IMPROVING RANGE CONDITIONS FOR WARTIME LIVESTOCK PRODUCTION

FARMERS' BULLETIN NO. 1921
U.S. DEPARTMENT OF AGRICULTURE

B

THE improvement of range lands to meet the demands for increased livestock production for war purposes is highly important. To bring about the greatest improvement with the least expense it is necessary to know what kinds of range lands will best respond to improvement measures.

This bulletin discusses range condition and describes the characteristics of soil and forage by which the rancher may determine which of his lands are in need of improvement.

Washington, D. C. Issued December 1942

IMPROVING RANGE CONDITIONS FOR WARTIME LIVESTOCK PRODUCTION

By F. G. Renner, *Chief*, and E. A. Johnson, *senior soil conservationist*, *Range Division, Soil Conservation Service*

FARMERS' BULLETIN No. 1921

Contents

U. S. GOVERNMENT PRINTING OFFICE: 1942

For sale by the Superintendent of Documents, Washington, D. C. - - - - Price 10 cents

INTRODUCTION

THE following pages are written for the stockmen of the plains, prairies, and mountains, whose industry is vital to success in the war we are now waging.

Especially during the last 5 years, the stockmen have improved their range by conservative methods. Many hundreds of water developments and fences have been constructed to control livestock and facilitate better management, and, of particular importance, greater attention than formerly has been paid to forage and feed requirements and the productivity of both the range and livestock.

Thus, one of the country's oldest industries was ready in America's greatest hour of need. And today the products of American ranges sustain our men who are fighting and preparing to fight across the Seven Seas.

Beef, wool, mutton, and hides that must come from our ranges to meet constantly increasing production goals may prove as important in winning the war as the goals set for factories and shipyards. But while the munition makers and shipbuilders can expand their plants indefinitely the men of the ranges have no more acres upon which to expand their production. These men are faced with a difficult problem, namely, to maintain the present supply of meat without impairing the productive capacity of the range and without risking such calamitous losses as occurred following the disastrous droughts of the past. In short, they must keep livestock numbers in balance with available feed supplies.

To assure both production of beef and protection of the grasslands, the 1942 wartime production program goals call for the slaughter of about 28 million head of cattle and calves, as compared with the slaughter of some 26 million head last year. Production goals for 1943 are expected to be higher. Goals for the slaughter of sheep were also raised in 1942. By stabilizing the number of livestock, the present ranges can be improved and built up by careful methods of conservation management and production geared to meet the livestock demands not only for this year but for next year and for the duration.

"Grass—the forgiveness of Nature." For the stockman it is the mainstay of the livestock industry.

RANGE CONDITION

The condition of the range largely determines what it will produce in livestock and livestock products. Ranges in good condition produce more, and at less cost. Unless they are kept in good condition, production will fall off, and production costs will increase.

When a range is in the best condition, the soil is rich in nutrients and organic matter except on the most arid ranges, a maximum amount of the most desirable forage is produced for grazing, and the plant cover is sufficient to allow the principal forage plants to maintain themselves. A range is in poor condition when the soil is washing or blowing away and the cover of forage plants is thinning out and producing less than the maximum amount of forage for livestock.

Each range has its own "top" condition. The term "range condition" refers to quantity and quality of forage in relation to the potential productive capacity of the range land. Account is taken of the kind and forage value of plants on the range, their density and vigor, and the condition of the soil in relation to the plant cover.

Ranges in excellent, good, fair, and poor condition are described on the following pages. This information will assist the rancher, the livestock operator, and the landowner in judging the soil and forage on his range—the first step preparatory to measures for its improvement and increased production.

Excellent ranges have an abundance of thrifty, nutritious grasses.

RANGE IN EXCELLENT CONDITION

The soils and plant cover on ranges in excellent condition have usually been little changed by grazing. Such ranges produce as much, or practically as much, forage as they are capable of producing. The plant cover is adequate to hold the soil in place and to maintain or build up its fertility. Excellent range condition is characterized by the superior quality and quantity of the forage.

1. The majority of the plants are those that provide the greatest possible nutrition to livestock and are sufficiently abundant to prevent losses of soil and moisture under grazing use; and

2. The kinds of forage plants are those which persist, even when grazed, under the long-time climatic conditions prevailing in the locality, holding their own against other vegetation.

