

Burning and Grazing Increase Herbage on Slender Bluestem Range

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This paper describes how prescribed burning, in combination with cattle grazing of various intensities, affected grass production, utilization, and litter accumulation in the bluestem-longleaf pine type. The study was conducted on open grassland of the Palustris Experimental Forest in central Louisiana. Most of the longleaf pines had been cut over 20 years previously.

Prior to 1951, the area had been burned every 2 or 3 years during winter or early spring according to local custom of removing litter and hastening new grass growth.

Grasses constitute over 90 percent of the herbaceous cover. Slender bluestem (*Andropogon tener*) and pinehill bluestem (*A. divergens*) rank first and second as the principal forage plants and are the key management species. Slender bluestem is most abundant on treeless flatlands that have been grazed intensively and burned frequently. It matures early—usually by mid-June. Repeated close grazing is necessary to prevent the formation of wiry, persistent flower stalks and to prolong the period of palatability (Figure 1). Pinehill bluestem is more prevalent under longleaf pine timber stands and on cutover, sandy hills. It produces less herbage than slender bluestem but matures later and is more palatable.

Other grasses contributing significant quantities of forage are the panics (*Panicum* spp.), paspalums (*Paspalum* spp.) and miscellaneous bluestems, including fineleaf bluestem (*Andropogon subtenuis*), paintbrush bluestem (*A. ternarius*), Elliott bluestem (*A. elliottii*), and big bluestem (*A. gerardii*). Carpet-

grass (*Axonopus affinis*) is the principal invading perennial grass.

Grassleaf goldaster (*Chrysopsis graminifolia*) and swamp sunflower (*Helianthus angustifolius*) are the most common perennial, broad-leaved herbs. Grasslike plants include pinehill beakrush (*Rhynchospora globularis*), and several species of *Carex* and *Cyperus*.

Shrubs and deciduous trees are sparse. Important species include blackjack oak (*Quercus marilandica*), southern wax myrtle (*Myrica cerifera*), shining sumac (*Rhus copallina*), and blackberry (*Rubus* spp.).

Soils are deep, medium textured, and slowly permeable to very slowly permeable. Surface drainage is generally good.

Annual precipitation averages about 58 inches, with about 36 inches occurring during the growing season—March through October. Summer droughts of 4 to 8 weeks duration are fairly common.

In February 1952, eighteen 1/3-acre paddocks were installed on a range burned by wildfire the previous year. From 1952 through 1959, 6 paddocks were grazed heavily and 6 moderately, while 6 were ungrazed (Figure 2). Moderate grazing was aimed at utilizing about 40 percent of the herbage. Cows were in paddocks intermittently for a total of about 15 animal days during the 130-day grazing season. For heavy grazing the number of animal days was doubled.

In January 1955, 6 paddocks were burned by slow-moving backfire, and in March, 6 were burned by free-running headfire. The remaining 6 were left unburned. The 9 grazing-burning treatments were replicated twice.

Grass production was measured at the end of each growing



FIGURE 1. Ungrazed, cutover bluestem-longleaf pine type on which slender bluestem is the principal species.

