

New Grazing Research Programs for Southern Forest Ranges

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Highlight

In recent decades, research has brought substantial improvement in cattle and forage management on cutover forest ranges in the South. Today, massive reforestation is complicating the problems of integrating grazing with timber growing, and research aims are shifting accordingly. This paper reviews the current southern grazing situation and describes the range research program of the U. S. Forest Service.

Because of a unique combination of climatological, economic, and sociological conditions, management problems on southern ranges differ vastly from those in the West. Mild winters, hot summers, and rainfall averaging 45 to 65 inches combine to pro-

duce a dense, fast-growing vegetation that is generally dominated by trees. More than 90 percent of the 197 million-acre southern range area is classed as forest land. While timber production is the primary land use, native forage often grows abundantly beneath timber stands, in natural openings, and on cutover lands, providing forage for substantial numbers of range livestock.

Major range types of the South are mapped in Figure 1. Longleaf pine-bluestem and longleaf-slash pine-wiregrass types comprise the principal range area. Though not the most

extensive, they produce far more herbage per acre than other types, largely because overstory density is relatively low. Also, cutover areas have remained open for long periods, while those in other types have reverted more readily to woody vegetation. Shortleaf-loblolly pine-bluestem ranges rank second in importance, because of their tremendous acreage. Forage production in this type is low to moderate.

Combined, the longleaf pine-bluestem and longleaf-slash pine-wiregrass types occupy about 26.5 million acres along the lower Coastal Plain, from east Texas to South Carolina (Fig. 1). Upward of 3 million cattle now graze this zone. Forage plants are mainly coarse grasses, intermediate to tall. Range hogs and sheep are numerous in some sections, but both are declining as popularity of cattle increases.

Longleaf pine-bluestem ranges extend from southeast Texas to southwest Alabama. The pre-

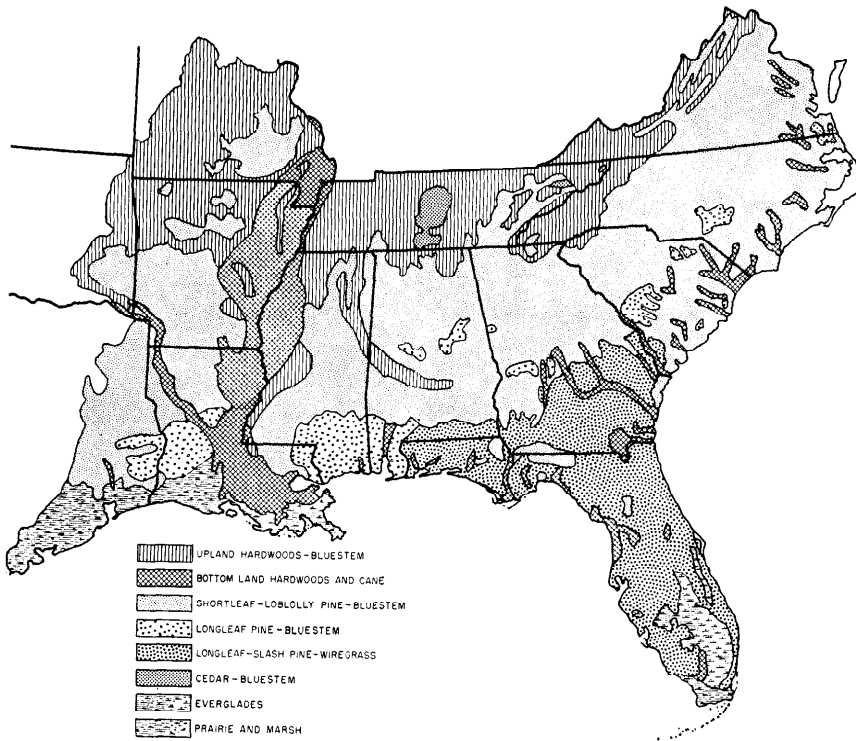


FIGURE 1. Range types of southern pine forests.

dominant forage grasses, pinehill bluestem (*Andropogon divergens* (Hack.) Anderss. ex Hitchc.) and slender bluestem (*A. tener* (Nees) Kunth), grow in association with panicums (*Panicum* spp.), paspalums (*Paspalum* spp.), minor bluestems, and a few important forbs. Herbage yields vary from about 300 pounds per acre annually under fully stocked pulpwood stands to over 3,000 pounds on cutover land and among newly established pines. Forage values are highest from about April 15 to early July, when all classes of cattle make fair gains. During the remainder of the year, forage is seriously deficient in one or more essential nutrients.

