

Youth Forum

Does Prescribed Burning on High-Elevation, Cool-Season Meadows Impact Forage Quality, Diet Selection, and Performance of Grazers?

By Brad Fuller

Editor's Note: This paper is the second-place winner of the High School Youth Forum contest at the Society for Range Management Annual Meeting, February 2007, Reno, Nevada.

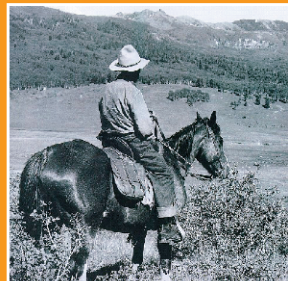
Introduction

Historically, low-intensity fires have been a key element to ensure the health of rangeland ecosystems. However, throughout the last half of the 20th century, active use of fire to manage rangeland resources was nearly nonexistent. Only after recent catastrophic fires have threatened human life has the use of low-intensity prescribed fire been viewed and socially accepted as a solution to reduce the threat of wildfires and enhance rangeland health.

When appropriate precautionary measures are taken, a prescribed fire is an effective means of enhancing rangeland health and promoting multiple uses by reducing undesirable (ie, woody, weed, or dead plant species) flammable fuels and vulnerability to insects and disease, as well as improve the recycling of soil nutrients (which promote plant growth) and grazing patterns of wild and domestic grazers.

The Valles Caldera National Preserve (VCNP), formerly known as the Baca Land Grant and Baca Ranch, is a living example of how low-intensity fire can impact a landscape. Throughout the 19th and 20th centuries, while the lands were under communal and private ownership, low-intensity fire was used to burn the residual grass on the high-elevation meadows at the end of the summer grazing season and with adequate winter moisture would guarantee regrowth of young, nutritious grass for sheep and cattle to graze. These fires moved slowly across the vast Valles (Valleys) and also burned small trees encroaching the grasslands within the meadows.

Use of Fire to Manage Grazing Resources on the Baca Ranch



Throughout the 19th and 20th century, when the lands were under communal and private ownership, low-intensity fire was used to burn grass in the meadows at the end of the grazing season in early Fall

With adequate winter moisture this range management practice would guarantee re-growth of young, nutritious grasses for sheep and cattle to graze the following spring

Since the federal government purchased the Baca Ranch in 2000, one of the largest resource management issues has been poor grazing distribution. Management strategies such as herding, strategic placement of supplements, and cattle type have been implemented to help improve grazing distribution. Prior to the fall of 2005, prescribed fire had not been implemented as a grazing distribution tool on the VCNP, while under federal management. Hypothetically,

Table 1. Average standing forage (lbs./acre) in the nonburned and burned pasture prior to the October 2005 prescribed burn.

	Standing crop	Nonburned area biomass	Burned area biomass
	(%)	(%DM; pounds/acre)	
Mountain valley	100	2,384	1,179
Mountain meadow	100	1,444	1,669
Riparian	100	1,930	783
<i>Average</i>		1,919	1,210

a fall burn in a predominantly cool-season grass system (used seasonally for grazing) will likely impact grazing distribution long-term by uniformly increasing the nutritional composition of the cool-season grasses, hence the nutritional quality of the available diets for grazers, as well as their respective performance.

Research Objectives:

1. Does prescribed burning improve the nutritional quality of cool-season grasses on high-elevation meadows?
2. Does prescribed burning improve the quality of the diet selected by wild and domestic grazers during the initial summer grazing season following a fall burn?
3. Does prescribed burning improve performance of domestic grazers during the summer grazing season following a fall burn?

Materials and Methods

Study Area. The research was conducted on the 89,000 acre Valles Caldera National Preserve (VCNP) located in

Sandoval County, NM, and formerly known as the Baca Ranch. Approximately 2,000 acres in 2 Valles (Valle Grande and Valle Toledo) on the preserve were used for this research project. In the fall of 2005, a prescribed burn was successfully conducted on approximately 2,000 acres within the cool-season meadow of the Valle Toledo. Therefore the Valle Toledo served as the treatment area for this research project and the cool-season meadow within the Valle Grande served as the control area for this project.

