

Determining Forage Weight on Southern Forest Ranges

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OPEN forests in the Louisiana uplands produce 2500 pounds or more of grass per acre per year (Fig. 1A). But adjacent 15-year-old plantations of pine or good stands of second-growth pine may not produce more than 250 pounds of green herbage per acre; most of it is covered by pine litter which weighs 6 to 10 tons per acre (Fig. 1B).

On southern forest ranges we are using actual weight of herbage as the basis for measuring forage production and ground cover. The method is simple, concrete, and well suited to conditions on the ground. It is an adaptation of the weight estimate method devised by Pechanec and Pickford (5), for use in determining grazing capacity on western ranges. Their method requires actual clipping and weighing of herbage on training plots; then weight estimates only on temporary plots to inventory range forage by species. They used plots 100 square feet in size. Our adaptation of the method aims at weight measurements of vegetation as forage, as an ecological response to forest or range management, or as fuel, according to the purpose of the study. In inventorying herbage, our procedure is to actually clip and weigh the total yield by herbage classes, while the species weight composition is estimated.

In 1944, the method was tried on plots ranging from 4.4 square feet (0.0001 acre) to 100 square feet in area. Weights for the smallest plots varied too greatly to yield significant results with a reasonable number of samples. The largest plots produced more herbage than could be

harvested or weighed conveniently. The size plot finally selected after much trial, error, and analysis, was 9.6 square feet in area, or a square of 3.1 feet on a side—about halfway between a square yard and a square meter (1). Under average herbage conditions, this size of plot gives a reasonably low error, and only 10 to 15 plots are needed to sample a vegetation sub-type. It is about the easiest size to work with, and its area is such that when herbage is weighed in grams, the production per acre can be calculated in pounds simply by multiplying the number of grams by 10, i.e., grams-per-plot times 10 equals pounds per acre. Obviously, small amounts of grass can be weighed more easily and accurately on gram scales than on pound-ounce scales. Moreover, metric weight values are better suited for field records and initial computations. Final values are in pounds per acre.

It was found that plant density cannot be used as a satisfactory measure of forage production and ground cover. A range that usually has 0.6 to 0.8 density supports less than half that cover throughout the season following a spring burn, even though weight of herbage produced may actually be greater after the burn.

The equipment used in determining forage yield by clipping and weighing is a pair of sheep shears, a spring scale of 500 grams capacity, a 3.1 feet square wire frame made of welding rods $\frac{1}{4}$ inch in diameter, paper bags in which to weigh and keep samples, and record forms.

Field procedure is to place the wire frame on the sample point and to un-

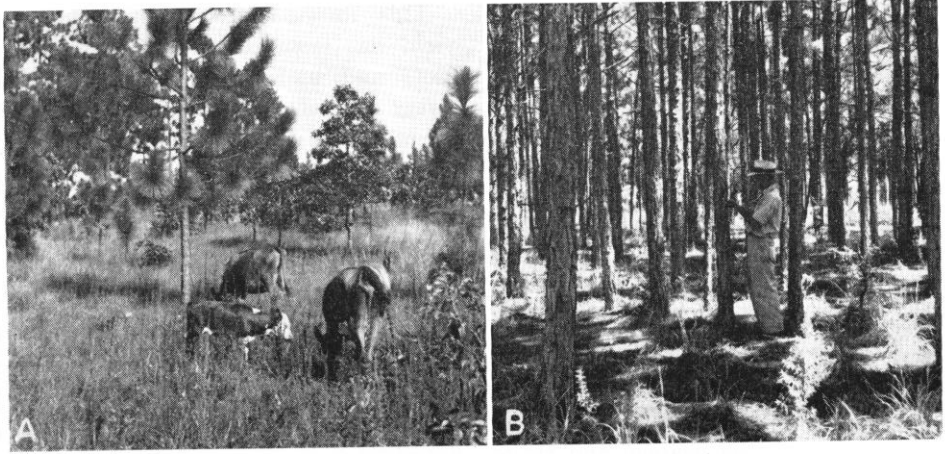


FIG. 1. VARIATION IN FOREST RANGE CONDITIONS IN THE LONGLEAF PINE TYPE IN LOUISIANA

A, left. Open forest with 2500 pounds of herbage per acre. Photo Sept. 4, 1946. B, right. Dense second growth forest, unburned for many years; only a few clumps of grass grow through the heavy pine needle litter. Photo Aug. 21, 1946.



FIG. 2. CLIPPING HERBAGE ON A PLOT 3.1 FEET SQUARE TO DETERMINE ACTUAL WEIGHT OF FORAGE ON OPEN FOREST RANGE BURNED THE PREVIOUS WINTER

Photo April 18, 1946

tangle the vegetation underneath so that the frame will rest near the soil. The various components are then clipped and weighed (Fig. 2). The material is gathered and weighed in this order: Litter (pine and oak leaves), old growth (previous season's herbage), weeds, and grass. Segrating of individual species is usually impractical; actual weights are obtained by herbage classes and where desired the species composition is estimated and then revised to check with the total actual weight. Weeds usually are separated into legumes and others. Where browse is present, the leafage and twigs on branches in or over the plot and within reach of cattle are also harvested and weighed. To account for total production on grazed ranges, estimated utilization of current herbage by classes and species is recorded with the green weight data. Field samples are saved to obtain air-dry weights of green herbage, or of all material if it happens to be wet.

The method is varied to fit conditions or objectives. For permanent plots that should not be disturbed and for extensive herbage inventories, for example, the weights of material are estimated. However, this requires periodic clippings of plots to train workers in estimating. In experiments on the relationship between density of forest stands and herbage production, the tree stand surrounding the forage plot is recorded also.

This method of determining forage yield has been tested on thousands of plots and under conditions where the forage varied from 10 pounds to 5000 pounds of herbage per acre. It is being used at four branches of the Southern Forest Experiment Station where range research is underway: Brewton, Alabama; Gulfport, Mississippi; Alexandria, Louisiana; and Harrison, Arkansas. Specific examples of how the method is being used on southern forest ranges in studies of grazing management, range seeding, and plant control, may be found in the literature cited (2, 3, 4).

LITERATURE CITED

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