Heavy Winter Grazing Reduces Forage Production: An Observation

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Some range professionals have expressed a viewpoint that grazing timing has more impact on plant welfare than grazing intensity (Sharp et al. 1994, Frost et al. 1994, Burkhardt 1997). Others have challenged this idea, maintaining that intensity is the most critical aspect of grazing management (Pieper and Heitschmidt 1998, Heady and Child 1994, Holechek et al. 1998a,1998b). Controversy also centers around how much adverse impact one year or season of heavy grazing will have on subsequent forage production assuming it is followed by rest or conservative use. Although these issues are of much practical importance to ranchers, little research is available on these subjects (Heady and Child 1994, Holechek et al. 1998a).

During 1997 and 1998 we had an opportunity to test some of these ideas on a short- grass prairie rangeland in south-central New Mexico. The site had two adjacent pastures in good (late seral) ecological condition with a long history (over 10 years) of winter and spring use (mid December to mid May) by cows at conservative stocking levels. Prior to 1997, periodic range surveys showed forage production on the two pastures was nearly equal. In 1997 one pasture was shifted to conservative summer grazing with yearling cattle. On the other pasture cows continued to graze in the winter-spring period with a 50% increase in the stocking rate. Estimated percent use of forage was increased from 40-45% to 60-65%. One year later, in 1998 (July and August), both pastures received non-use. In September 1998 we evaluated vegetation composition and standing crop of forage on each pasture. This allowed us to evaluate how one year of summer cattle grazing at a conservative intensity (about 35-40% use) and one year of winter-spring grazing at a heavy intensity (about 60–65% use) would impact forage production the following growing season.

Site Description

Our two study pastures were located on the eastern edge of the Mescalero Apache Indian Reservation in south-central New Mexico. Both pastures are classified as southern plains shortgrass prairie, with wolftail and blue grama being the primary forage grasses (USDA-Natural Resources Conservation Service). They are adjacent to each other and separated by a common fence (Figure 1). Elevation of the pastures is about 5,500 feet. The pastures are on the eastern edge of the Rocky Mountains and have moderately flat terrain (slopes vary

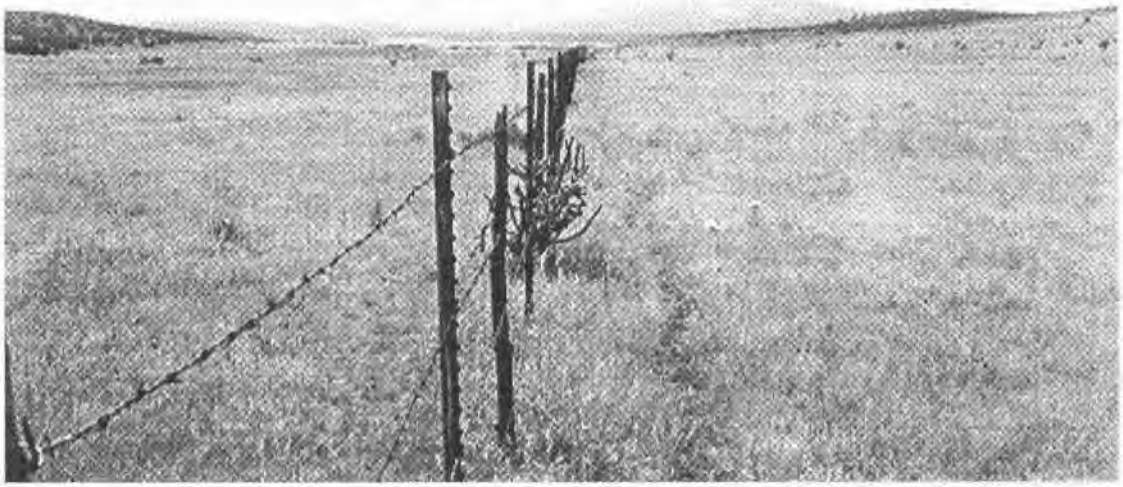

Fig. 1. *These two pastures in south-central New Mexico received moderate winter-spring grazing by cattle until 1997. In summer 1997 the pasture on the right (Deep Lake) was grazed conservatively while in winter-spring 1997-1998 the pasture on the left (Spur) was grazed heavily. In September 1998 (picture) after summer non-use (both pastures) the pasture on right had 50% higher forage standing crop than the pasture on the left.*

from 0 to 9%). Annual precipitation is about 15 inches with over 60% occurring in the summer. July and August are the wettest months, while the December through May period is relatively dry. Growing season precipitation in 1997 was about 20% above average while 1998 precipitation was near average. The last killing frost usually occurs in early April with the first frost in mid-October. Soils on the pastures are primarily moderately deep loams (3 to 6 feet).

Methods

On 4 September 1998 we selected two key areas in each pasture for our vegetation composition and forage standing crop evaluation. A permanent watering point occurs near the center of the fence that divides the two pastures. We located our key areas in each pasture about 0.8 miles east and 0.8 miles west of the watering point along the common fence, and 60 yards inward from the fence. The step point method (Evans and Love 1957) was used to quantify vegetation composition. Two, 100 yard transects were used for cover and standing crop measurements on each key area. Standing crop was estimated by clipping ten, 2.4 foot square quadrats located systematically on each by area (Cook and Stubbendieck 1986). All standing crop estimates were converted to a dry matter basis.