Additional characteristics of ranges in excellent condition:

1. Vigorous condition of the better forage plants.
2. Good reproduction of the better grasses and other desirable forage plants either by seed or vegetative spread such as tillering, runners, or underground rootstocks.
3. Some litter on the ground under and between plants.
4. Loose and friable topsoil containing a certain amount of organic matter, the amount varying according to the climate.
5. Soil movement on the grazed range not greater than if the same range were ungrazed.
6. Little or no silt in the runoff water.

A productive range, but one producing less forage than possible.

RANGE IN GOOD CONDITION

Ranges in good condition differ from those in excellent condition in the following ways:

Although the better perennial plants predominate and are still rather abundant, they have been replaced in part by less nutritive and less erosion-resistant plants, mostly perennials. Ranges in good condition produce markedly less forage of the better kinds of plants than ranges in excellent condition, grazing capacities generally being at least three-fourths as great but not as high as those of ranges in top condition. Slightly less moisture is retained, and soil is being lost in slight amounts.

Additional characteristics of ranges in good condition are usually as follows:

1. The vegetation has thinned, and bare spots have appeared.
2. The vitality of the better forage plants has been reduced. The plants have lost color and fail to produce a normal abundance of viable seed or strong, healthy runners or rootstocks.
3. There is insufficient litter under or between plants. As a result, a portion of the rainfall that would normally go into the soil runs off.
4. There has been some washing of the darker top layer of soil, and runoff from the range is cloudy with silt.

The better forage plants are in the minority and lack vigor on ranges in "fair" condition.

RANGE IN FAIR CONDITION

On ranges in fair condition both the soil and plant cover have been distinctly damaged. The majority of the plants making up the plant cover are definitely less desirable in their value for animal nutrition and soil protection than those on excellent ranges. The poorer, less desirable perennial grasses, not found in quantity on the same kind of range in a healthy state, have largely or entirely replaced the more valuable plants. Annual plants are present in normal years. Such ranges normally produce only from one-half to three-fourths of the forage found on similar ranges in excellent condition.

Additional characteristics of ranges in fair condition are usually as follows:

1. The vigor of the valuable forage plants is low, except in protected places. (The poorer plants, like the snakeweed and the tufts of three-awn in the above photograph, may be fairly thrifty.) There is usually no reproduction or spread of the better plants.
2. The density of plant cover and resultant litter is insufficient to protect the soil from washing and blowing, and on sloping ranges active erosion is clearly evident.
3. The surface soil shows poor tilth, being hard and crusted.
4. The amount of bare ground is relatively large, the plant cover being insufficient to hide or mask the soil.
5. Runoff water is heavy with silt.

RANGE IN POOR CONDITION

Ranges in poor condition are highly unstable as regards both soil and forage, and resistance to erosion and runoff is extremely low. Forage plants are low in nutritive value, and the range usually produces less than half of the forage which the same range in excellent condition would yield. The primary characteristic of a range in poor condition is the dominance of perennial weeds, unpalatable shrubs, or annual plants. These have largely replaced the perennial grasses, which occur mainly as scattered remnants in protected places. Vegetation may be absent on ranges in extremely poor condition.

Additional characteristics of ranges in poor condition are usually as follows:

1. The vigor of vegetation is generally low, except for annuals in favorable seasons. Weeds and unpalatable shrubs are thriftier than the perennial grasses. There is no reproduction or spread of the better plants.
2. The ground surface covered by perennials is one-half or less than that of perennials on excellent range of similar character. The density of plant cover and litter on the whole is insufficient to protect the soil from washing and blowing, and active erosion is conspicuous.
3. Removal of the topsoil by washing or blowing has exposed the subsoil or has left extensive areas of gravel on the surface.
4. Runoff is extremely rapid, and the silt load of runoff water is extremely heavy.

Ranges in poor condition are usually severely eroded.

