

Cow Weights and Calf Production for Pasture 12-C Lehmann Lovegrass Grazing Trials, 1982 to 1993

Abstract: The purpose of the grazing trials described in this paper was to provide information to aid in the development of grazing management strategies where Lehmann lovegrass has become a dominant species. Seven pastures were utilized from 1984 to 1987 for a comparison of four yearlong stocking rates to seasonal grazing rotated through three pastures. A second trial, 1988 to 1993, rotated cows and calves through all pastures at a very low stocking rate. Spot grazing created patchy grazing patterns that persisted throughout the study period on all treatment pastures, except the yearlong very heavy stocking and summer-use rotation pastures. Weaned calf production for all treatments (especially the rotated treatment) tended to decrease in the last 2 years of the 1984 to 1987 trial because cows slipped to later breeding and poorer percentage calf crops. Cows selected for limited high quality forage, especially in winter and spring, from the heavily grazed patch areas, and repeated heavy grazing reduced the potential quantity of forage produced in these patches. A two-pasture, alternate summer use, with both pastures grazed during winter and spring, is suggested as a possible grazing system to maintain favorable calf production and a sustainable range resource.

Keywords: Lehmann lovegrass, grazing trial, stocking rate, pasture rotation, cow weight, patch grazing

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The precipitation data for Station 41 reported in table 1 were provided by the Santa Rita Experimental Range Digital Database. Funding for the digitization of these data was provided by USDA Forest Service, Rocky Mountain Research Station, and the University of Arizona.

Introduction

This paper is written as a printed version of a poster presentation. Each section of the paper is written as text associated with a figure or table, as displayed on a poster. No review of literature is included.

Eragrostis lehmanniana Nees. (Lehmann lovegrass) has become a dominant species on many ecological sites in southern Arizona, and strategies for management of these sites are not well established. This paper adds livestock production and utilization pattern data to the management information base.

Water Source and Site Characteristics

Implementation of the grazing trials began in the spring of 1982, with the installation of 2 miles of water line from Benson Wells to a storage tank installed near the center of pasture 12-C. The PVC pipe was bedded in soil free of large rocks (fig. 1)

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Figure 1—Bedding water line across a loamy upland ecological site dominated by Lehmann lovegrass, spring 1982.

prior to covering by a grader. Figure 1 also provides a view of the loamy upland ecological site on a Whitehouse soil series that dominates the study area. Sampling on this site in 1980 estimated 1,500 pounds per acre standing biomass. Sampling on monitoring plots in 1984 estimated 2,250 pounds per acre standing biomass with a vegetation composition of Lehmann lovegrass, 69 percent; *Calliandra eriophylla* Benth. (false mesquite), 25 percent; grama grass group: *Bouteloua chondrosioides* (H.B.K.) Benth. (sprucetop), *B. hirsuta* Lag. (hairy), and *B. repens* (H.B.K.) Scribn. & Merr. (slender), 3 percent; and other species, 2 percent. The slopes of the draws that drain these uplands had 700 pounds per acre standing biomass and vegetative composition of Lehmann lovegrass, 9 percent; false mesquite, 16 percent; grama grass group, 55 percent; and other species, 12 percent.

Precipitation

Seasonal precipitation for the forage production year summarized in table 1 includes precipitation in October, November, and December from the previous calendar year, as this precipitation is a major factor contributing to this production. Precipitation in 1983 and 1984 was very favorable, especially in summer. These 2 years of very favorable precipitation led to optimistic estimates for stocking rates for this grazing trial. Precipitation was lower over the next 3 years, but no years during the trial period were drought years. Precipitation Station 41 is located near the center of the study pastures.

Pasture Layout

Two-wire electric fences for an initial six pastures and water troughs at the center of the pastures were completed by fall 1982. At this time, 118 cows were allocated to the pastures to test three intensities of yearlong grazing and a seasonal treatment with one herd rotated among three pastures. Corrals and working facilities to accommodate scales, calf table, and loading chute were completed in 1983.

