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## United States Department of Agriculture,

## DIVISION OF AGROSTOLOGY.

[Grass and Forage Plant Investigations.]

**EXPERIMENTS IN RANGE IMPROVEMENTS.**

The chief problem in the cattle regions of the Southwest is, How shall we restore or bring back the grasses on lands where they have been destroyed by overstocking? An estimate based on such statistics as we have been able to obtain from correspondents indicates that the carrying capacity of the southwestern ranges was 40 per cent less at the beginning of 1897 than it had been in 1880. The money value of this loss has been variously estimated at from ten million to forty million dollars in the State of Texas alone, and on the other ranges in the Western States and Territories the aggregate loss from this cause (overstocking) is not less than a hundred million dollars. In other words, if the natural pastures in the country west of the ninety-eighth meridian were now covered with as luxuriant a growth of grass as they were twenty years ago, the additional number of live stock which could be carried would be worth probably upwards of a hundred million dollars.

The regrassing of overstocked lands is to the interest both of the individual stockowner and the commonwealth. The small losses sustained by each owner become in their aggregate a sum which materially affects the welfare of the State. It is the common testimony of stockmen that there are vast areas where the abundance and quality of the natural herbage has been decreased. The better grasses have been run out by overstocking during years of drought. Weedy annuals of less value, because less palatable to stock and less nutritious, have taken their places. If these fail the ground becomes entirely bare of vegetation. In other sections the amount of natural pasturage has been decreased by the encroachment of perennial weeds and thorny shrubs and by the cactus thickets, or the grasses have been destroyed by rabbits and prairie dogs. Overstocked lands are not only unproductive, but they rapidly deteriorate in productive capacity. They require rest and treatment to again restore them. The soil becomes hard and compacted by the trampling of cattle. Less of the annual rainfall is absorbed by the soil, and more each year is lost in the flood waters. Moreover the finer and hence richer portions of the surface soils are washed into the streams, because there is no protecting mat of grass roots to retain them.

## EXPERIMENTS BY STOCKMEN.

Many experiments have been undertaken by individual farmers and stockmen to determine methods of again bringing up the value of the prairie pastures to increase the grazing capacity. Such work, undertaken as it often is by men who have a wide influence among stockmen and stock-owners, is of great value. But the results of such experiments, however valuable, do not obtain that extensive and rapid circulation which they merit. There is probably no class of American producers who are more ready to undertake work which will tend toward the betterment of the marketable product than the cattlemen and sheepmen of the West. All who are familiar with the history of the cattle industry will admit that there is room for improvement in methods all along the line, from the breeding sections to the feeding pens, but nowhere is it more important than in the pastures—to provide more and better grasses. An abundant supply of nutritious forage in the pastures means more continuous and rapid growth of the animal, and in the end a finer quality of beef and mutton, a better yield and grade of wool. There is immediate need of work along this most important line—range improvement.

## EXPERIMENTS BY THE DIVISION OF AGROSTOLOGY.

Experiments have been undertaken by this Division at two points in Texas. An effort is being made to determine the most practicable and at the same time the most economical way of treating the natural pastures in order to again cover them with the native grasses, or with other better species from similar regions in other countries. One experiment is being made at Channing, in Hartley County, which will in a large measure represent the conditions that prevail on the high plains of the Panhandle of Texas, western Kansas, and Oklahoma, and parts of Colorado and New Mexico; and one at Abilene, to serve for the central and western prairies of Texas, up to the border of the Staked Plains.

The work was commenced at both of these places in March, 1898. An idea of its scope may be obtained from the accompanying plan (fig. 1) of the range station, near Abilene, Tex. The use of an irregular body of land, containing about 640 acres, was donated by Mr. C. W. Merchant, for a period of three years. The fences and two tanks to supply water were provided by the citizens of Abilene. The work was inaugurated by Prof. C. C. Georgeson, formerly of Kansas, at that time in the employ of this Division. Since its establishment it has been in charge of a special field agent, Mr. H. L. Bentley.

The section was divided into six pastures of 80 acres each, two of 40 acres, and one of 70 acres, and the remaining 10 acres is being

devoted to the cultivation of grasses. The work as planned is as follows:

*Pasture No. 1.*—No treatment except to keep stock off until June 1, pasturing the balance of the season.

*Pasture No. 2.*—Cut with a disk harrow and kept stock off until June 1, pasturing the balance of the season.

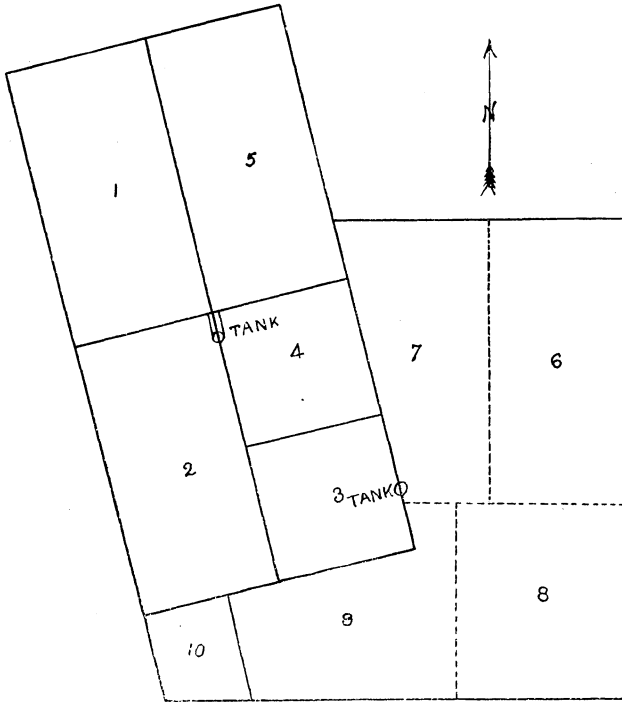


FIG. 1. Plan of 640-acre tract used for the range experiments at Abilene, Tex. (Scale 3 inches to the mile.)

