PUBLICATIONS
1993

Forage Research in Texas, 1993

Forage Response and Beef Herd Performance after Prescribed Burning on the Coastal Prairie

C. Wayne Hanselka, L. R. Sprott, David H. Bade, and D. E. Hale

Summary

The responses of forage (production and quality) and beef herd production to prescribed spring burning were measured during a 21-month postburn period in south Texas. Two 1,000-acre pastures, typical of Texas Gulf Coastal Prairie, were used. One pasture was burned in February 1984, while the other was left unburned. Each pasture was stocked at 4 acres/animal unit with Brahman crossbred cows. Mean values for forage energy content (%), crude protein (%), and production (lb dry matter/acre) increased in regrowth on the burned pasture relative to the nonburned pasture. Likewise, calving percentage and number of calves born early in the calving period increased for cows grazing the burned pasture. Prescribed burning improved gross return to the livestock enterprise by almost 20%.

Introduction

The middle Texas Gulf Coastal Prairie was historically influenced by fire. In recent times, prescribed fire has been used extensively to (1) suppress woody species and enhance forage production and quality; (2) improve the performance of stocker calves on native range and improved pastures, and (3) improve weight gains and nutritional profile of mature cows grazing regrowth. It is estimated that prescribed burning could net an additional $9.60 to $10.40/acre through increased beef production as a result of higher postburn forage quality and quantity.

This study monitored the responses of native range forage and beef herd production parameters to prescribed spring burning on the Texas Gulf Coast Prairie. Gross dollar returns to the cow-calf enterprises on both burned and nonburned pastures were monitored to evaluate economic feasibility of prescribed burning of coastal prairies.

Procedure

This study was conducted on the Coastal Prairie in northeast Goliad County, Texas, on two similar 1,000-acre pastures from February 1984 to November 1985. The pastures were composed of similar plant species and estimated to be in fair range condition with a fuel load of 3,400 lb/acre. Brownseed paspalum (*Paspalum plicatulum*), Pan American balsamscale (*Elyonurus tripsacoides*), seacoast bluestem (*Schizachyrium scoparium*), and longspike tridens (*Tridens strictus*) dominated the study pastures. A few scattered mesquite (*Prosopis glandulosa*) were present. (Scientific names follow Hatch et al. [1990]). The pastures were rotationally grazed before this study, and grazing on both pastures was deferred for the latter half of 1983. One pasture was then burned on 15 Feb. 1984.

Both pastures were then deferred until 2 April 1984, when each pasture was stocked with 250 Brahman crossbred cows from the ranch cow herd. Supplemental feed consisted of hay, salt meal, and minerals. The cows used to stock the pastures had begun calving in December 1983 and calved through March.

Monthly forage samples were taken at three locations in each pasture along permanent 500-ft transects. Standing crop (air-dried lb/acre) in three 3-sq-ft areas along each transect were clipped to ground level, air-dried, and weighed separately. Forage subsamples were mixed thoroughly and analyzed monthly for crude protein and Mcal of digestible energy at the Texas Agricultural Extension Soil, Water, and Forage Laboratory, Texas A&M University, College Station.

Selected cows (10%) from the herd were sampled monthly for body condition scores. Calves born, by month, within the calving period was determined by monthly counts of all calves until all the cows had calved. Average market weights of calves from each pasture were also recorded.

Results and Discussion

Changes in forage yield and quality are shown in Figures 1 to 3. Monthly postburn data shows an apparent advantage in yield, crude protein, and energy content in regrowth from the burned pasture. Mean values of these four measurements over a 21-month postburn period were higher in regrowth from the burned pasture than in growth from the unburned pasture.

Keywords: prescribed burning / forage production and quality / beef herd production.

The quality advantage in regrowth forage from the burned pasture was evident until June 1985 (16 months postburn), whereas the forage quantity advantage in the burned pasture lasted 2 to 3 months longer. Elevated levels of nutrients on burned rangeland generally remain only 3 to 4 months postburn (Hanselka 1989); however, in this study, forage removal by grazing probably kept the plants in a growth state, promoted tiller growth, and maintained elevated nutritional quality values.