Table 1—Seasonal precipitation (inches), Station 41, Santa Rita Experimental Range, fall 1980 to summer 1993.

Forage production year	Season			Total
	October to January	February to May	June to September	
1981 ^a	2.70	3.94	10.71	17.35
1982	2.19	1.82	8.90	12.91
1983	5.79	4.03	12.27	22.09
1984	7.92	1.77	22.65	32.34
1985	8.45	2.56	7.96	18.97
1986	3.54	3.51	8.07	15.12
1987	3.66	4.25	5.39	13.30
1988	5.65	2.52	9.91	18.08
1989	5.76	1.53	6.44	13.73
1990	5.42	1.92	15.56	22.90
1991	3.59	3.92	4.77	12.28
1992	4.46	5.08	11.87	21.41
1993	7.30	4.21	9.65	21.16
Mean	5.11	3.16	10.32	18.59

^a October, November, and December precipitation is for previous calendar year.

After fall roundup in 1983, the grazing trial design was modified to add a very heavy stocking intensity. Original pasture 4, which was to be a rotated pasture, was divided to make pastures 4 and 5 as shown in figure 2. Pasture 3 was exchanged with pasture 4 to be the summer rotation pasture. The holding pasture was not fenced until the winter of 1986 to 1987.

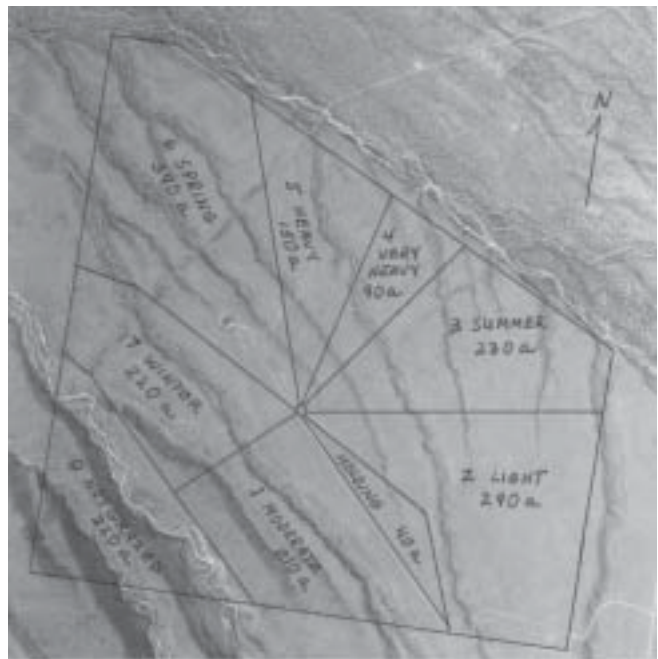


Figure 2—Pasture layout for Santa Rita Experimental Range pasture 12-C grazing trial, 1984 to 1993.

Data Collection and General Information

Cows were weighed, condition estimated, and calves were worked at the calf table (fig. 3) at spring roundup in mid-May to early June. At the fall roundup in early November of each year, cows and calves were weighed, cow condition was estimated, calves were weaned, and limited culling (to allow cumulative treatment effects to be expressed) and replacement of the cows was accomplished. Percentage of cows culled was 1.8 in 1984, 10.1 in 1985, 9.1 in 1986, and 37.5 at the end of the initial 4-year trial in November 1987. The annual percentage of cow death losses during the 1984 to 1987 trial were: 1.8 in 1984, 2.8 in 1985, no death loss in 1986, and 3.1 in 1987.

Stocking Intensity

Planned stocking rates for the 1984 to 1987 trial were initiated by assigning four cows and 16 bred heifers to pasture 2 (light use, 16 acres per animal unit year [AUY]), 18 cows to pasture 1 (moderate use, 12 acres per AUY), 15 cows to pasture 5 (heavy use, 10 acres per AUY), 13 cows to pasture 4 (very heavy use, 7 acres per AUY), and 49 cows to pastures 3, 6, and 7 (seasonally rotated, 17 acres per AUY for the total area of the three rotated pastures). Dates of seasonal pasture moves varied annually, but summer use was July to mid-November, winter use was mid-November to March, and spring use was from March to July. Following the 1984 to 1987 grazing trial, a second trial was initiated. The stocking rate was reduced to a very light use (31 acres per AUY), and cows were rotated annually through seven pastures until 1992 when they also grazed the previously ungrazed pasture 8. Calves were weighed at fall roundup.