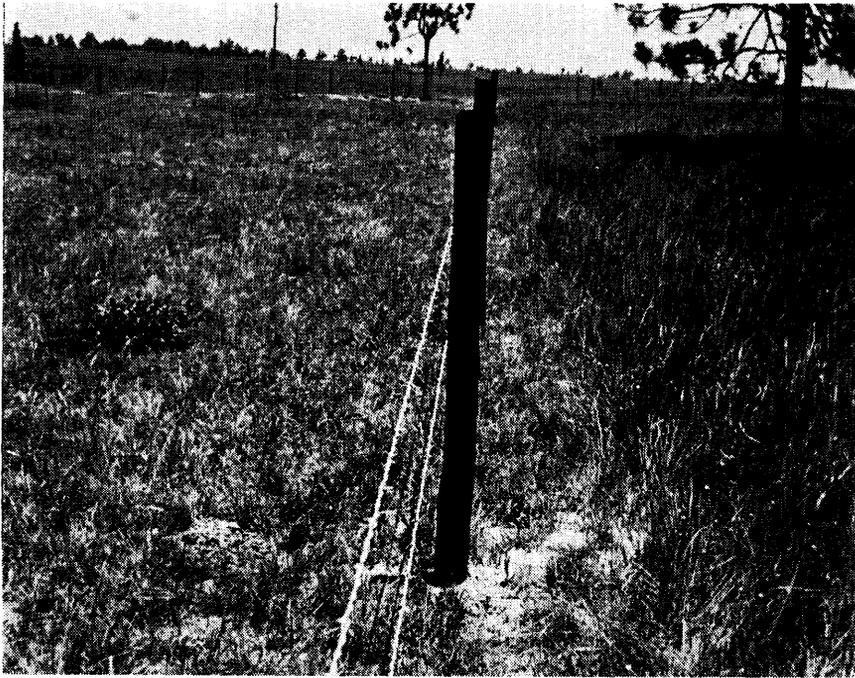


FIGURE 2. Fenceline contrast showing degree of utilization immediately following a grazing period, heavily grazed range (left), ungrazed range (right).

ment with the findings of Pieper *et al.* (1959), who reported that intense grazing reduced daily dry-matter consumption as much as 25 percent.

Grass Production

In the fall of 1952, there was little difference in grass production among grazing treatments. Yields averaged about 2,800 pounds (air-dry) per acre and varied from 2,645 pounds on ungrazed paddocks to 2,925 pounds on those grazed heavily. However, wide differences between grazed and ungrazed paddocks were apparent 2 years later. Over the entire study, grazed paddocks produced significantly more than ungrazed, and the heavily grazed yielded significantly more than the moderately grazed (Figure 4).

The late winter and early spring burning of 1955 markedly increased grass production on ungrazed range but not on grazed. There were no important differences in yields between paddocks burned by backfire in January and those burned by headfire in March. The beneficial effect of burning the un-

season on four 3.1- by 3.1-foot clipped quadrats per paddock. Quadrats in the grazed paddocks were protected by wire cages. Residual grass herbage was determined by clipping 16 quadrats in each grazed paddock. Quadrats were relocated each year. Grass utilization was the difference between residual and total production. Litter was hand-separated from current production on all quadrats.

Forage Utilization

Over the 8 years, cattle removed an average of 47 percent of the total grass growth from the moderately grazed paddocks and 67 percent from the heavily grazed (Figure 3). Year-to-year variations in rainfall and the difficulty of estimating utilization interfered with the goal of 40-percent removal under moderate grazing. Annual fluctuations in utilization were less under heavy than under moderate grazing.

Indicated average forage intake was 34 pounds (air-dry) per animal-unit day under moderate grazing. Cows in the heavily grazed paddock were

forced to eat less palatable plants and plant parts, and consumption was only 27 pounds per day. Greater deposits of excreta on the heavily grazed range may also have lowered forage palatability. The difference in consumption is in general agree-

