

# A Pasture-Comparison Method of Estimating Utilization of Range Herbage on the Central Great Plains

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A method of estimating the utilization of range herbage by livestock has been developed at the Central Plains Experimental Range in northcentral Colorado. It combines the weight-measurement method developed in Australia and the ocular estimate-by-plot method developed on the United States Sheep Experiment Station.

Beruldsen and Morgan (1934), in Australia, determined percentage utilization by clipping samples on small pastures before and after grazing. The pastures were small enough and the number of sheep large enough to permit the lapse of only 1 day between the before-and after-grazing clippings. The difference in air-dry weight between these clippings was assumed to be the

herbage utilized. Heady (1949) considered simplicity and the reduction of personal error two very desirable features of this method of determining utilization of range herbage. The heterogeneity and variations in past grazing use of range vegetation and the required fencing were considered disadvantages.

The ocular estimate-by-plot method of Pechanec and Pickford (1937) is one in which an herbage-utilization estimate is made on a plot of such limited size that the entire plot is clearly visible from one point. The percentage utilization of a given area is the average of estimates from a series of plots selected at random. Pechanec and Pickford, as well as Stapledon (1931), believed that a greater degree of

accuracy was obtained by confining observations to small plots.

## Pasture-Comparison System

In the system developed at Central Plains Experimental Range, percentage utilization for three different degrees of herbage use is determined on a small pasture by the weight-measurement method of clipping before and after grazing. These three known degrees of herbage utilization on the small pasture are used as guides in estimating percentage of utilization on each ocularly estimated plot in a large pasture.

This pasture-comparison method is initiated by fencing a 1-acre pasture to exclude livestock during the growing season. At the end of the growing season 180 plots are clipped in the small pasture. Sixty plots are clipped in each of the areas designated for one of the three degrees of herbage utilization. The palatable perennial herbage is clipped at ground level from plots 1 by 2 feet in area. Plots are located at random along lines systematically placed within the pasture. Before-grazing plots are located along one set of lines and after-grazing plots are located along

another set to prevent locating an after-grazing plot in the same place as a before-grazing plot. After the 180 before-grazing plots have been clipped, the cattle are turned into the small pasture and allowed to graze it one-third lightly, one-third moderately and one-third heavily. The cattle are controlled by an electric fence to obtain the three degrees of herbage utilization. The 180 after-grazing plots are then clipped. Air-dry weights of before-grazing and after-grazing clippings are used to determine percentage utilization for each of the three degrees of herbage use. The utilization figure for each degree of use is obtained from 60 plots clipped before grazing and from a similar set of plots clipped after grazing. This number of plots has consistently given results with a sampling error of 10 percent or less of the grazing-intensity mean.

These three known degrees of herbage utilization on the small pasture are used as guides for ocular concepts of percentage utilization on larger areas. Estimates to the nearest 5 percent are made on 80 plots located in each half-section pasture at Central Plains Experimental Range. This intensity of sampling pro-

vides a representative and adequate sample. Individual plots, 15 feet in diameter, are compared with the three known degrees of herbage utilization on the small pasture, and each is assigned a percentage utilization figure. The percentage utilization for each half-section pasture is the average of estimates from these 80 plots. At Central Plains Experimental Range estimates on half-section pastures are made by driving an automobile along established lines of permanently located plots. The vehicle is halted momentarily while the plot concerned is compared with the three degrees of known utilization on the small pasture. Photographs of the small pasture are helpful in this procedure. After the plot has been given a percentage utilization figure, the value is recorded and the examiner drives to the next plot. An experienced examiner can make estimates on 200 or more plots per day. The examiner's ocular concept should be maintained by frequent re-examination of the vegetation in the small pasture.

