Yearlong Grazing of Slash Pine Ranges: Effects on Herbage and Browse

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Highlight: Total herbage yields under immature slash pine were not appreciably changed by yearlong cattle grazing which removed 30 to 60% of the annual growth. However, moderate (45%) and heavy (60%) grazing reduced pinehill bluestem frequency and increased carpetgrass. Individual browse species were not affected by grazing intensity, but total cover was reduced with moderate grazing. As tree density increased, the total herbage yields decreased.

In the South cattle generally graze in longleaf slash pine-bluestem forests all year. Depending upon stocking rates, such continual grazing may place considerable stress on the range and cause competition between wildlife and livestock. Although the effects of seasonal grazing on bluestem ranges are known (Duvall, 1962; Duvall and Linnartz, 1967), yearlong grazing has not been fully explored; and cattlemen have few guidelines for determining whether intermittent or continuous grazing is best for a particular range. This paper describes how yearlong grazing affects forage production and plant frequency in a forested range in central Louisiana.

Procedures

Three areas on the Palustris Experimental Forest in central Louisiana were regenerated to slash pines between 1961 and 1964 at a rate of 25% each year (Pearson et al, 1971). The original longleaf pine forest had been cut more than 30 years before this study began, leaving relatively open grassland. Slender bluestem (*Andropogon tener* (Nees) Kunth) and pinehill bluestem (*A. divergens* (Hack.) Anderss. ex Hitchc.) were the dominant grasses; panicums (*Panicum* spp.), paspalums (*Paspalum* spp.), and miscellaneous bluestems were also prominent.

Until 1960 cattle grazed at moderate intensities all year long. Since 1960 yearlong grazing on three units of the range has been light, moderate, or heavy with utilizations of approximately 30, 45, and 60%. Supplemental feeding alleviated nutritional inadequacies of the range, and prescribed burning provided rotational grazing within each pasture (Duvall and Whitaker, 1963 and 1964; Pearson and

Whitaker, 1972). Prescribed burning was accomplished in the winter on a 4-year rotation during pine regeneration and on a 3-year rotation after the trees were age 5.

Every year after pine regeneration, five 0.1-acre permanent exclosures and five areas open to grazing were randomly located within each grazing unit. At the end of the 4-year regeneration period, there were 20 pairs of exclosed and open areas in each unit. For this study, measurements were made only in the oldest (regenerated 1961) and youngest (regenerated 1964) stands. Consequently, 10 paired plots were measured per grazing intensity. At the time of measurement, the trees were 8 and 11 years of age. Cattle had not grazed on the exclosures since pine establishment.

Sixteen temporary quadrats (2.4 ft²) were systematically located within each exclosed and each open area. Trees, herbage, vines, and shrubs were measured

during October, 1971. Tree cover was computed with a spherical densiometer (Pearson and Jameson, 1967), which measures the percent crown in a 90° cone above the sampling point. Herbage frequency, botanical composition by weight, and production in pounds/acre were estimated by sight. On one randomly selected quadrat in four, production was estimated, clipped, oven-dried, and weighed; these data were used to correct for error-of-estimate and green weight conversion to a dry weight basis. Herbage species included grasses, grasslike plants, and forbs; plants were recorded by species, genera, or species group. Frequency and percent crown cover of shrubs, vines, and hardwoods 5 feet high or less were recorded in each subplot.

T-tests evaluated statistical significance of differences between grazed and protected plots within each grazing unit. Covariance analysis adjusted herbage yields by tree canopy cover for comparisons within grazing intensity groups.

Results and Discussion

Herbage yield

Grazing, even at heavy intensities, did not affect total herbage production: yields averaged between 800 and 1050 lb/acre on both grazed and ungrazed range (Table 1). However, herbage yield significantly decreased as the tree canopy cover increased. Production under 8-year-old trees averaged 1393 lb/acre; under 11-year-old trees it was only 567 lb. This relationship can be expressed by the following linear equation:

$$Y = 3170 - 29.8 C$$

where *Y* is herbage yield in pounds/acre

Table 1. Botanical composition (%) and weight (lb/acre) of herbage yields under immature slash pine with different grazing intensities.

Measurement and species	Grazing intensity					
	Light		Moderate		Heavy	
	Grazed	Ungrazed	Grazed	Ungrazed	Grazed	Ungrazed
Composition (%)						
Grasses						
Pinehill bluestem	57	62	19 ¹	40	17 ¹	45
Other bluestems	19	13	22	13	9	7
Switchgrass	0	t ²	1	2	0	t
Other panicums	10	11	31 ¹	20	28	18
Paspalums	0	t	1	t	1	6
Carpetgrass	1	t	8 ¹	1	26 ¹	1
Other grass	6	4	7	11	7	15
Total grasses ³	91	90	88	87	88	91
Grasslike plants	1	1	3	2	2	2
Forbs						
Legumes	3	3	1	1	1	2
Composites	2	4	6	5	6	3
Other forbs	3	3	4	5	3	2
Total forbs ³	7	9	10	10	10	7
Total herbage field (lb/acre)	1041	1016	998	998	1035	805

¹ Significantly different at 0.05 level from exclosed portion of the grazing unit.