*Pastures Nos. 3 and 4* (of 40 acres each).—Grazed alternately, the stock being changed from one pasture to another every two weeks, thus allowing the grasses a short period for recovery after each grazing.

*Pasture No. 5.*—No treatment except pasturing until June 1 and keeping stock off the balance of the season.

*Pasture No. 6.*—Left as a check, without any treatment whatever except to keep stock off during the first season.

*Pasture No. 7.*—Dragged with an ordinary straight-toothed harrow and stock kept off during the first season.

*Pasture No. 8.*—Disked and stock kept off from it during the first season.

The 70-acre pasture, No. 9, was not grazed. Seeds of a number of wild and cultivated varieties were sown directly upon the sod.

An effort has been made to get a stand of Texas Blue Grass and Curly Mesquite by transplanting fragments of sod to the bare spots. East and west furrows were also broken in order to arrest the grass seeds which are blown over the ground by the prevailing north and south winds, the idea being to form seed beds, from which the most valuable sorts should spread in every direction.

To insure uniformity the section of land was inspected before the commencement of work by a committee of stockmen, who made an estimate of the carrying capacity of the land at that time (April 1, 1898). The committee decided that the land would carry 40 head of stock cattle to the square mile, in the proportion of 10 cows with calves, 15 yearlings, and 15 two-year-olds, which proportion will be maintained as closely as possible until the end of the experiment. The land will be judged again at intervals during the experiment, in order to determine as exactly as possible the percentage and rate of improvement in the different portions under the various methods of treatment.

Mr. H. L. Bentley, the special agent in charge, estimates that there has already been a gain of 25 per cent in the amount of grass on the land, in the case of those pastures which have been disked and harrowed. His report, dated November 24, 1898, concerning the experiments, is herewith appended:

#### REPORT OF MR. BENTLEY.

The drought that has been on here for several months has not yet been broken. Since April 1 the rainfall in the immediate section embracing the Station has been distressingly small. There are two large tanks on the property, but there is water in only one of them, and at present only a small amount. There are also 15 or 20 shallow water-holes that in ordinary years catch and hold water most of the season, but they have been only partially full twice in seven months and now all are dry. As a result there has been no end of difficulty in keeping cattle in the pastures on account of the water scarcity. Just now I have no cattle in pasture at all, not having sufficient water for even the 13 head called for by the experiment. I hope, however, that we will soon have another good season here. If once the tanks are filled there will be sufficient water to carry the cattle through the winter in accordance with the plan. Notwithstanding the protracted drought the grass is good—astonishingly good. In the pastures which were harrowed I believe that there is fully twice as much grass as at this time last year. Had we had normal seasons since April 1 it is plain to me that the harrowing experiments would have shown splendid results.

The 10 acres of garden land are in first-class condition to catch and hold all the rain that shall fall during the winter. The woven-wire fence around the 10-acre tract was placed in position by experienced fence builders, and I feel confident now that the grasses and legumes will not be troubled seriously in the spring by the prairie dogs and rabbits. The prairie dogs moved *en masse* on the garden as soon as the crops appeared. Before the fence (woven wire) was placed in position they had nearly destroyed the roots of the alfalfa and cowpeas, but anticipate no further trouble from them.

Enough seed of the cowpeas was saved for the next year's trials. The velvet bean vines bloomed out too late to mature the beans before frost. An abundant crop of pods formed, but no matured seed was secured. The teosinte grew to be from 18 to 32 inches tall, then the drought set in and it never recovered sufficiently to do much good. The roots lived and it made some growth, but did not mature any seed.

I am certain that with normal amount of rain next year we will be able to demonstrate:

(1) *That the culture of the native sod with disk and tooth harrows will pay well in this section.*

(2) *That alfalfa of all kinds can be grown successfully without irrigation.*

(3) *That the teosinte is a splendid forage plant for this section, superior to any of the sorghums so far tested.*

(4) *That the velvet bean will do astonishingly well and prove a crop of much value.*

(5) *That all of the many varieties of cowpeas which were experimented with this year are available crops for forage purposes.*

There have been practically no results from any of the grass seeds that were sown. A number of varieties germinated, but they did not develop satisfactorily because the rains did not come in time.

The data thus far secured at the close of eight months' work give sufficient promise that definite, tangible results will accrue from these experiments for the benefit of stockmen. It is too soon to draw conclusions, but the outlook for rapid increase in the quantity of grass on these overstocked pastures is encouraging. Moreover, the methods in use are such as are well within the reach of any stock owner, should he wish to avail himself of the results.

#### FUTURE WORK.

During the succeeding seasons experiments will be made as to the practicability of sowing alfalfaree, bur clover, Bokhara clover, alfalfa, sorghum, and other wild and cultivated grasses and forage plants directly on the sod without further treatment than to keep stock off during at least the first year. On an examination of the plans it will be seen that a number of methods are being undertaken which may be adopted at but little expense by stock owners, should they prove to result profitably.

These experiments ought to be carried on for at least three years. At the end of that time sufficiently tangible results will undoubtedly be secured to enable stockmen to decide what is the best method of bringing back the grasses.

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Approved:  
JAMES WILSON,  
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WASHINGTON, D. C., *December 27, 1898.*