Longleaf-slash pine-wiregrass vegetation occurs mainly in south Georgia, Florida, and south Alabama (Fig. 1). Pineland threeawn (*Aristida stricta* Michx.), the primary wiregrass, is the main forage plant. Curtiss dropseed (*Sporobolus curtissii* (Vasey) Small ex Scribn.), carpetgrass (*Axonopus affinis*

Chase), and several bluestems, panicums, and paspalums are common associates. Herbage production on the best open sites reaches about 2,000 pounds per acre annually. Under well-stocked timber stands grass yields are similar to those on comparable sites in the longleaf pine-bluestem type. Nutritive value of wiregrass herbage is moderately high during 2 or 3 months after burning, but quality of mature wiregrass is even lower than that of mature bluestem forage.

Over 95 percent of the southern range area is privately owned. Prior to 1930 most owners clearcut their timber, leaving expansive prairie-like areas. These lands were generally open to grazing free of charge. Moreover, cattlemen could burn ranges at will to remove accumulated litter and improve forage quality.

As in early days of the West, unregulated use of the range fostered many problems. Overgrazing, uncontrolled breeding, severe seasonal malnutrition,

little or no control of diseases and parasites, and general neglect of animals resulted in low beef production. Calf crops averaged 50 percent, calf weights were less than 300 pounds at 7 months, and mortality was high.

These difficulties generated still others. Because minimal management yielded low returns, cattlemen were willing to invest little in breeding stock. Commonly, herds were started by mating family milk cows to beef bulls, thereby populating the range with scrub cattle. People owning little or no arable land turned to cattle raising, creating a wide disparity between range forage supplies and badly needed home-grown supplements. After years of free grazing, opposition to fencing was intense, and efforts to close the range were often met with wire-cutting and incendiary forest fires.

Especially since World War II, the situation has improved. Through insistence of landowners and highway users, fence laws have been enacted and enforced. Fencing has become widespread, but by no means universal. In some regions free range still predominates and arson and fence-cutting help maintain the status quo. Scrub or "native" cows remain common, but quality is improving through increased use of good beef bulls. Largely as a result of research, the practice of adequately supplementing range forage during winter is gaining, and many stockmen now recognize the need to regulate grazing intensity.

These advances, though gratifying, have done little to ease the overall situation. New problems have appeared as fast as old ones have been resolved, mostly because of renewed interest in timber growing. Regeneration of cutover lands and understocked timber stands is moving ahead rapidly. The South already has almost 15 million acres of

man-made forests—largely pine plantations less than 10 years old—and the area promises to double in a few years.

New forests are rapidly re-occupying much of the best rangeland. As pine canopies close, herbage yields decline drastically, species composition changes, and both nutritive content and palatability may be altered. Burning, which stockmen have relied on to improve forage quality, must frequently be halted until trees reach 8 feet or more.

Damage by cattle to young pines is of major concern to forest owners. Where grazing is not carefully controlled, browsing and trampling frequently destroy planted and seeded stands during the first year.

Problems of land management are further complicated because many forest landowners are feeling pressures to improve wildlife habitat management. On some industrial holdings foresters are now de-emphasizing hardwood control and prescribed burning to enhance relations with wildlife interests. In keeping with the multiple-use policy of the U. S. Forest Service, habitat improvement is becoming increasingly important in administering national forests. These developments will usually mean less grass, of lower value, for cattle.

Although timber growing is generally the main goal of management, landowners are showing increasing interest in non-timber revenue to pay mounting taxes and operating costs. Some now arrange cash grazing leases with cattlemen; others graze their own cattle, trying for greater return than leases provide. A small, but growing, number are considering hunting fees as a source of income. In south Florida, where large tracts are rancher-owned, grazing is the primary land use. Here, landowners are interested in timber and wildlife revenues to aug-

ment range income. The prevailing problem, then, is one of effectively integrating timber and cattle management. For some landowners, coordinated production of timber, beef, and wildlife looms as a new and complex objective.

Forest Range Research

In 1940, the U. S. Forest Service initiated range management research in the South on experimental areas in North Carolina and Georgia. The beginning of study in Louisiana followed in 1943. Since then range experimentation has gradually expanded. At present, the Southeastern Forest Experiment Station, with principal field units at Fort Myers, Florida, and Tifton, Georgia, investigates problems of the longleaf-slash pine-wiregrass type. The Southern Forest Experiment Station works primarily on longleaf pine-bluestem ranges, mainly at Alexandria, Louisiana. Much of the study by both stations is in cooperation with other Federal agencies, State experiment stations, forest industry, and ranchers. To date, experimentation has been mainly along seven lines.

