Some Aspects of Management of Western Range Lands

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THE attention given to the western range and its problems by public agencies and stockmen in the past decade was a welcome sign to those interested in the permanent welfare of the West. The last ten years saw greater strides in management of both public and private ranges, more advances in range research and extension, more range men trained in schools of higher education, and a greater appreciation of range problems by stockmen and the public generally than any previous period in the history of the United State. Such progress was very timely too, because the 728 million acres in our western range constitute more than a third of the land in the entire country, and contribute forage for livestock and wildlife and water for irrigation, that can ill afford to be out of adjustment in these trying days when the smooth internal working of the United States is a prerequisite to a calm unhurried view of affairs abroad.

If the decade just ended was one of unusual progress, it also witnessed greater difficulties than any previous ten years. It witnessed the cumulative effect of all the destructive factors which caused the range as a whole to lose half its grazing capacity in the comparatively short span of 50 years' use by domestic livestock. The causes are familar: lack of exact knowledge of how to best maintain range productivity, the exploitation of drier and still drier range areas without a corresponding development and application of basic scientific information required for sound management and proper stocking practice, unsound land policy resulting in land ownerships too divided or too small for economic production; financial handicaps in the form of over-investment in land, high interest, transportation costs to distant markets and high taxes, and climatic vagaries that make severe drought the great unpredictable hazard of the livestock business.

OUTSTANDING events of the 1930's were: the stimulation of better range management on private range lands through AAA benefit payments and by the Soil Conservation Service within its Conservation Districts, the initiation of range administration on the previously unreserved public domain, better range protection and a more sustained occupation and use of national forest ranges, and the local and regional planning and action efforts of both public agencies and private stockmen. But none of these measures, nor any adjustment of economic factors or administrative policy can be fully effective without sustained forage production on the range. This viewpoint orients the following discussion which lists the basic principles of range management, and reviews some of the more recent improvements in management practices, with especial emphasis on proper use of the vegetation itself.

The emphasis on management of range forage is fully warranted because there is increasing evidence that economic difficulties are minimized or eliminated when there is plenty of grass for the livestock to eat. For example, on the Santa Rita Experimental Range in southern Arizona, a profit of 8.8 per cent was earned on an investment of $69.23 per cow over the 11-year period from 1925 to 1936. (*4*). But such satisfactory financial results were obtained only on a conservatively grazed range, and by the exercise of other improved management practices aimed at securing optimum production and effective use of the range forage. Similar results of Forest Service research on experimental ranges in New Mexico, California, Utah, Idaho, and Montana, and by progressive private ranch owners in every western state, are convincing evidence that good range management pays.

Basic Management Principles

UNDERLYING all sound range management are the four cardinal principles familiar to every range man, and so well presented by Jardine and Anderson (*6*) for range management on national forests. These principles are: (1) adjustment of different classes of livestock to fit the areas best adapted to each class; (2) determination of the number of livestock that should graze each range through estimates of the grazing capacity; (3) establishment of proper seasons for grazing the different types of vegetation at different zones of elevation, with especial emphasis on opening the grazing season only when the

important forage plants are ready to utilize; and (4) distribution of livestock on the range to secure more even and effective use of the forage. Improve water distribution, better salting methods for cattle, and open, quiet herding of sheep and bedding them down in a place each night are commonly applied methods of attaining better distribution of livestock grazing. Talbot's work on watering places in the Southwest (9) and Chapline and Talbot's salt Circular (2) are standard references which fully repay careful study. Determination of proper numbers is especially important and will be discussed in more detail later.

The most positive way of working out the practical application of these basic management principles on any range unit is through a simple, concise management plan. In brief and graphic form the good plan clearly pictures the available range forage, the demands upon it and related land resources, and shows how such demands can be met as fully and fairly as possible and at the same time assure permanent maintenance and production of the range forage plants. The plan coordinates the range use with other related agricultural resources in the highest interest of community development and public welfare.

Analysis of the forage spply and preparation of a plan for its best use require detailed information best obtained from range surveys. Range surveys are sometimes questioned because the grazing capacity estimates obtained frequently need adjustment to records of actual numbers of livestock grazed. Range surveys are best understood as a comprehensive, systematic method of obtaining reliable data for the preparation and carrying out of adequate plans for range management and administrtion. It is in the management plan that the grazing system, number and class of livestock, their distribution and season of grazing must be fitted into the highest use of vegetation and protection of the soil upon which it grows.