Data collected. To achieve the first objective, grass samples were clipped in both Valles prior to the prescribed burn in the fall of 2005 and once weekly beginning in late June 2006 through September 2006 to estimate forage production and quality before and after the prescribed burn. To meet the second objective, fecal scat samples from cattle and elk were collected weekly from both the Valle Toledo and Valle Grande. The third objective was accomplished by measuring the body weight of cattle prior to and at the conclusion of a 60-day summer grazing season following the prescribed

Table 2. Average standing forage (pounds/acre) in the nonburned and burned pasture in June 2006 (prior to steer turnout) and October 2006 (after steer removal).

		June 2006		October 2006	
		Nonburned area biomass	Burned area biomass	Nonburned area biomass	Burned area biomass
	Standing crop (%)	-----(%DM; pounds/acre)-----			
Upland	100	2,731.8	1,372.4	4,189.9	1,291.1
Intermediate	100	3,654.1	1,410.6	2,357.1	1,419.4
Riparian	100	3,979.4	3,622.7	4,428.7	3,871.4
<i>Average</i>		3,346.6	2,135.2	3,658.6	2,193.2

burn. Two hundred steers were divided into 2 separate groups (100 steers per group). One group was turned out in the Valle Toledo and the other in the Valle Grande.

Results

The forage quantity in the nonburned areas was higher than the burned areas prior to the prescribed burn, October 2005 (Table 1), prior to steer turnout, June 2006 (Table 2), and after steer removal in October 2006 (Table 2). During the 2006 summer grazing period the average crude protein was higher in the burned area than in the nonburned area (Table 3).

The fecal scat from the elk on the burned areas was slightly greater than from the elk on the unburned areas.

There were no consistent differences in the fecal scat of the cattle from the 2 areas (Figure 1).

Performance of the weaned beef steers was better from the animals that had grazed the burned area than the steers from the unburned area (Table 4).

Conclusions

Nutritional quality of cool-season grasses was improved in the burned compared to the nonburned area during the growing season. The data from this project also suggest performance (total gain and average daily gain) was enhanced in steers that grazed the burned pasture during the summer grazing season of 2006. Interestingly, the diets selected by both the steers and elk were not improved by the prescribed burn.

Table 3. Average crude protein (% DM) of standing forage in the nonburned and burned pasture during the 2006 summer grazing season.

	July		August		September	
	Nonburned	Burned	Nonburned	Burned	Nonburned	Burned
	----- (% DM)-----					
Upland	9.27	11.53	9.00	10.20	6.98	8.66
Intermediate	9.61	11.50	9.20	10.37	8.56	7.74
Riparian	9.98	14.10	10.19	11.80	9.26	8.69
Average	9.62	12.37	9.46	10.79	8.27	8.36

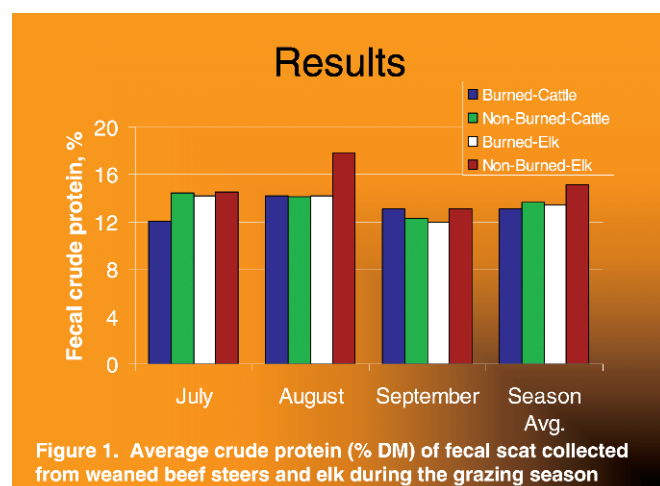


Figure 1. Average crude protein (% DM) of fecal scat collected from weaned beef steers and elk during the grazing season

Figure 1. Average crude protein (% DM) of fecal scat collected from weaned beef steers and elk grazing either the nonburned or burned pasture during the 2006 summer grazing season.

Table 4. Average body weight, total gain, and daily gain of weaned beef steers grazing either the nonburned or burned pasture during a 60-day summer grazing season.

Item	Nonburned	Burned
Average initial body weight (pounds)	547	544
Average final body weight (pounds)	694	704
Total gain (pounds)	147	160
Average daily gain (pounds/day)	2.45	2.67



Implication

The summarized data indicate both the quality of the cool-season grasses and cattle performance can be enhanced during the summer grazing season immediately following a fall prescribed burn.

Author is a student at Clayton High School, Clayton, NM.