1. *Evaluating forage resources.*—Major range species and plant associations have been classified. Herbage production capacities of principal sites and seasonal forage values of important plants have been determined. The most significant finding was that the main species produce reasonably good forage for brief periods after growth begins, but virtually all herbage in the full leaf or mature stages is seriously deficient in protein and phosphorus. Deficiencies of calcium, cobalt, copper, and iron are locally severe.

2. *Testing grazing systems.*—Deferred grazing and deferred-rotation grazing, which work well on western ranges, are unsuccessful in the South. With these systems, cattle depend heavily on mature herbage, which is too low in quality on southern ranges. Grazing programs involving rotational burning have proven best. Prescribed fire raises forage values and improves distribution of grazing.

3. *Formulating range supplementation programs.*—Highly successful supplemental feeding programs have been devised for the longleaf pine-

bluestem type. Cows grazing native range yearlong and receiving 375 pounds of cottonseed cake per head during winter produced 83-percent calf crops, and 6½-month weaning weights averaged 433 pounds. Similar results have been achieved on wiregrass range by combining concentrate feeds with improved pasture to supplement native forage.

4. *Analyzing cattle-timber conflicts.*—Study has shown that, on free range, cattle can be a serious hazard to forest regeneration. Both longleaf and slash pine seedlings are often browsed heavily during winter, and mortality among browsed seedlings is substantially higher than among unbrowsed seedlings. Browsing also reduces height growth and sometimes deforms surviving seedlings.

5. *Assessing effects of grazing and burning on forage.*—In the bluestem type, herbage yields were greater on grazed range than on the ungrazed, and range utilized heavily (65 to 70 percent) was as productive as that used moderately (45 to 50 percent). Intense grazing increased carpetgrass at the expense of pinehill bluestem, while relative proportions of the main grasses were altered little by moderate grazing. Botanical composition and average yield were unaffected by burning at 4-year intervals. On wiregrass ranges, ground coverage of pineland threawn and Curtiss dropseed decreased slightly when ranges were burned annually and grazed heavily. Less frequent burning allowed these plants to maintain or increase vigor. In both areas, burning appreciably improved forage values for 2 or 3 months.

6. *Controlling range weeds.*—Effects of burning on saw-palmetto (*Serenoa repens* (Bartr.) Small) and gallberry (*Ilex glabra* (L.) Gray)—common weedy pests on Coastal Plain ranges—were short-lived, as plants sprouted vigorously following fire. However, heavy grazing for 2 months after burning virtually eliminated saw-palmetto (Fig. 2). Chemical treatment reduced infestations of gallberry and saw-palmetto, but cost was high.

7. *Evaluating range revegetation and fertilization.*—Good results were obtained in Florida by seeding carpetgrass and common lespedeza (*Lepedeza striata* (Thunb.) H. & A.) on both undisturbed and

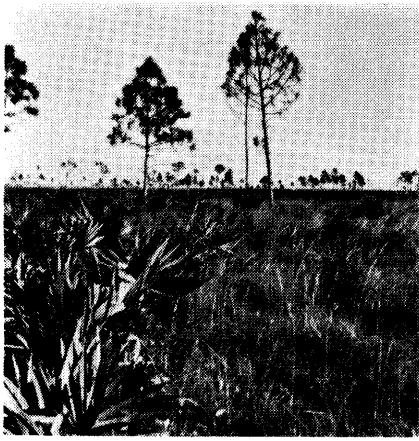


FIGURE 2. Fire, followed by regulated heavy grazing, controlled sawpalmetto (left), producing quality grass range (right).

chopped, disked range. Phosphorus and potassium were applied to all plots. Land preparation hastened establishment of seeded plants, but cost was prohibitive.

Applying a ton of rock phosphate per acre to south Florida wiregrass range doubled herbage yield and substantially improved forage quality. Moreover, heavy grazing induced by fertilization retarded recovery of saw-palmetto on chopped sites. In north Florida, 50 pounds of nitrogen per acre increased production of bluestem herbage tenfold under 25-year-old pines.

Much of the information derived from these studies applies mainly to understocked forest stands. Ahead lies the more formidable task of solving problems associated with the harvesting of forage by cattle throughout complete timber rotations, with due consideration for wood yield, watershed protection, and wildlife habitat improvement. To meet this challenge, research emphasis has been shifting toward timbered ranges.

