF THE SOUTH SIERRA FOOTHILLS OF CALIFORNIA

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Summary

High levels of grazing by cattle of riparian areas was observed on two range units during a previous trial at the San Joaquin Experimental Range, 40 miles north of Fresno, California. Mapping of residual dry matter (RDM) in the riparian areas of Range Units 1 and 8 indicated that over 50 percent of these areas were below recommended RDM levels. The relocation of supplemental feeding sites in Range Unit 1, away from water sources and in areas of high RDM during two subsequent years reduced the impact of grazing in the riparian areas from a 3-year average of 50+ percent of low RDM to 1 and 7 percent in 1986-87 and 1987-88. Range Unit 8 was left unchanged to provide a means of eliminating the effect of the current year's weather and forage production as a cause of a shift in the cattle distribution. Low RDM levels were mapped in 54 and 35 percent of the riparian areas during the same two years. These results, obtained in years of below normal forage production, indicate that cattle use of riparian areas can be manipulated through the location of feeding sites, even though previous studies moving salting locations did not influence grazing patterns.

Introduction

Annual rangelands are comprised of several different land classes which vary in the amount of forage produced, time of forage growth, and species composition. Distribution of use by cattle on these rangelands is highly correlated with the amount of forage production of the different land classes (Wagnon 1967); that is, the greatest amount of cattle use occurs on the highest producing areas—the riparian areas.

On these rangelands the greater use of riparian areas by cattle results in lower amounts of residual dry matter (RDM) than on associated sites at the end of the grazing season (Frost et al. 1988). Residual dry matter is the dry plant material left on the ground from the previous year's forage growth. Moderate amounts of RDM provide a favorable microenvironment for early seedling growth, soil protection, adequate soil organic matter, and a source of low quality fall forage (Clawson et al. 1982). Moderate levels of RDM for riparian areas on the San Joaquin Experimental Range have been determined to be 400 to 800 pounds per acre. During a recent 3-year supplemental feeding trial under typical feeding practices, one-half of the riparian areas were consistently left with low amounts (less than 400 pounds per acre) of RDM while less productive areas were left with high amounts of RDM (McDougald et al. 1987; Frost et al. 1988). The low amounts of RDM do not provide the best microenvironment for seedling growth nor the best soil protection. A method of redistributing cattle use into less productive areas and away from riparian

areas would provide more favorable conditions for forage production and soil protection than currently exist.

This paper reports a study to determine if the use of riparian areas, expressed in terms of RDM remaining in the fall could be affected by a livestock management practice.

Since past investigations found that relocation of salt blocks was ineffective in changing the distribution of cattle use (Wagnon 1967), we examined the relocation of the supplemental feeding areas into areas previously identified as consistently having high amounts of RDM.

Study Area

The San Joaquin Experimental Range is located 28 miles northeast of Fresno in Madera County, California, near the center of the state and in the heart of the granite soil section of the Sierra Nevada foothills. It supports annual plant/oak woodland type vegetation and is characterized by grassy, rolling hills with a scattering of trees and occasional dense stands of brush. It is in the lower part of the woodland zone between the treeless valley floor and the higher brush and timber belts. Seeds of most herbaceous plant species germinate with the first 0.5 to 1.0 inches of fall rain. The plants grow slowly during the winter and rapidly when warm temperatures return in March. Most of the herbaceous species reach maturity in April and are mostly dry by mid-May. The climate is Mediterranean, characterized by mild, rainy winters and hot, dry summers. Annual precipitation averages 19 inches, with extremes of 9 and 37 inches.

Range Units 1 and 8 were used during this trial. Both units are approximately 450 acres, of which over 5 percent is considered riparian area.