Implemented stocking rates (fig. 4) varied from the initial allocation due to culling, death losses, and a few cows not staying in their assigned treatment pasture. The heavy stocking level became similar to the moderate stocking level at the beginning of the trial, as two cows assigned to the heavy treatment were missed in the initial roundup and



Figure 3—Working calves at the calf table during spring roundup.

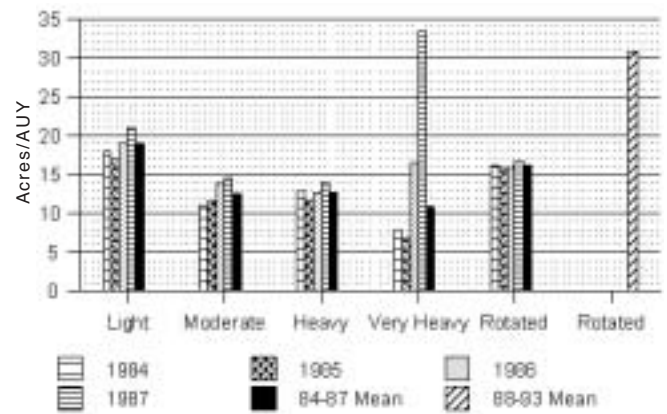


Figure 4—Stocking rate, acres per animal unit year.

remained in other pastures, and two cows in this treatment died early in the trial. These two treatments are similar in stocking rate as implemented, and are referred to as moderate to heavy in the following discussion. Implemented stocking rate data include bulls.

Cow Weights

Annual spring cow weight treatment means for 1985 to 1987 (cows were not weighed in the spring of 1984) generally varied between 800 and 900 lb, and coefficients of variation were near 10 percent (95-percent confidence intervals were on the order of +/- 50 pounds). Cow weights at the spring roundup were similar for all treatments. At fall roundup, cows in the moderate to heavy use treatments were the heaviest, averaging over 950 pounds (fig. 5). Cows in the very heavy use treatment and seasonal rotation averaged 900 lb, and the cows in the light use pasture averaged about 850 lb. The light cow weights for the light use treatment were due to a high proportion of first calf heifers assigned to this treatment at the beginning of the trial. Fall cow weights for all treatments except the very heavy intensity were higher in 1984 than for

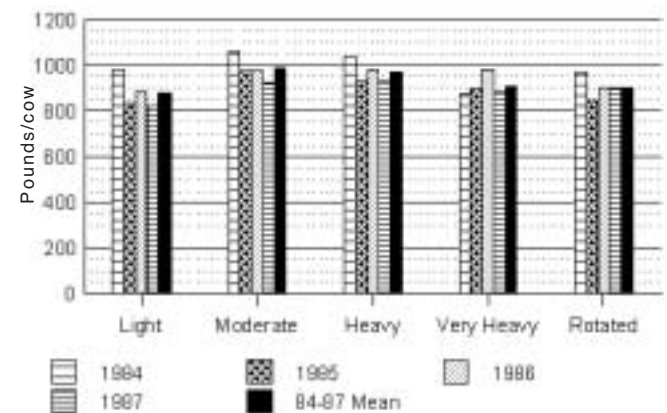


Figure 5—Cow weights at fall roundup, pounds per cow.

all other years, and this correlates with the extremely good summer precipitation in 1984 (table 1).