Results and Discussion

Vegetation Composition and Range Condition

Vegetation composition was similar on the two key areas within each pasture (Table 1). Wolftail and blue grama were the primary forage grasses on both pastures. Wolftail is considered a decreaser in response to grazing while blue grama is considered an increaser (Gay and Dwyer 1980). Rangeland ecological condition scores using the quantitative climax approach developed by Dyksterhuis (1949) and guidelines by the USDA-Natural Resources Conservation Service were 57% for the heavily grazed Spur Pasture and 61% for the conservatively grazed Deep Lake Pasture. These scores correspond to good condition or a late seral stage, and indicate that past range management has been sound. Late seral shortgrass rangelands provide a high level of forage for livestock and game animals (elk, pronghorn, mule deer), and have stable soils. Diversity in plant and wildlife species is near maximum.

Table 1. Percent composition by cover (step-point method) on south-central New Mexico rangelands conservatively grazed in summer (Deep Lake Pasture) and heavily grazed in winter-spring (Spur Pasture) on 4 September 1998.

Plant Species	Pasture	
	Spur	Deep Lake
	(% Composition)	
Wolftail	24	30
Blue Grama	22	21
Threeawns	20	4
Vine Mesquite	5	10
Silver Bluestem	2	4
Other Grasses	1	1
Total Grasses	74	70
Silverleaf Nightshade	1	1
Ragweed	6	4
Other Forbs	6	6
Total Forbs	13	11
Fringed Sagewort	8	18
Other Shrubs	5	1
Total Shrubs	13	19

Standing Range Crop

Total standing crop of forage was about 50% higher on the conservatively grazed Deep Lake Pasture compared to the heavily grazed Spur Pasture (Figure 2, Table 2). These differences were greater for perennial grasses than forbs. Prior to 1997, forage production along the fence where our key areas were located was considered to be near equal for the 2 pastures.

Table 2. Standing forage (lbs/acre) on south-central New Mexico rangelands conservatively grazed in summer (Deep Lake Pasture) and heavily grazed in winter-spring (Spur Pasture) on September 4, 1998.

Forage Component	Pasture	
	Spur	Deep Lake
	(lbs/acre)	
Perennial Grasses	352	824
Forbs	256	436
Total Forage	608	1,260

Stubble height of blue grama was evaluated when cattle were removed from each pasture prior to non-use in summer 1998. Blue grama in the conservatively grazed Deep Lake Pasture had a two inch average stubble height compared to 1.25 inches in the heavily grazed Spur Pasture. Recommended minimum stubble height for blue grama after grazing is two inches (Crafts and Glendening 1942). Blue grama stubble height below 1.5 inches indicates heavy grazing, and forage use levels in excess of 60%.

Other Findings on Grazing Intensity Versus Timing

Our observation that grazing intensity is much more critical than grazing timing is consistent with other studies in arid and semi-arid areas. In comprehensive studies of controlled timing of grazing in arid areas on the Santa Rita Range in southcentral Arizona, Martin and Cable (1974) found more perennial grass cover on yearlong than on seasonally grazed pastures. Perennial grass production was closely associated with degree of grazing use, and was highest where grazing intensity

was lowest. In this study, winter-spring grazing with summer rest and summer-fall grazing with winter rest were both inferior to year-long grazing from the standpoint of productivity of desirable perennial grasses. Perennial grass cover and production actually averaged lower on pastures grazed November to April than those grazed May to October.

Heady and Child (1994) reviewed the long term (20 year) results of various grazing management practices applied on 95 different pastures on the Vale Oregon District, Bureau of Land Management. All seasonally grazed pastures started with moderate grazing and had increased forage production during the twenty years. Season of use made little difference. The key factor in range improvement appeared to be the reduction in grazing intensities that were applied when the project was initiated in 1966.

On salt desert rangeland in Utah, one year of heavy defoliation of primary forage plants in winter and spring had long term deleterious effects on their productivity (Cook and Child 1971). After 7 years of non-use plants that had been heavily defoliated still had lower vigor than untreated plants.

Recently the effect of one year of heavy cattle grazing on subsequent forage production was evaluated in the Chihuahuan Desert of south-central New Mexico (Nsinamwa 1993). Timing of grazing in this study occurred during the summer. For several years prior to application of the moderate and heavy grazing treatments all experimental areas had been conservatively grazed. In the year following grazing treatments, forage production was reduced about 25% on heavily (60% use) compared to moderately (40% use) grazed areas. Both years of study had well above average growing season precipitation. This study showed that one year of heavy grazing, even under favorable precipitation conditions, can reduce subsequent forage production.

During the recent drought in New Mexico (1994–1996) we had considerable opportunity to observe forage production on similar rangelands with different grazing intensities. We noticed that areas receiving heavy grazing during the drought typically produced lower amounts of forage when the drought broke in 1997 than pastures where some degree of forage residue was maintained. Generally, recovery of forage plants after drought appeared closely related to standing crop levels maintained throughout the dry period. Hughes (1982, 1990) found that desert grasses were quite slow to recover from occasional years of heavy utilization regardless of season of use. We strongly agree with his recommendation that grazing use be kept within safe limits (no more than 50%) regardless of year or season.

Management Implications

The forage production data collected in September 1998 indicate that one year of heavy use on shortgrass rangeland in New Mexico during dormancy (winter and spring) can reduce forage production the following growing season as much as 50% compared to conservative or

a)

b)

Fig. 2. *Standing forage crop on Deep Lake Pasture (a) and Spur Pasture (b) after summer non-use in September 1998. The Deep Lake pasture was conservatively grazed while the Spur Pasture was heavily grazed in 1997-1998.*

moderate use. Conservative use during the growing season appears to have much less impact on subsequent forage production than heavy use during dormancy.

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