AN ESSENTIAL feature of the effective management plan is that it be kept up to date, that it be made a vital living part of range management. A national forest in central Montana exemplifies actual field application of range surveys and management plans to successfully maintain the range in good condition in the face of severe drought and urgent demand for range. The forest is typical high mountain bunch-grass, with all the suitable mountain valley land well settled and under cultivation in feed and cash crops and hay. In common with nearly

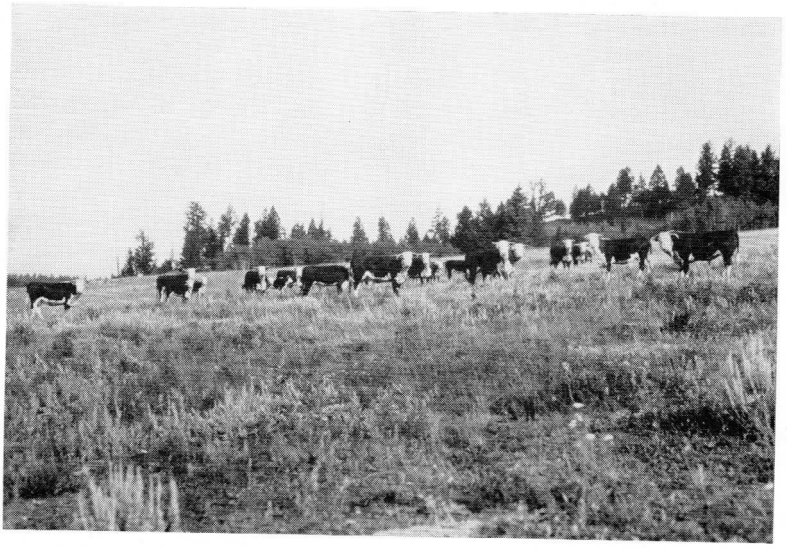


Photo by U. S. Forest Service

Earmarks of good management: high quality cattle with ample forage on a national forest summer range in Montana.

every range in the country, livestock numbers were increased during the World War, but were brought down again in time to avoid excessive damage from overutilization during and subsequent to the severe drought in 1923. Actual reductions in numbers of livestock were minimized by better distribution on the range. Certain permittees changed from cattle to sheep in order to make better use of the steeper slopes, and reduce overuse by cattle along streams and on small meadows. The forest was covered by range surveys, unit by unit, but owing to boundary changes and limited funds, over such a long period of years that the various surveys were by no means uniform. It would have been easy to file the survey data as unusable or out of date, but the supervisor carefully checked each unit, kept the facts up to date through intensive field followup of actual stocking, utilization and range conditions, and welded all the available information into a live, practical management plan. Some further adjustments were necessary to prevent excessive damage during the record breaking droughts in 1934 and 1936 and to allow the vegetation to recover afterward, but changes were made without sacrifice to the resident permittees.

The more intensive becomes the management on a range, the

more obvious it is that proper numbers of livestock are really the key to the situation, and that other management measures are fully effective only when the range is properly stocked. Proper stocking implies stocking the range at grazing capacity, which is the maximum number of livestock which a range unit will support each season over a period of years without injury to the range, tree growth, or watersheds, or unwarranted interference with game and recreation or other land services. However, this general definition of grazing capacity requires further explanation. Experiments in numerous parts of the West show that forage production on any range may vary above or below average as much as 50 per cent from year to year. Stocking the range or excessive costs to the producer. For example, Forest average forage production or above, as is often done, means short feed in more than half of the years, unless the shortage is made up with costly supplemental feeding. Wise range management, therefore ,indicates proper stocking at a point somewhat less than average. Therefore, proper stocking and true grazing capacity are ordinarily considered to be about 20 to 25 per cent below the average forage production to permit the same number of livestock to graze satisfactorily on the range in all but the most severe drought years without injury to the range or excessive costs to the producer. For example, Forest Service studies in the shortgrass type of the Northern Great Plains, in cooperation with the Bureau of Animal Industry, showed that only 25 per cent overutilization in the average year gave lower calf crops, smaller calves at birth and an average of 72 pounds less weight at weaning than from cows on conservatively grazed range. During the five year experiment, the conservatively grazed cows produced a calf crop of 82 per cent as compared to only 73 per cent on the overused range. Feed costs were a half greater on the overused range. (5.)

