

# USE OF SUPPLEMENTAL FEEDING LOCATIONS TO MANAGE CATTLE USE ON RIPARIAN AREAS OF HARDWOOD RANGELANDS<sup>1</sup>

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*Abstract: Typical cattle use on two range units of hardwood rangeland (annual rangeland) at the San Joaquin Experimental Range, Madera County, California, left 50 percent of riparian area with less than optimum amounts of residual dry matter (RDM) for promoting seedling growth and soil protection. By relocating supplemental feeding sites away from water sources and into areas of high amounts of RDM, the impact of cattle on riparian areas was greatly reduced. In Range Unit 1, where supplemental feeding sites were relocated, only 1 percent of the riparian area was left with low amounts of RDM. In Range Unit 8, where feeding sites were left unchanged, over 50 percent of the riparian area was left with low amounts of RDM.*

Hardwood rangelands (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 and others 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 and others 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 and others 1987; Frost and others 1988). The low amounts of RDM do not provide the best microenvironment for seedling growth nor the best soil protection. A means 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
Riparian	6 1	7 1
Rolling, open	21 1	5 %
Rolling, rocky, brushy	73 %	63 %
Steep, rocky, brushy	0 %	25 %

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## 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 and others 1988; Dunbar and others 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 in Range Unit 1. They were placed in areas which, during the three 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 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 AUM's) was similar for all years:

	Range Unit 1	Range Unit 8
	(Use per year in AUM's)	
1982-85 average	449	469
1986-87	432	444

In early October RDM was mapped using categories of high, moderate and low (Clawson and others 1982):

Residual dry matter (pounds per acre)		
Low	Moderate	High
<400	400 - 800	>800

**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	11.9
54 year ave.	2,316	Oct. 27	19.0

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 (McDougald and others 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 followed the same general pattern as during the baseline period. During this trial and the baseline period about 55 percent of the riparian area was left with low amounts of RDM, while approximately 30 and 15 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 only 1 percent during this trial (table 2). The percentage of area with moderate RDM levels was also reduced from 39 percent to 27 percent while the percentage of area with high RDM amounts was increased from 13 percent to 72 percent (table 2).

These results, obtained in a year 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.

**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	1	27	72
Range Unit 8	54	33	13

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