The small pasture pictured in Figure 1 is located on the medium-textured upland range site as defined by Heerwagen (1958). Blue grama (*Bouteloua gracilis*)

is the dominant in this site. Clipping and grazing were done during the last week in August 1957. Percentage utilization for each degree of herbage use determined by the weight-measurement method was 50, 30 and 15. This small pasture was grazed by 20 head of yearling Hereford heifers in a 2-day period. Using a relatively large number of animals decreased the time lapse between before-and after-grazing clippings as well as the number of times water had to be hauled to the cattle. The water tank was placed in the block planned for heavy use.

Because of the heterogeneity of range vegetation, it is necessary to establish a small pasture guide in each major range site on the larger area to be examined. According to Heerwagen (1958), "A range site is a physiographic land unit having sufficient homogeneity of climate, soil and topography to produce essentially the same kind or amount of plant cover when in climax condition."

#### Discussion

The pasture-comparison method of estimating range utilization is a valuable tool where large areas must be checked for herbage utilization and man-

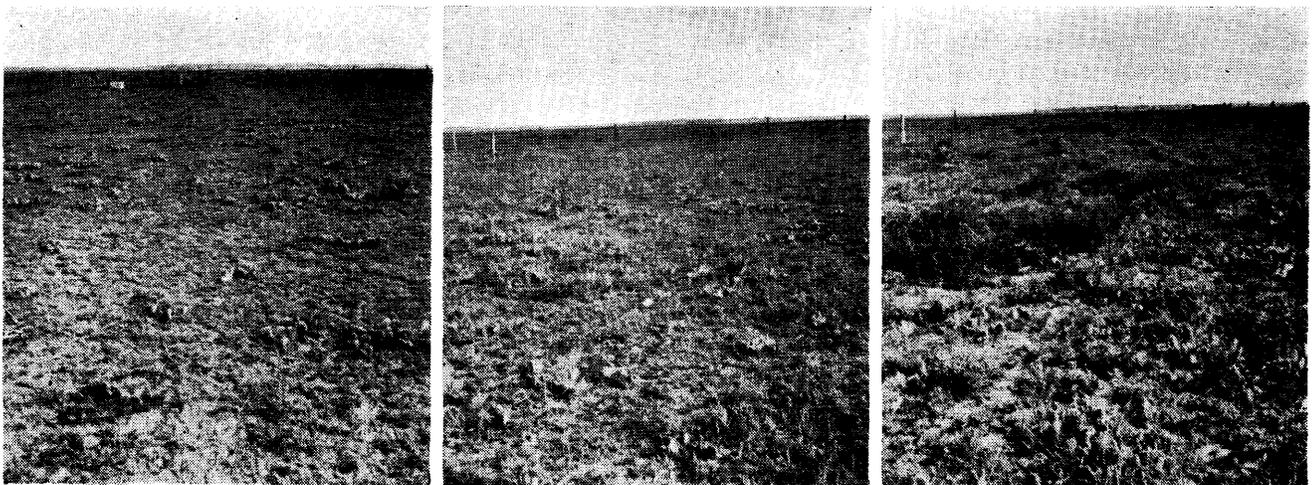


FIGURE 1. Three different degrees of herbage utilization in the small pasture on the medium-textured upland range site. Percentage utilization from left to right was 50, 30, and 15.

hours available are limited. The small pastures make excellent demonstrations of the different degrees of grazing use.

Several factors should be recognized if the use of this pasture-comparison method of estimating herbage utilization is being considered. An estimate of the percentage of herbage remaining on a range grazed season long is made in terms of grazing on a small pasture allowed protection during the growing season. Utilization is estimated on the assumption that several factors are negligible or balance one another. Some of these factors are regrowth of grazed plants and the differential effects of insects, rodents, disease, trampling and

moisture supply on plants grazed season long versus those protected during the growing season. In the use of this pasture-comparison method at Central Plains Experimental Range we have assumed that the factors mentioned tend to balance one another and that their net effect upon the estimate of herbage utilization is negligible. This assumption has been made because with this method of estimating utilization, the air-dry weight of herbage eaten has consistently been very close to the dry matter feed requirements of the cattle. The actual net effect remains to be determined.

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