Preburn calving percentages in the two pastures were not different between burned (60%) and unburned (57%); however postburn calving percentages were higher (77% vs. 61%) in cows grazing the burned pasture (Table 1). Preburn calving pattern (number of calves born monthly within the calving period) was not known, but cows grazing the burned pasture showed a distinct postburn advantage for number of early born calves (e.g. January 1985). Calves born in January were conceived in April 1984, just 60 days postburn. Cow body condition scores were consistently higher on the burned pasture (Fig. 4), and this may have allowed the cows to rebreed earlier. However, consistently achieving this improvement in calving patterns will depend on timing the burn with the

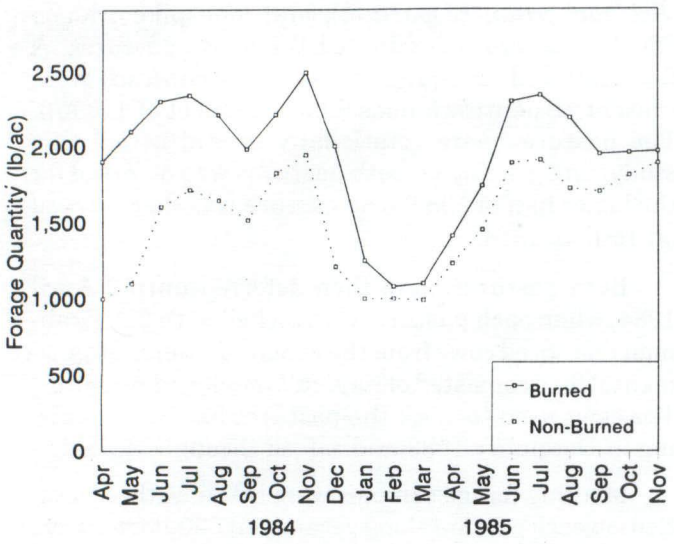

Figure 1. Range forage response (lb/acre) to prescribed burning.

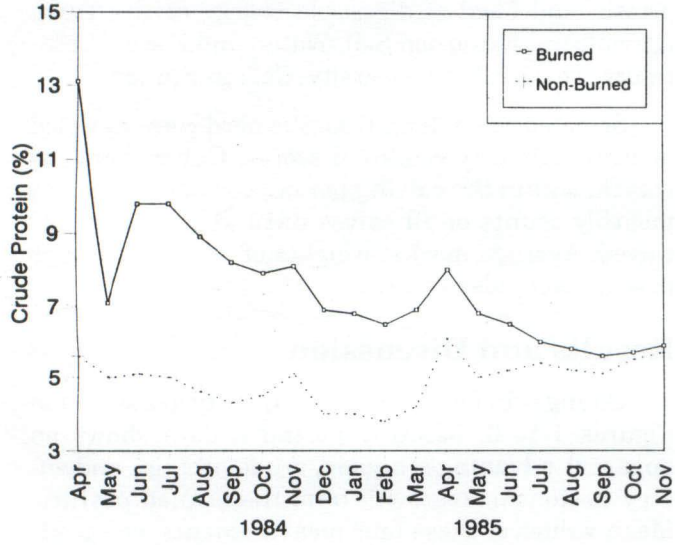

Figure 2. Forage crude protein content (%) on burned and nonburned pastures.

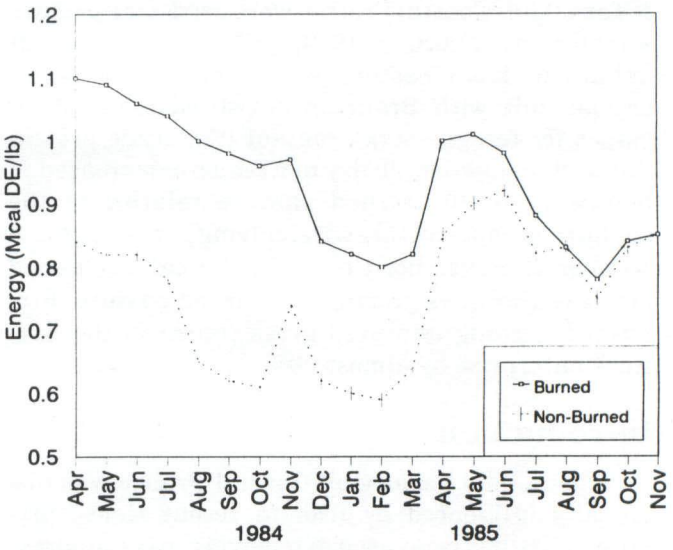

Figure 3. Energy (Mcal DE) variations in forages on burned and nonburned pastures.