Utilization Standards

INCREASING recognition of the importance of maintaining the vegetation in the highest possible state of productivity has caused great interest in methods of checking currently on the degree of stocking to guard against overutilization of the more valuable forage plants. Standing's article on utilization standards in the 1938 Ames Forester (8) merits careful reading by every range man. Proper grazing of the more important forage plants is at the heart of range management, but since

no two years are identical in forage productivity, the range manager must directly observe the vegetation to determine its use and its reaction to such use. Hence utilization standards are essential tools in the every day work of range administrator.

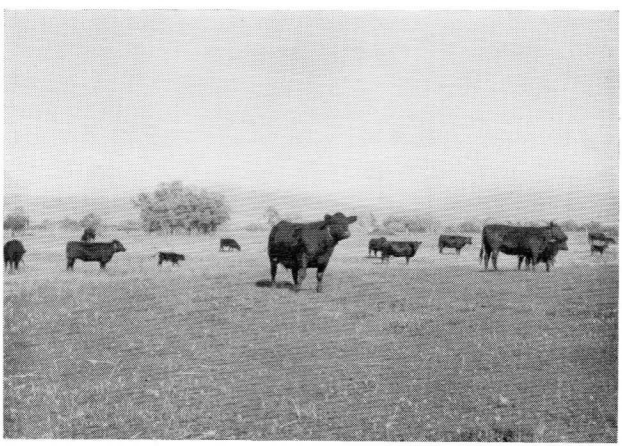
There is, of course, no magic about any system of range utilization standards. They are simply the evidence by which the trained inspector judges three things: (1) current utilization, (2) range condition, and (3) the trend of range condition.

Range trend must be approached from the ecological viewpoint, because it is dynamic, over-changing. Weather, especially severe drought, and grazing use by livestock or big game are two important factors in keeping the general trend of range condition either on the up or the downgrade. This viewpoint must pervade utilization standards, because it is usually in the severe drought years, when vegetation is struggling for its very existence, that most damage is done, especially to the better forage plants, if too heavy grazing is allowed. For example, near Miles City, Montana, density of perennial range plants by 1937 declined on representative meter square quadrats to approximately 10 per cent of the 1933 pre-drought density. With favorable weather in 1938 and 1939, the density increased from this low level, but was still below the 1933 level in 1939. (5.) Since the density of perennial vegetation reflects the growth conditions of the previous year, the stand of forage plants may be only one-fourth as much in the year following drought as in the year of drought. To regain the vegetation stand lost during drought requires especial care in stocking, management, and the utilization standards by which current grazing is judged. Even with the range regularly stocked conservatively at about 20 to 25 per cent below average forage production, some further adjustments such as supplemental feeding, fewer livestock or shortened season, are necessary to meet extreme drought such as generally prevailed in the West in 1934.

In applying utilization standards, it is found that most ranges have key areas upon which it is practical to base management. Key areas are the critical portions of a range which usually receive the heaviest grazing use because they are more accessible and livestock naturally congregate on them. However, key areas do not include the small localized areas where livestock trampling or limited overuse may be unavoidable, such as around salt grounds or permanent watering places. Typical key areas are the canyon bottoms, meadows, ridge tops, and range in the vicinty of water. If the soil and plant cover on these areas

are maintained in satisfactory condition, there is ordinarily little danger of serious erosion or plant depletion elsewhere on the range.

HOWEVER, the designation of key areas is no substitute for thorough inspection of the entire range at least once each year, to be sure that parts other than designated by key areas are not overused. This is especially true on long season or year-long ranges of the Great Plaints or Southwest, where in level or rolling country, key areas are not always easily designated except as those close to water. In this kind of range, soil types especially susceptible to disturbance by trampling or soil blowing must be carefully watched and managed, or they will not only suffer within themselves, but also become a source of blowing soil to damage adjacent ranges. Such was the case on a ranch in southern New Mexico, where several thousand acres of fine black grama range was killed out by sand blown onto it from an adjacent overutilized and rundown range.



On key areas there usually grow a relatively few key species upon which utilization estimates and management may be based. They are the more important forage plants, palatable to livestock, fairly abundant or potentially so, with ability to withstand grazing, and are usually perennials. The real basis of range inspection is as careful a check as possible on the degree of utilization, and trend of range conditions as indicated by the vigor, number and utilization of the key forage plants.