	Range Unit 1	Range Unit 8
	(percent)	
Riparian	6	7
Rolling, open	21	5
Rolling, rocky, brushy	73	63
Steep, rocky, brushy	0	25

Methods

During a 3-year study (1982-85) of range cow supplementation, the amount of RDM remaining in the fall was measured and mapped for Range Units 1 and 8 at the San Joaquin Experimental Range (Frost et al. 1988; Dunbar et al. in press). This 3-year period identified a pattern of use for riparian areas in those units. These patterns were used as the baseline in determining the effect of relocating supplemental feeding locations on the distribution of cattle use.

Supplemental feeding sites were relocated in 1986-87 and 1987-88 in Range Unit 1. They were placed in areas which, during the 3-year supplemental feeding trial, consistently had high amounts of RDM remaining in early October. Feeding locations were not changed in Range Unit 8 to provide a means of eliminating the effect of current years' weather and forage production as the cause of a shift in the distribution of cattle use. Annual precipitation and forage production were lower in 1986-87 and 1987-88 than in the years involved in the supplemental feeding trial during which cattle use distribution was established (Table 1). Use by cattle (expressed as Animal Unit Months or AUMs) was similar for all years:

	Range Unit 1 (Use per year in AUMs)	Range Unit 8
1982-85 average	449	469
1986-1988 average	429	437P

Table 1. Average forage production and precipitation at the San Joaquin Experimental Range, California.

Year	Production (lbs/ac)	Date of Germinating Rain ¹	Total Precipitation
1982-83	3,630	Sept. 26	37.4
1983-84	1,824	Oct. 1	16.3
1984-85	1,690	Oct. 17	13.6
1986-87	968	Sept. 28	11.1
1987-88	807	Oct. 28	11.6
54 year avg.	2,316	Oct. 27	19.0

¹ Date when 0.5 inches precipitation fell within a seven day period.

In early October RDM was mapped using categories of high, moderate, and low (Clawson et al. 1982).

Residual Dry Matter (pounds per acre)		
Low	Moderate	High
<400	400-800	>800

Amounts of RDM were determined by the Comparative Yield Method (Haydock and Shaw 1975) and visual estimation. The acreages within each RDM class were mapped, measured, and expressed as percentages of total riparian area. These percentages were examined to determine if the change in supplemental feeding locations in Range Unit 1 produced a change in the use of riparian areas within that unit.

Results and Discussion

Traditional supplemental feeding locations in Range Units 1 and 8 resulted in approximately 50 percent of the riparian areas being left with low amounts of RDM in early October (McDougal et al. 1987) (Table 2.) These feeding locations were generally located in close proximity to water sources and salt locations. Cattle use in Range Unit 8 during 1986-87 and 1987-88 followed the same general pattern as during the baseline period. During this trial and the baseline period an average of about 45 percent of the riparian area was left with low amounts of RDM, while approximately 45 and 10 percent was left with moderate and high RDM levels, respectively (Table 2.).

In Range Unit 1, relocating the supplemental feeding sites into areas which consistently had high amounts of RDM remaining in the fall resulted in a dramatic change in RDM levels in riparian areas. The percentage of total riparian area with low amounts of RDM was reduced from 48 percent in the 3-year baseline period to an average of 4 percent during this trial (Table 2). The percentage of area with moderate RDM levels was changed from 39 percent to an average of 56 percent, while the percentage of area with high RDM amounts was increased from 13 percent to an average of 40 percent (Table 2).

Table 2. Percentage of riparian area within RDM classes in early October.

Year and Unit	Low	Moderate	High
1982-85			
Range Unit 1	48	39	13
Range Unit 8	59	29	12
1986-87			
Range Unit 1		27	72
Range Unit 8	54	33	13
1987-88			
Range Unit 1	7	84	9
Range Unit 8	35	59	6

These results, obtained in years of below average forage production, indicate that cattle use can be manipulated through the location of supplemental feeding sites. By moving supplemental feeding locations away from water sources and into areas where high amounts of RDM remain, the impact of cattle on riparian areas in hardwood rangelands can be greatly reduced.

Literature Cited

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