CHANGES IN RANGE CONDITION

A range in poor condition may be on the mend, whereas ranges in a reasonably satisfactory condition may be on the downgrade. Range trend applies not so much to condition in one year as a series of years; for example, a range may decline in 1 or 2 years because of drought or use by livestock, but if its condition over a period of 5 or 10 years is noticeably better than in the preceding 5 or 10 years, it is unquestionably on an upward trend. On the other hand, 1 or 2 rainy years will not mend a range that has been in poor condition a long time, especially if overuse is continued. The range may actually be on the downgrade if the valuable plants are grazed so closely as to be unable to survive and regain their vigor during the following years.

Deteriorating range. Improving range.

Wheatgrass range on the downgrade. The valuable grasses have largely been replaced by sagebrush and cactus.

HOW TO RECOGNIZE A RANGE ON THE DOWNGRADE

Signs of a range on the downgrade include:

1. Good forage plants "going out" and being replaced by poor ones; the number of young, inferior plants increasing.
2. Thinning of perennial grass cover with the grass tufts breaking down and dying. The poorer the condition of the range, the more rapidly this process takes place.
3. Weakened vitality of the important forage plants as shown by pale color and reduced height and volume in periods favorable to good growth.
4. Soil being washed or blown away with a distinct increase in the number and size of gullies. The large gullies are beginning to show steep, vertical banks. The grass and other vegetation in small gullies is being washed out.

Blue grama crowding out poorer plants on an improving range.

HOW TO RECOGNIZE AN IMPROVING RANGE

Earmarks of an improving range are, for the most part, the opposite of those of a range on the downgrade. They include:

1. Noticeable reproduction or spread of the better forage plants. More seed is being produced than in previous years. Seedlings and young plants are numerous. Poorer forage plants are dying and being replaced by better ones.
2. The stand of forage looks vigorous and is increasing, especially the more desirable forage plants.
3. Animals are not eating the poor plants of low nutritional value to any great extent.
4. Washing and blowing of soil are being arrested by vegetation. Soil is being held in place. Vegetation is appearing in the gullies.

Analyze the range. Is it in a condition that will permit the soil to produce the most it can of nutritious forage, year in and year out? If not, something should be done about it.

HOW TO IMPROVE THE RANGE

A knowledge of range condition will serve as a basis for the establishment of range-protection and range-improvement measures. There is no quick, easy and, at the same time, inexpensive method by which poor ranges can be brought back to an excellent condition. The easiest and least expensive way is to cooperate with nature, chiefly by balancing the grazing use with the ability of the plant cover to hold the soil in place under grazing and produce the greatest possible amount of nutritious forage. Intensity of grazing should be such as will allow excellent ranges to maintain their productiveness and permit poorer ranges to develop an erosion-resistant cover of more valuable forage plants.

A range badly in need of improvement.

DO

1. **Examine ranges in the neighborhood in excellent condition** that are similar to your own with respect to rainfall, elevation, steepness of slopes, and soil characteristics. Ascertain the history of grazing use—the past and present stocking rates and the manner in which the range is managed. The kind and abundance of forage now being produced affords a satisfactory index of the potentialities of other ranges in the same vicinity having the same general characteristics.

2. **Study the condition of each pasture on your own range,** noting particularly the kind of vegetation, its vigor, the amount of litter and humus in the soil, and the adequacy of plant cover, litter, and humus to absorb water, obstruct runoff, and prevent the accumulation of water into streamlets.

3. **Lighten the grazing load on ranges that have declined under heavy stocking.** Continuing to graze at the same rate may permit livestock to use fully all the forage now on the range, but it will not permit more nutritious plants to take the place of the poor forage now growing there, nor allow the better plants to develop a luxuriant growth.

4. **Watch the changes that take place in the condition of the range.** If, after making allowance for temporary surpluses of forage in good years and temporary deficiencies in poor years, the condition of the range is found to be declining, a cut in numbers of livestock will ordinarily be necessary; if it is found to be improving, no reduction will be needed. It is safe to increase the rate of stocking on a deteriorated range when a gain in range condition has been made in a poor year.

   If the grazing capacity is not known, technical assistance can be secured for making range-condition surveys and assisting in analyzing range problems and determining suitable stocking rates. Soil conservation districts and grass conservation districts are in a position to secure such aid for ranchers.