Weaned Calf Weights

Treatment mean weaned calf weights generally varied between 350 to 550 lb with coefficients of variation near 20-percent and 95-percent confidence intervals on the order of +/- 50 lb among treatments within years. Calves from the light use pasture weighed over 600 lb in 1984 (fig. 6). This high weight was a bias in the trial, as a result of the high proportion of first calf heifers assigned to this treatment. These heifers had been bred to calve earlier than the cows that were assigned to the grazing trial. The very heavy use treatment calf weights were lower in both 1984 and 1985 compared to the other treatments, and there was a trend to lighter weight calves in the later 2 years of the 1984 to 1987 trial for all other treatments.

Calf Production as Pounds Per Animal Unit Year

Calf pounds per AU (fig. 7) combine the effects of calf weight, percentage calf crop, and stocking rate. The low weaned calf pounds per AU the second year of the very heavy use treatment is very evident. Even with the very good precipitation years of 1983 and 1984, cows bred on the very heavy use pasture in 1984 had light calves in 1984 (fig. 6) and a 70-percent calf crop in 1985. Calf crops for the other treatments ranged from 85 to 100 percent in 1985. Cow numbers assigned to the very heavy treatment were reduced to seven cows in the fall of 1985. In 1986 and 1987 when forage in the very heavy use pasture became limited, these remaining cows were placed with and contributed to the calculated stocking rate of the rotated pastures, and the stocking rate of the heavy use pasture reduced accordingly.

The poorest mean calf pounds per AU for the 1984 to 1987 trial was for the seasonally rotated treatment. In addition to the trend to lighter calf weights in the later 2 years of the 1984 to 1987 trial, percentage calf crop in 1987 was 67, 64, and 72 percent for the light, moderate, and rotated treatments,

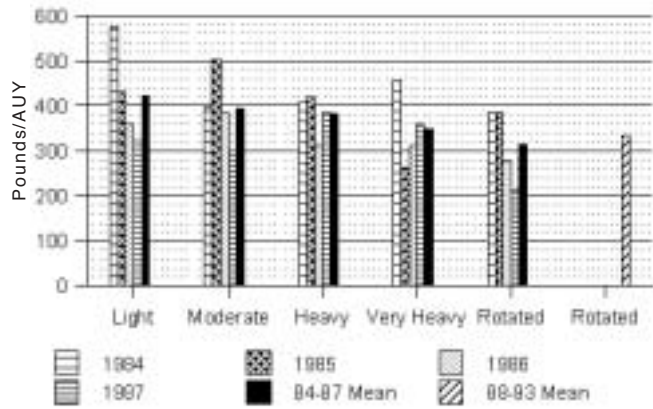


Figure 7—Calf weaning weights, pounds per animal unit year.

respectively. Progressively drier years, lack of nutritional forage to stimulate prompt breeding after calving, and limited culling during the 1984 to 1987 trial contributed to these results. Mean calf pounds per AU for the rotated treatment with very light stocking from 1988 to 1993 was slightly higher than the rotated treatment mean for the 1984 to 1987 trial.

Calf Production as Pounds Per Acre

The very heavy use treatment yielded high calf production per acre for 2 years and then was not sustainable (fig. 8). Weaned calf production for the yearlong moderate to heavy use treatments averaged near 30 pounds per acre per year, and the yearlong light use and the 1984 to 1987 light use rotated herd produced near 20 pounds per acre. Mean weaned calf production for the very light stocking and rotation through seven or eight pastures from 1988 to 1993 was 10 pounds per acre. Reducing the stocking rate and rotating through seven or eight pastures as compared to rotating

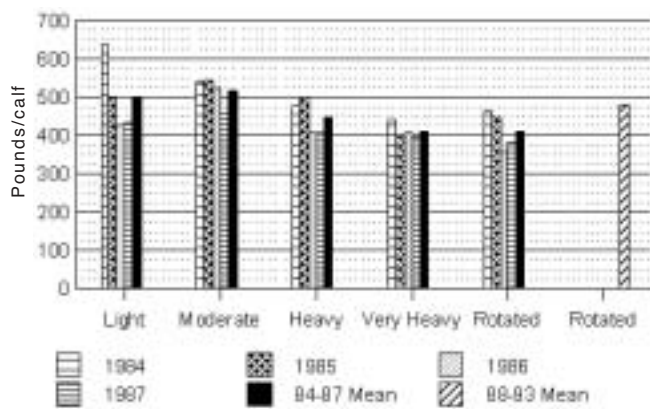


Figure 6—Calf weaning weights, pounds per calf.

