RANGE MANAGEMENT

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Range management is the scientific supervision of grasslands and the restoration of grass on soil tilled for wheat and other crops, which is being badly wind eroded and which should never have been broken from the virgin sod. The purpose of range management studies is to develop methods of grazing, consistent with the conservation and use of the other resources of the land, that will restore and maintain the forage and support livestock most effectively. Numerous practices are now so widely applied on national forest ranges that few realize they are the result of research. Applications of these principles will tend to restore the balance that was found here before settlement by the white man.

The plain was covered with species of tall and short grasses. Wherever the water table was close to the surface there were small patches of shrubby vegetation. The general terrain was rolling, and in some places steeply sloped, but there were no gullies on the hillsides nor deep drainage channels in the alluvial bottoms. On the land covered by vegetation there was no evidence of destructive soil erosion. Broad valleys carried indistinct drainage channels through deep alluvium accumulated in the lower levels. This caused soil moisture to be held near the surface during a considerable part of the dry season and grasses, especially rye grasses, grew luxuriantly. This balancing of conditions, a result of a long period of adjustment, was seriously disturbed when stock was introduced and when grazing on the natural pasture was carried on excessively.

The cover of vegetation, under natural conditions, protected the soils from the erosive action of wind and water. The leaves broke up the fall and the force of the raindrops. The vegetative matter absorbed several times its own weight in water. The water was released slowly and seeped down through holes and crevices formed by frost, roots, and animal life. During drenching rains the excess trickled slowly

away, since it was hindered and slowed down by the stems and blades of grass. Flowing slowly, the water picked up only very minute quantities of soil in suspension and carried them away.

Since the plains have been used for grazing, financial pressure and lack of foresight caused almost universal overgrazing. Because there had been a continued and serious deterioration of the range, because a considerable area had been converted from range to tillage, and because severe drought conditions had burned the land during 1935, the Great Plains are estimated to have been nearly one hundred per cent overstocked in 1935. This overgrazing has been the main factor in the depletion of the range.

The depreciation of the range that will result from overstocking is obvious, and too much emphasis cannot be given to the necessity for care, first to adjust the grazing so as to give the main forage plants as much chance to grow as possible, and second to avoid putting any more cattle on the area than it will carry under the plan of use decided upon.

Financial pressure has caused another evil which has resulted in great loss and depletion of the soil by wind erosion. This is the plowing of land which was previously suitable only for range and trying to raise crops on them. In many places whole plow-depths of top-soil have been lost in the short history of cropping, while it took from four hundred to a thousand years to build just one inch of that topsoil. It is estimated that there are perhaps 24,000 crop farms covering about 15,000,000 acres, suitable in the first place only for range land, which should no longer be plowed, because they are losing their topsoil.

Erosion has been the most serious result of overgrazing. Wind erosion is greatly accelerated on overgrazed range as well as on crop lands, but the effects that water erosion leave are more spectacular. The surface run-off from uplands has become more rapid and hillsides have become deeply gullied, much of the soil being carried to the lowlands. The increased speed causes the debris which is taken and deposited in the lowlands to be coarser and more abundant.

In the valleys where the water usually spreads out over the whole bottum, gullies have caused the more complete subdrainage of the valley floor, and consequently there is less vigorous and abundant vegetation.

Erosion has been a result of the depletion of two important factors, the surface vegetation, and the humus in the soil. Overgrazing removes the leaves of the grasses so that they no longer break the force of the rain drops and protect the soil from splashing and loosening up. And the run-off is no longer hindered as it is when the grass was not eaten close. Another result of overgrazing is a change from desirable plants of high forage production to others of a hardier but less palatable and nutritive species. These hardier species, that have been taking over the range, have neither as extensive nor as deep a root system as their predecessors and so have inferior soil binding qualities. There is not so much foliage so the surface of the soil is not protected so well. Experiments show that the run-off and soil erosion from the protected virgin plain were negligible. On the hardier but less protective and productive downy-chess grass 25.5 per cent of the precipitation was unabsorbed. On needlegrass-lupine grasses 47.6 per cent of the precipitation was unabsorbed. Further, as this water ran off it carried the equivalent of 2,017 pounds of soil per acre from the downy-chess grasses and 4,783 pounds of soil per acre from needlegrass-lupine grasses.

The depletion of the humus in the soil has been caused by failure to leave an excess of forage on the ground. As the organic matter decays and is not replenished those qualities essential for plant growth disappear also. The water holding capacity of the soil is greatly reduced so that there is not so much moisture available to the plants, and resistance to erosion is lessened. The nutrients taken from the humus itself are lacking. The texture of the soil is no longer as suitable for root penetration and for anchoring the plants.

The success of any system of range management depends first of all upon the adjustment of the number of grazing livestock to the grazing capacity of the range. The

capacity varies from year to year with climatic conditions and it requires a scientifically trained manager to estimate the grazing capacity of depleted range and to limit the number of cattle grazing on the range. A twenty to thirty per cent excess or forage should be left on the range for protection from erosion and to add organic matter to the soil. With this treatment the range will gradually return to the more desirable types of grasses in the order of natural succession. Rotation of grazing so as to allow different sections to produce seed, protection in the spring until new supplies of food have been stored in the roots, and proper distribution of cattle on the range for profitable use of the forage for preservation of the grasses and for the resulting conservation of the soil; all these are also important principles to be followed under any system of range management.

The only way to measure the value of research and of the range resource itself is in the terms of economic welfare. Grazing capacity on managed range is double that of the unregulated range, net calf production is more than half again larger, and death losses are only one-fifth to one-third.

All present ranges should be under the supervision of a competent range manager. Much of the land which has been cultivated for wheat and which is being badly eroded by wind action should be reseeded with plains grasses and should be carefully grazed under the supervision of a range manager. Range management is a recently developed branch of botany with a golden future. More brilliant biology and botany students should be encouraged to enter the field of range management and to offer their services toward a restoration of a desired balance in nature.

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