DON'T

1. Don't count on light stocking to produce marked effects on an overgrazed range immediately. Range recovery takes longer than range destruction. The poorer the range, the longer will be the process of recovery, **but any gain is a step toward greater production.**

2. Don't base the normal rate of stocking on 1 year's forage production alone. Even a poor range may, in a favorable year, produce a fair quantity of feed, such as it is. Next year it may—normally—be expected to have its usual poor yield.

   On the other hand, a good or excellent range may have a poor yield during a dry period. Be prepared this year to take advantage of the forage that can normally be expected on the range. If this is not done, livestock production may suffer because of forage wasted. If, by chance, growing conditions should again turn out to be unfavorable and the forage should be deficient, **take part of the stock off in time to prevent damage to the range.**

3. Don't allow livestock to graze the plants so closely that insufficient cover is left to hold snow and retard runoff. **A loose, porous soil, with its dense and vigorous plant cover, absorbs fall and winter moisture and reduces the runoff from spring thaws.** This penetration of the soil moisture not only provides moisture for plant growth the following year but also helps to maintain spring, pond, and well-water supplies for livestock.

4. Don't expect light stocking alone, or in all cases, to restore a range to excellent condition. Even a small number of livestock if concentrated in one corner of a pasture, along a watercourse, or in one pasture for too long a period, may overgraze those places and undergraze the remainder of the range, with no benefit to the livestock or the range as a whole.

Apply other good range-management practices. Investigate the possibilities of a later season of use, a shorter season of use, rotation of grazing, and means of distributing the livestock over the range more in keeping with the development and relative abundance of the different kinds of forage in the various portions of the range at various seasons of the year.

Graze seasonal ranges after forage has developed—not before.

USING RANGE ACCORDING TO THE SEASONAL GROWTH REQUIREMENTS OF THE FORAGE

DO

1. **Plan the time of grazing according to the seasonal development of the valuable forage plants.** Ranges at higher elevations are ordinarily ready for grazing later than low ranges.
2. **Allow the new growth of grasses to reach, before being grazed, a height that will enable them to continue to grow vigorously after grazing has started.** Bunchgrasses should ordinarily be much taller than short grasses before they can be safely grazed.
3. **Graze so as to permit the forage to produce its highest yield.** Close, continuous grazing materially reduces the total amount of forage produced. Alternating the use of pastures during the grazing season gives the plants more opportunity to produce nutrients. Some grasses have both an early and late growing period; others cure well on the stem and furnish feed of good quality during the winter. Schedule the use of different parts of the range in such a manner that desirable forage plants will be produced in sufficient abundance each season to enable livestock to make the greatest possible gains.
4. **Allow the better plants to mature a sufficient amount of good seed to fill in the bare spots of the range.** Postpone the use of poor pastures until after the seeds have ripened. Delay the use of the same pasture the following year to give the small seedlings a

chance to establish themselves. In a similar manner, defer the use of the other pastures in rotation so as to give all pastures needing this kind of treatment an opportunity to improve.

5. **End the grazing each year in time to let the better plants store up sufficient food materials to carry them through the winter and start vigorous growth the following spring.** This means stopping the grazing when bunchgrasses are eaten down to a height of 4 to 6 inches and shortgrasses to 1 inch to 2 inches, depending on the species and locality. Ordinarily, the ungrazed height of valuable forage plants remaining on the ground after grazing should be higher on ranges in poor condition than that on excellent ranges.

DON'T

1. Don't allow livestock to drift to high ranges on the first showing of green grass in the spring. Such early use will injure the newly started plants and damage the soil. **Keep stock off the range until the soil is firm and plants have gotten a good start.**
2. During dry years don't allow the better plants to be eaten closer than the safe stubble height, if it is possible to prevent it. In such years it is especially necessary for the plants to maintain their growth processes in order to survive. **Utilize the forage to a safe degree according to the seasonal growth.**
3. Don't force the use of seasonal growth of poorer grasses to the point where the better plants will be driven out. You may get rid of the poorer plants, but the better ones will go out first. **Graze your livestock so as to maintain the better plants.**
4. Don't overstock a range in the early growing stage of the vegetation. Although young range plants are high in vitamin, protein, and mineral content, they also contain more water than mature plants, and livestock must eat a proportionately greater volume for sustenance and production. **There should be a plentiful supply of early forage** so that grazing animals may easily obtain a sufficient amount of feed to meet all their requirements.