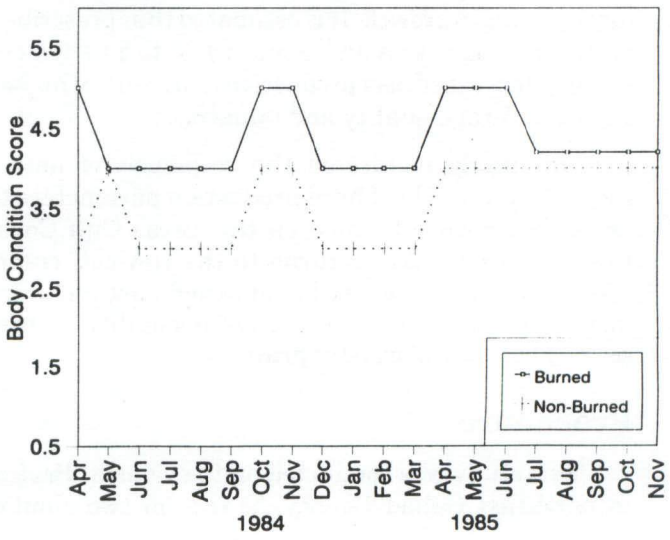

Figure 4. Body condition scores (1-poor to 10-excellent) of cows on burned and nonburned pastures.

Table 1. Number of calves born, by month, and calving (%) on burned and nonburned pasture.

	Date						
Pasture	Dec. 1984	Jan. 1985	Feb. 1985	Mar. 1985	April 1985	Total calves	Calving (%)
Burned	32	119	25	9	8	193	77
Nonburned	16	56	61	9	10	152	61

start of the breeding season. For cows in this trial, the breeding season began annually in March.

Preburn market weights of 1983 calves did not appear to be different (Table 2). However, calves from cows on the burned pasture that were born before or shortly after the burn had an appreciable difference in market weight in 1984. The advantage in forage yield and quality may have increased milk yields in cows on the burned pasture, resulting in the apparent calf weight improvement. Furthermore, these calves could use higher quality burned regrowth and presumably benefit from the higher forage yields and quality as did their dams. Market weights in 1985 also were higher for calves from cows on the burned pasture. This is likely attributed to the higher number of early born calves in the burned pasture (Table 1).

The increased number of calves and higher calf market weights allowed an increase in gross dollars returned per cow on burned range during the year of the burn (1984) and the following year (Table 3). In 1984 a $10.21/head advantage was achieved in cows on the burned pasture for a $2.55/acre advantage using a $0.60/lb selling price. In 1985 a $48.65/head advantage was achieved for cows on the burned pasture for a $12.16/acre advantage. The advantage of burning would increase as selling price of calves increased above $0.60/lb. In a period that included two calf crop marketings, a single prescribed fire improved gross dollar returns to the beef cattle operation by almost $15,000, a 20% advantage over not burning.

Table 2. Calf market weights (lb) on burned and nonburned pastures in Goliad County.

	Preburn	Postburn	
Pasture	1983	1984	1985
	lb/calf		
Burned	414	438	442
Nonburned	418	407	425

Table 3. Gross returns ($) per cow on burned and nonburned rangeland, 1984-85.

		Gross†	Cost of burn	Gross less cost of burn	Difference
1984	Burned	157.68	8.28	149.40	10.21
	Unburned	139.19	—	139.19	
1985	Burned	204.20	—	204.20	
	Unburned	155.55	—	155.55	

† $\frac{\text{number of calves 5 market wt.} \times \$0.60/\text{lb}}{\text{number of cows}}$

In this trial, prescribed spring burning markedly improved forage and beef production. Although the advantage in forage yield and quality appeared to last for only 12 months, this was long enough to boost production in two calf crops. Because advantages in forage yield and quality appeared to diminish after 12 months, burning every second or third year may be warranted if weather conditions and subsoil moisture facilitates fuel load production and subsequent regrowth. Adequate grazing management is required to ensure a requisite amount of fine fuel (grasses) and to harvest the benefits of the prescribed burn.

Level and rate of improvement in production from a beef breeding herd through the use of prescribed range burning will depend on timing of the burn and the start of the breeding season. In spring-breeding cows, timing of postburn forage improvement was almost coincident with start of breeding and appeared beneficial to herd reproduction. A late winter - early spring burn in herds with late fall and early winter breeding periods might have different or no effects on reproduction. Nevertheless, the improvement in forage yield and quality after a spring burn would likely improve weight gain in fall- or spring-born calves regardless of whether reproduction was improved in their dams.

Literature Cited

Hanselka, C. W. 1989. Forage quality of common buffelgrass as influenced by prescribed fire. Texas J. of Agriculture and Natural Resources 3:15-18.

Hatch, S.L., K.N. Gandhi, and L.E. Brown. 1990. Checklist of the vascular plants of Texas. Texas Agri. Exp. Stn. MP-1655.