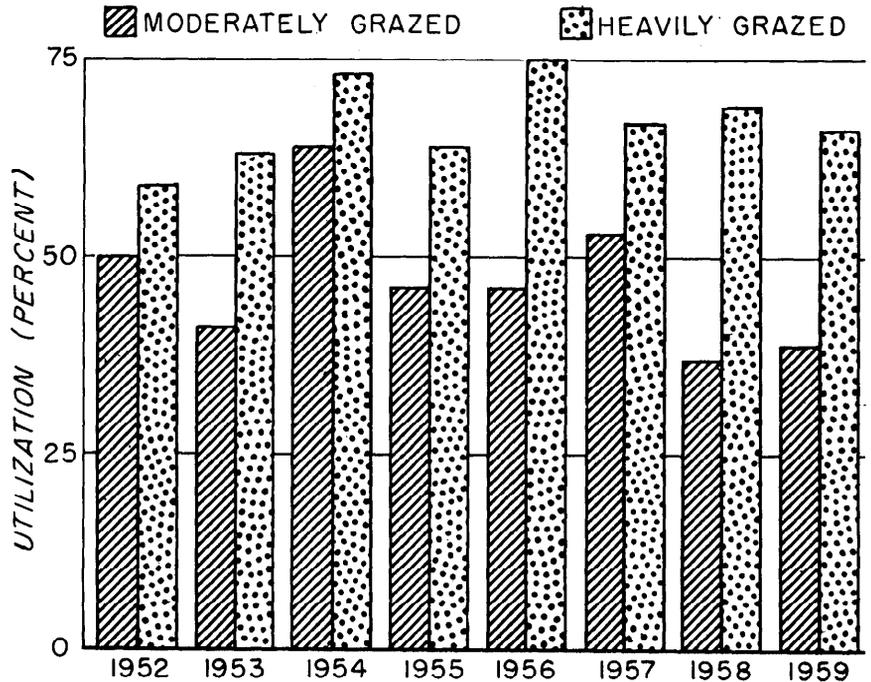


FIGURE 3. Proportions of herbage utilized by cattle.

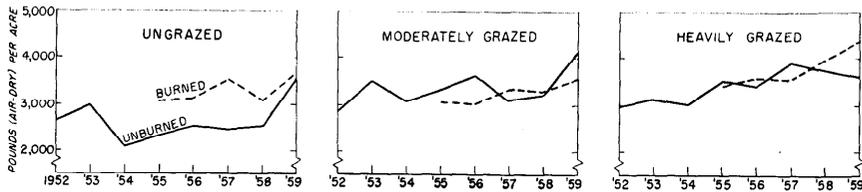


FIGURE 4. Grass production under three grazing intensities.

grazed paddocks lasted through 1958 (Figure 4).

The results illustrate the ability of slender bluestem to make regrowth despite repeated herbage removal. In this respect it reacts quite differently from grasses reported by Albertson *et al.* (1953), Newell and Keim (1947), and Tomanek and Albertson (1953). In the South, Halls (1957) reported that grazing decreased yields on annually burned wiregrass-pine ranges. Cassady (1953) found that close clipping of bluestem-longleaf pine range at 2-week and 4-week intervals for 3 years depressed production, but the effects of long-term clipping were not studied.

Litter Accumulation

On unburned range, the amount of litter was directly related to grazing intensity. Ungrazed paddocks averaged 5,300 pounds per acre, while moderately grazed and heavily grazed paddocks averaged 2,340 and 1,240 pounds, respectively. These differences were highly significant.

Burning ungrazed range reduced litter from about 5,000 pounds per acre in early 1955 to 3,190 pounds one growing season later. On moderately grazed

range, the reduction was from 2,400 to 1,690 pounds. Three growing seasons after burning, litter in ungrazed or moderately grazed paddocks had regained the preburning levels.

Under heavy grazing, burning had little influence on litter weight but changed litter composition. Prior to burning, about 35 percent of the litter consisted of residue from prior years. One growing season later, litter was composed entirely of new herbage.

Similar results have been reported by Wahlenberg *et al.* (1939), who found that slender bluestem was highly susceptible to smothering by litter, and by Ehrenreich (1959), who noted that litter on protected native prairie retarded plant growth.

Practical Application

Moderate grazing is preferable on bluestem-longleaf pine ranges. Though heavy grazing may increase herbage yields, it is likely to damage forest regeneration and lessen the vigor and survival of some forage species. It may also impair soil and hydrologic conditions. Moderately stocked ranges are more likely to have a reserve of forage during droughts and for winter grazing.

Preventing large accumula-

tions of herbaceous litter is apparently the key to high herbage yields. Ranges that have been ungrazed for several years should be burned before they are stocked with cattle. On lightly grazed ranges, burning on a 3- to 4-year cycle will help maintain high yields. Where grazing is moderate to heavy, burning does not appear to benefit herbage production.

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J. Kenneth Sexton, member and past chairman of the California Section, ASRM, has been named Livestock Man of the Year by the San Francisco Chamber of Commerce.

Ken is a 1923 graduate of the University of California and has been nationally prominent in livestock affairs for many years. In association with his two sons and Glen Eidman, he operates three ranches in Glenn County.