² Refers to botanical compositions less than 0.5 percent.

³ Discrepancies between total and individuals are due to rounding.

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Table 2. Percentage frequency of herbage and browse occurrence in 2.4 ft² grazed and ungrazed quadrats.

Species	Grazing intensity					
	Light		Moderate		Heavy	
	Grazed	Ungrazed	Grazed	Ungrazed	Grazed	Ungrazed
Grasses						
Pinehill bluestem	93	86	52	69	64	73
Other bluestems	58	54	55	38	63	41
Switchgrass	0	1	1	3	0	1
Other panicums	75	81	88	74	90	81
Paspalums	0	1	6	2	13	13
Carpetgrass	3	1	19	4	32	3
Other grass	49	32	43	31	55	36
Grasslike plants	28	19	67	56	48	42
Forbs						
Legumes	58	51	14	17	37	41
Composites	40	44	67	59	65	46
Other forbs	72	63	66	63	65	39
Shrubs and vines						
Waxmyrtle	0	3	28	29	6	8
American beautyberry	0	1	0	2	0	0
Shining sumac	1	5	0	6	0	0
Yaupon	0	0	0	3	0	0
Blackberry	2	3	9	25	3	9
Huckleberry	3	1	2	3	0	0
Carolina jessamine	0	0	3	17	0	0
Alabama supplejack	1	0	4	4	1	2
Oaks	4	3	9	8	1	4
Other shrubs	1	1	3	5	1	0
Other vines	0	1	0	1	0	2

and *C* is percent tree cover. The coefficient of determination was 63.3%. Since only 8- and 11-year old trees were measured in this analysis, tree values included from 40 to 95% canopy cover. To maintain productivity of herbage, trees should be thinned periodically to permit sunlight to reach the forest floor.

Herbage frequency and composition

Grazing did not alter percent composition of the major herbage groups on the range. Grasses as a whole comprised 87 to 91% by weight of the total herbage; 7 to 10% was forbs; and 1 to 3% was grasslike plants (Table 1). On all grazing units,

pinehill bluestem occurred more frequently than any other species (Table 2).

The amount of tree cover, on the other hand, slightly altered herbage composition. Herbage beneath 8-year-old trees was 90 to 94% grass and 5 to 8% forbs; beneath 11-year-old trees it was 80 to 88% grass and 11 to 18% forbs. Grasslike plants accounted for 1 to 3% in both stands.

Although overall herbage composition was not changed, grazing intensity did affect individual species. Pinehill bluestem, the principal species on the range, decreased as grazing increased. Although light grazing increased pinehill bluestem

frequency slightly, moderate and heavy grazing significantly reduced yields. Even with light grazing under 8-year-old trees, pinehill bluestem yields were lower than without grazing. Frequency was lowest in the area of moderate grazing under 11-year-old trees; however, initial bluestem production was exceptionally low here.

Carpetgrass (*Axonopus affinis* Chase) became more abundant as grazing increased. This species produced about 1% of the total herbage yield on lightly grazed range but over 25% on heavily grazed land. Frequency with heavy grazing was ten times greater than with light grazing.

The effects of grazing on other grasses varied. Switchgrass (*P. virgatum* L.) was more plentiful on ungrazed plots. Light grazing increased the frequency and yields of "other bluestems," especially fineleaf (*A. subtenius* Nash. and Elliott (*A. elliotti* Chapm.) "Other panicums" were more prevalent and had higher yields where grazing was moderate or heavy.

Yields from grasslike plants and forbs were relatively constant regardless of grazing intensity; however, forb frequency did vary somewhat. Heavy grazing increased occurrence of composites and "other forbs" by about 20 percentage points. Moderate and heavy stocking reduced the number of legumes slightly.

Since these results are in general agreement with those reported by Duvall and Linnartz (1967), we must conclude that herbages on treeless or timbered range respond similarly to yearlong and seasonal grazing by livestock.

Browse frequency, cover, and composition

On all grazing units herbaceous plants far outnumbered the browse species. Shrubs and vines were relatively infrequent, especially in the lightly and heavily grazed pastures; those appearing most often were waxmyrtle (*Myrica cerifera* L.) and blackberry (*Rubus* spp.) (Table 2).

Individual browse species were not significantly affected by grazing intensities (Table 3); however, prescribed burning probably reduced browse cover to levels insufficient for adequate statistical analyses. Total browse cover was significantly less in areas of moderate grazing, but no differences were found with light and heavy grazing intensities. Since browse levels were low, these data are insufficient for definite recommendations regarding grazing effects on shrubs and vines.

Table 3. Crown cover (%) of shrubs and vines under immature slash pine with different cattle grazing intensities.