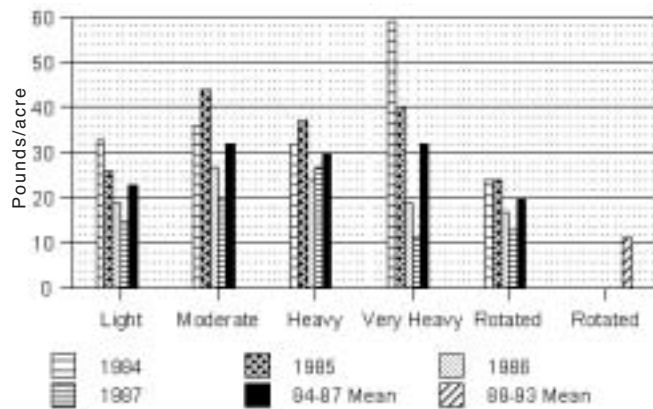


Figure 8—Calf weaning weights, pounds per acre.

through three seasonal pastures did improve individual calf weights (fig. 6), but production per acre was very poor (fig. 8).

Patch Grazing

Forage utilization within pastures was very patchy (areas of Lehmann lovegrass and other species utilized as much as 80 percent or more, especially under mesquite and on slopes of draws, dispersed among areas with little or no utilization) (fig. 9). Lehmann lovegrass produced new growth in these patch areas from early spring to late fall when moisture was present. During these grazing trials, cows selectively improved their nutritional intake by grazing in previously grazed patch areas, as reported by Ruyle in his paper presented at this symposium. Spot grazing in patches persisted throughout the grazing trials on all treatment pastures, except the yearlong very heavy use treatment and the summer use seasonal rotation pasture. In 1986, the yearlong very heavy use pasture (7 acres per AU) became one large, heavily grazed patch with little regrowth available for use. This pasture supported only light stocking rates in 1986 and 1987, indicating that heavy, repeated grazing in patch areas reduced potential forage production on these patch areas, even in a short term.

Patch Management

Stocking rates based on acres or average standing perennial grass production for the grazing trials reported in this paper provide little guidance for management decisions.



Figure 9—Patch utilization pattern for Lehmann lovegrass in pasture 2 after 4 years of light yearlong stocking.

Results indicate that the key to management of pastures dominated by Lehmann lovegrass is management of the grazed patches.

Cows slipped to later breeding or skipped a breeding during the later years of the 1984 to 1987 grazing trial for all treatments, especially the rotated treatment. Nutritional intake during the breeding season is known to influence cow breedback time after calving. New tiller growth in grazed patches provided improved nutrition, but repeated and heavy utilization of forage in these patches reduced the potential to produce adequate forage quantity.

The observation of use pattern for the summer use rotated pasture provides a clue to a possible strategy for management. By 1987 the summer use rotated pasture had become one large patch (fig. 10), but utilization was less than in the very heavy use pasture. High intake of green forage by cows in the summer, growing calves eating the green forage, high stocking density in a rotated pasture, and 4 consecutive years of summer grazing combined to account for the utilization pattern developed on this pasture.

A two-pasture rotation may be suitable for improving the quantity of high quality forage during spring in pastures that are dominated with Lehmann lovegrass. One pasture is grazed during the summer and fall season, and the second pasture is rested. Both pastures are then open for grazing during the winter and spring seasons. The second pasture is grazed during the second summer and the first is rested, and again both are open for use in the winter and spring. The objective is to increase the area of patches with higher stocking density in the summer pasture without stressing the livestock. During winter and spring, livestock have the opportunity to maximize forage selection for quality from the patches. The grazed patches are then provided rest every other summer to maintain plant vigor.



Figure 10—Uniform grazing use pattern for Lehmann lovegrass in pasture 3 after 4 years of grazing each summer to late fall.