Among problems receiving highest priority in current research plans are those relating to timber-forage relations. The objective is to provide landowners and cattlemen with reliable bases for predicting grazing capacities as new forests develop and silvicultural treatments are applied. Such information will be of vital importance in executing long-term grazing leases, which are sorely needed to stabilize the range cattle industry. Although longleaf pine-

bluestem and longleaf-slash pine-wiregrass ranges will receive primary attention, experimentation will extend to the extensive shortleaf-loblolly pine-bluestem type. Work presently beginning in Texas will evaluate forage resources on timbered sites.

In Louisiana, experimentation is already yielding data regarding effects of overstory advancement and thinning regimes in planted pines on quantity, chemical content, and botanical composition of bluestem herbage. Early results show that herbage yields are unaffected by pines up to 8 years. Under older pines, slender bluestem, which yields more herbage of higher protein content during summer than other major species, is declining sharply.

Similar experiments are under way in Florida and Georgia—one to chart trends in wiregrass production under planted pines, another to assess effects of varying stand densities in pine and eucalyptus on cattle forage and game habitat. Surveys of tree-forage relations under varying stand and site conditions are being conducted to facilitate planning of additional research in this area (Fig. 3). Georgia researchers also are relating yield of improved forage species to fertility levels in pine plantations and studying integrated production of cattle and timber on intensively managed pastures. Information from these studies should prove invaluable in formulating better pasture-range combinations.

Prescribed burning—an important technique in managing southern



FIGURE 3. Surveys of tree-forage relations show good yields of quality forage under managed pine stands.

pinus—is receiving increased attention as a way to improve forage and manipulate grazing. Thus far, results show that range burned in a 3-year rotation produces substantially more usable nutrients than unburned range, and that time of burning appreciably affects yield and forage values. South Florida studies will appraise interacting effects of grazing intensity and burning season on range plants.

Problems of grazing influences share importance with those of timber-forage relations in the revised programs. Included are responses of forest regeneration, tree growth, soil conditions, and forage vegetation to grazing. Interrelated effects of reforestation and cattle production are currently under investigation on a 1,600-acre range in Louisiana. Impact of grazing intensity on survival and growth of pine seedlings is determined, and grazing effects on forage are assessed in terms of calf production. Initial results show that, with managed grazing, damage to pine seedlings is usually light even though forage utilization is relatively intense (Fig. 4). They also show, however, that poor distribution of grazing may pose a serious threat to pine regeneration, even on lightly grazed ranges.

Kind and severity of damage by cattle to young pines and effects of injury on survival and growth are subjects of intensive study in Georgia and Florida. As degree and nature of damage can be correlated with specific grazing pressures and distribution patterns, attention will focus on designing grazing systems to minimize injury. Investigations of grazing effects on specific soil properties and composition of herbaceous vegetation will continue, and additional information will be sought concerning responses of pine establishment and growth to soil changes induced by grazing.

Ecological problems earmarked for study relate chiefly to brush control and overstory-understory relations. Work is continuing on the autecology and life histories of gallberry and saw-palmetto in an effort to improve control of these persistent weedy shrubs. Moisture, fertility, and light requirements of important forage grasses, especially pineland three-awn, slender bluestem, and pinehill bluestem, will be determined to pro-



FIGURE 4. Browsing damage to these pines was light under managed, yearlong grazing despite utilization averaging more than 60 percent.

vide better understanding of their responses to overstory influences.

Aspects of cattle management that relate closely to range improvement and effective forage utilization have been studied for several years. This line of investigation will continue, but on a reduced scale, as many of the major problems have been largely resolved. In a Louisiana test started in November 1963, refinements of supplementation techniques

are being compared in an attempt to improve feeding efficiency and reduce labor requirements.

Land preparation and fertilization to aid pine establishment and growth may drastically modify range resources. Part of the research program in the pine-wiregrass type, where dependence on fire for forage renovation has been strong, will be aimed at finding how these forestry practices affect supply and quality

of forage in planted pine stands.

Finally, new research plans provide for development and improvement of measurement techniques. Long growing seasons and 12-month grazing make reliable assessment of herbage production and utilization particularly difficult. Two experiments aimed at devising better measurements of these attributes are in progress. Improved criteria for determining condition and trend on bluestem and wiregrass ranges and establishment of height-weight-density indices for wiregrass herbage are other goals of methodological studies.

The Outlook

Problems associated with forest grazing in the South are numerous and complex. Certainly, not all of them can be investigated simultaneously, and solutions to many may prove elusive. However, current research, plus studies that will start soon, should help answer some of the most pressing questions. Results obtained so far are generally encouraging. Prospects appear good for raising beef output of forest ranges and successfully coordinating cattle grazing with other land uses. Now, for the first time, ranching in the woods shows promise of becoming a sound business.