BETTER DISTRIBUTION OF LIVESTOCK ON THE RANGE

DO

1. **In dividing the range into pastures, take range condition into consideration.** Establish fence lines, wherever practicable, along the general boundaries of different range-condition classes so that each range division can be given the special kind of management it needs to improve its condition.

   Fences, both exterior and interior, aid in obtaining good livestock distribution and seasonal control, deferred and rotation grazing,

Distribution of livestock by fencing improves range condition.

control of breeding and livestock management in general. These contribute to range improvement.

2. **Distribute salt in underused portions of the range** in order to draw livestock away from overgrazed portions in poor condition. Salt should be made available for use at the time the livestock are scheduled to graze the locality of the salt ground. On a range with considerable variation in the type and condition of the vegetation, salt should be put out at times corresponding to the period during which the vegetation should be used.
3. **Relieve ranges in poor condition by developing water** in the portions of the range where forage is going to waste and transferring animals to such places. Properly spaced, adequate, and dependable water supplies are essential for sustained livestock production and good distribution of livestock. They reduce the distance animals must travel, prevent their concentration in a few places, and assist in improving the range and maintaining it in a good condition.
4. **Herd the livestock away from areas in poor condition.** Allow them to graze leisurely in the better areas. Change bed grounds for sheep and goats frequently, preferably each night.

DON'T

1. Don't make heavy expenditures for fences, stock-water developments, and other structural improvements **until an examination has been made of the condition of the range.**

Utilization improved by water development.

2. **Don't build division and drift fences when equally effective and less expensive measures or practices will bring about the desired distribution of livestock and improvement in range condition.** Small areas of poor range within a large unit can be adequately improved in many instances merely by applying good salting and herding practices.
3. **Don't place salt on land subject to rapid or severe erosion.** Even on erosion-resistant land, change the salt grounds before erosion damage begins. Avoid placing salt near water. Don't force animals to travel long distances for salt. It is better to salt at a number of places, placing a small amount of salt at each, rather than to have a few salt grounds with greater quantities of salt.
4. **Don't close-herd sheep and goats.** Severe trampling injures range in good condition and prevents poor ranges from improving.
5. Don't develop water where existing water is already adequate for the number of livestock the range can safely carry. Where the range already has sufficient livestock for the forage produced, additional stock-water developments should be designed to obtain better utilization of the varying amounts of forage in different parts of the range. In many instances, a closer spacing of water supplies will reduce travel distances for livestock and pay in increased livestock gains. **To improve range condition, develop water so that livestock can be shifted from the poorer parts of the range to the better places without overgrazing any part of the range.**

Sheep thrive on upland ranges supporting a mixture of weeds and fine grasses.

KIND OF LIVESTOCK TO USE TO IMPROVE RANGE CONDITION

DO

1. **Graze the kind and class of livestock for which the forage and range are best suited.** Different kinds of livestock have different preferences for the various plants commonly found on the range. Graze sheep on ranges where the forage consists principally of weeds, fine grasses, and shorter browse species. Graze cattle on the smooth to rolling ranges where the coarser grasses, sedges, and the grazable shrubby plants predominate. Where the topography is particularly rough or water supplies are inadequate for cattle, it may be necessary to graze sheep, even though the principal forage plants are better suited to cattle. In some instances, forage best suited for sheep must be used by cattle. **In any case, base the rate of stocking and season of use on the plants grazed by the particular kind of livestock actually using the range.**

DON'T

1. Don't force sheep to eat forage better suited to cattle or force cattle to eat sheep forage over an extended period of years. This practice long continued will lead to destruction of the preferred plants and gradual deterioration of the range. **Stocking with the kind of livestock for which the vegetation is best suited will permit the range to improve and maintain its condition.**
2. On some ranges it may be necessary or desirable to graze both cattle and sheep. **To maintain the range in satisfactory condition, do not doubly overgraze it.** Remove each kind of livestock when the plants that are most valuable for that kind of livestock have been properly grazed.