Species	Grazing intensity					
	Light		Moderate		Heavy	
	Grazed	Ungrazed	Grazed	Ungrazed	Grazed	Ungrazed
Waxmyrtle	0	.81	10.59	9.41	1.07	1.02
American beautyberry	0	.56	0	.22	0	0
Shining sumac	.11	.80	0	2.16	0	0
Yaupon	0	0	0	.88	0	0
Blackberry	.08	.15	1.23	4.97	.04	.47
Huckleberry	.15	.24	.09	.66	0	0
Carolina jessamine	0	0	.49	3.81	0	0
Alabama supplejack	.13	0	.79	.53	.02	.05
Oak species	1.26	1.37	1.58	2.31	.02	.50
Other shrubs	.06	.01	.69	2.56	.01	0
Other vines	0	.06	0	.01	0	.38
Total	1.79	4.00	15.46 ¹	27.52	1.16	2.42

¹ Significantly different at 0.05 level from exclosed portion of the grazing unit.

Although the longleaf slash pine-blue-stem ecosystem is not considered the best deer habitat, many of the browse species found on this range are good deer food. These include huckleberry (*Vaccinium arboreum* Marsh.), oak (*Quercus* spp.), Carolina jessamine (*Gelsemium sempervirens* (L.) Ait. f.), American beautyberry (*Callicarpa americana* L.), yaupon (*Ilex vomitoria* Ait.), and blackberry (Halls and Ripley, 1961). Alabama supplejack (*Berchemia scandens* (Hill) K. Koch), shining sumac (*Rhus copallina* L.), American beautyberry, and waxmyrtle are generally considered good bird food (Grelen and Duvall, 1966).

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Applications for Executive Secretary Position

The Society for Range Management is asking for applications for the position of Executive Secretary by **June 15, 1974**. Salary and other considerations will be by negotiation. Headquarters is in Denver, Colorado. Applications or inquiries should be sent to **Peter V. Jackson, III, Box 86, Harrison, Montana 59735**.

The following specifies the qualifications for and duties of the position.

Qualifications:

Trained and experienced in the art and science of the management of rangelands. Need not hold a degree in range management but must have had training in the sciences basic to the field and have worked in both the scientific and management aspects of it sufficiently to understand writings and hold discourse with researchers, teachers, and land administrators. Must have demonstrated administrative ability through successfully holding an administrative position in the management of rangelands for livestock and/or game animals, the direction and planning of range research, the management of a producing livestock ranch or the administration of a college department. Must have demonstrated capacity for dynamic leadership and idea generations within an organization, ability to meet and deal with the public, other organized scientific societies or groups, practicing producers of livestock, and organized wildlife groups.

Must have been a member of the Society for Range Management over an extended period of years and have participated in its activities through Section or Society office or committee work and have demonstrated his interest in and support of the Society and its objectives. Must be willing and have the physical capability to anticipate a tenure of ten to twenty years in the position.

Duties:

Guided only by the Bylaws, policy or specific instructions provided by the officers and Board of Directors be responsible for the conduct of all activities of the Society for Range Management, except those specifically assigned to committees.

By some personal direction but mostly through the services of an administrative assistant, who will work directly under his supervision, be responsible for: (1) all financial records of the Society, the expenditure of funds, the receipt and deposit of money, the management of investments, and the audit of

records; (2) the keeping of records of membership, dues payments, Section affiliation, mailing lists, dues, notices and correlation of records with those of the Sections totaling 5,000 and upward members; (3) service to Society committees for instruction, supplies, postage, and other expenses, reports and records; (4) service to Sections for membership records, dues payments, mailing lists, information on Society activities; (5) conducting elections of officers and revision of Bylaws; (6) purchase, maintenance and disposal of supplies, equipment, and furniture; (7) maintenance of files and preservation of material for historical value; (8) negotiation of contracts.

Serve as managing editor of the *Journal of Range Management*, and as editor of *Rangeman's News* and special publications. Work in the *Journal of Range Management* will be in cooperation with an editor who will be responsible for all technical papers and editorials printed in the *Journal*.

By personal attendance and participation in meetings of selected scientific societies, represent the SRM; present and explain its policies and programs and endeavor to coordinate such programs with those of similar aim; direct the activities of other individual Society members who may be assigned to represent it with some outside societies.

Directly take charge of the information program of the Society, and with or through committees or individuals prepare public relations material for use in exhibits, at public meetings, and for publication. Attend meetings of rancher and conservation organizations, prepare talks or papers and present them upon invitation. Participation in discussion at such meetings. Give leadership to the Sections in their public relations work as approved by the Board of Directors. Direct the Society campaign on membership recruitment, and the development of a growing membership roster.

Through visitation at Section meetings or with Section officers help Sections in their programs, stimulate new activities, coordinate their work with that of the Society, see that Society policy is followed.

Attend all meetings of the Society and its Board of Directors, and prepare an agenda for the latter. In collaboration with the current President have general supervision of local arrangements for the annual convention. Record proceedings of Directors' meetings and of Society business meetings and prepare minutes of same.