Herbage Disappearance and Grazing Capacity Determinations of Southern Pine Bluestem Range

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Highlight: *Herbage disappearance per animal unit day in yearlong grazing on southern pine range averaged 38, 47, and 38 pounds on lightly, moderately, and heavily grazed range. Cattle intake accounted for only 36 to 47% of the disappearance; factors such as trampling, weather, and wildlife accounted for more than 50%. To sustain light, moderate, and heavy grazing intensities yearlong, about 115, 100, and 70 pounds of herbage were required per animal day. Seasonal grazing only required 75 and 40 pounds for moderate and heavy stocking.*

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On most cattle ranges forage disappearance from trampling, weathering, and other such factors is generally attributed to cattle utilization or consumption. Although total herbage disappearance must be considered when evaluating range vegetation changes, only the forage consumed by the animals relates directly to their productivity.

This paper discusses herbage disappearance under three grazing intensities, calculates herbage losses attributed to cattle intake and other factors, and determines grazing capacity on the basis of herbage production requirements per animal day on southern pine-bluestem range.

Procedure

Cattle were grazed yearlong on three range units of the Palustris Experimental Forest in central Louisiana (Pearson et al., 1971). These units—totaling 1,600 acres—were stocked for light, moderate, and heavy grazing or 26, 20, and 13 acres per cow. Oven-dry herbage yields averaged between 1,750 and 2,150 lb/acre. Pinehill bluestem (*Andropogon scoparius* var. *divergens* Anderss. ex Hack.) and slender bluestem (*A. tener* (Nees) Kunth) were the chief forage grasses. Cows were mainly Brahman crossbred native cattle. Management included supplemental feeding of the cows, prescribed rotational burning of the range, and regulated breeding with beef bulls of good quality (Duvall and Whitaker, 1964; Pearson, 1971; Pearson and Whitaker, 1972). Calf crops averaged 82% for light, 73% for moderate, and 70% for heavy.

Forage production and utilization were measured annually in each range unit from 1961 to 1971 on 35 to 40 clusters of four 9.6 ft^2 plots, one caged and three grazed. Plots were clipped in February, and the caged-plot yield represented forage production. The mean yield of the three grazed plots was subtracted from the caged-plot yield to calculate utilization (Campbell and Cassady, 1955). Following clipping each year, clusters were moved 15 feet in randomly chosen cardinal directions to avoid reclipping. On Southern pine range Grelen (1967) found no utilization differences between stationary and transient cages.

The difference between the caged and grazed plots represented total herbage disappearance. Cattle intake was calculated from animal weights and nutritional requirements (National Research Council, 1970). Other factors of herbage disappearance, such as trampling, weather, and wildlife effects, were determined by the difference between the total disappearance and calculated cattle intakes.

Results and Discussion

Disappearance

Total herbage disappearance per animal grazing day averaged 38, 47, and 38 pounds on the light, moderate, and heavy grazing intensities (Table 1). Calculated cattle forage intake averaged 15 lb/day for cows and 2 to 3 for calves. Consequently, the loss of herbage from other factors was between 50 and 65%.

Weather is likely to have similar effects on caged herbage and that open to grazing. Therefore, trampling probably had the major influence on disappearance. Laycock et al. (1972) found trampling accounted for one-half to two-thirds of the herbage loss on the western range; other investigators, however, report lower amounts (Quinn and Hervey, 1970).

Weather and trampling accounted for about 10% greater disappearance in the moderately grazed unit than in the other two units. Soils of that unit were generally saturated for lengthy periods following rains, and trampling and grazing apparently hastened plant deterioration.

Other work has indicated that greatest disappearance occurs after plant maturity (Pearson, 1974). Those data show little disparity between cow intake and forage disappearance during spring when the herbages were young and growing fast; greatest differences occurred from July to October.

Disappearance from calf intake was determined from requirements prorated for weaning weight, age, and calf crop (National Research Council, 1970). One-half the intake requirements determined from the calf weaning weight was assumed for the calves from birth through weaning. To put the calf value in terms of cow days, the intake was multiplied by calf crop and weighted for age and time on the range during the year. Calf intake thus varied from 2.1 to 2.8 pounds per cow day (Table 1).

Although disappearance from wildlife could not be computed, deer consumption was estimated to be less than 5%. The deer population was probably less than 20 per section; even at that density with deer consuming 2.5 pounds of dry matter per day, intake would only be 1.8, 1.4, and 0.9 pounds per cow day on light, moderate, and heavy grazing intensities.

Grazing Capacity

In prior studies, utilization (herbage disappearance) averaging 45 to 50% of yearly herbage yield was judged near optimum for maintaining forage on southern pine range (Duvall and Whitaker, 1964; Pearson et al., 1971; Pearson and Whitaker, 1974). For briefer periods, however, utilization substantially exceeding 50% sometimes improves forage value and botanical composition (Duvall and Whitaker, 1964). To sustain light, moderate, and heavy grazing intensities yearlong in this study, herbage required was (after rounding to the next higher 5 lb) 115, 100, and 70 lb/cow day (Table 1). On seasonally grazed range, Duvall and Linnartz (1967) found that herbage disappearance averaged 34 lb/cow day with moderate (46%) and 26 lb with heavy (67%) use. Consequently, cattle required only 75 and 40 lb herbage production per cow day with seasonal moderate and heavy grazing.

If moderate grazing is the management goal, then initial stocking rates could, for practical purposes, be determined by dividing herbage production per acre by requirements per cow day. For instance, each acre of range producing 2,000 lb herbage annually would provide 20 cow days of yearlong grazing but 27 cow days of seasonal grazing. With these stocking rates, forage production would be adequate to supply the requirements for the cattle, deer, and other factors causing disappearance and still provide ample amounts for soil protection and continued plant vigor. Forage yields would have to be assessed for yearly fluctuations and stocking rates adjusted.

Table 1. Ten-year average herbage measurements (lb, oven-dry/cow day) under three grazing intensities.

	Light	Moderate	Heavy
Herbage yield	111.3	95.7	66.3
Total herbage disappearance	38.4	47.1	37.8
Cow intake	15.2	14.7	14.8
Calf intake	2.8	2.2	2.1
Disappearance due to other factors	20.4	30.2	20.9

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