The general indicators of satisfactory and unsatisfactory

range condition and of upward and downward range trend are well known to every range administrator and student, but the application of these general guides in interpreting the evidence of soil and vegetation on a specific area is a job that requires all the alertness and good judgment the range examiner possesses. Such guides and their application to specific types of vegetation have been aptly summarized by Talbot (10) and in regional utilization standards handbooks in several western regions of the Forest Service.

DEFINITE records of range condition and of current utilization are essential in following the range year after year. Utilization maps, showing the degree to which the key areas and other parts of the range are grazed at the end of the grazing season, or at any critical time during the season, furnish a graphic record suitable for quick interpretation and for permanent record. Accurate information on utilization of the current year's forage production is especially important, because correctly interpreted, it is a good indication of what will happen to the range if such grazing is continued. It is the advance indicator of probable trend in range condition as affected by grazing. Critical studies of carbohydrate production and storage in several range grasses in relation to growth prove that accumulation of food in the crowns and roots takes place during the decline of the current leaf and stem growth; that plants draw heavily on stored food in winter and spring before actual growth can be observed; that the character of shoot growth depends on food stored the previous summer; and that yield of forage is in direct relation to food production during the growing season. (7.) These studies indicate how too heavy grazing literally starves the plants to death.

It is axiomatic that proper utilization of the important forage plants must allow for their growth and reproduction in order to perpetuate the range resources. Actual or potential occurrence on the range, relish by livestock at different seasons, ability to withstand grazing, stage in plant succession, nutritive values or other properties, life histories, soil protective ability and drought resistance are a few of the factors that must be considered in establishing the proper use of a range plant. A general rule of thumb is sometimes given that at least a fifth of the total production of key perennial grass species should be left on the ground at the end of the grazing season, but this is far from a fixed rule because many species can stand to have

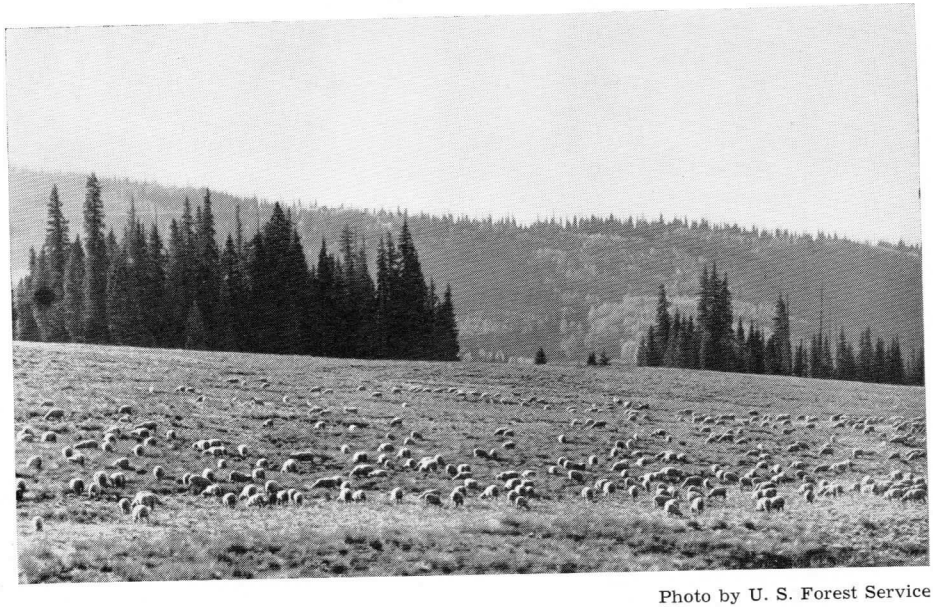


Photo by U. S. Forest Service

Abundant forage and open quiet herding of sheep on a national forest in Colorado.

only about half of their production grazed. Specific description of proper use for black grama (1) typifies the results of detailed research on this problem.

METHODS for determining the use of individual species are based either on ocular judgment or on more accurate estimates involving comparisons of ungrazed vegetation with grazed plants. Clipping and weighing of ungrazed plants in the field and comparison of grazed plants with ungrazed enclosures are valuable methods of training to estimate utilization. Grass volume tables developed in the Southwest (3) and in the Northern Region of the Forest Service have given a much more accurate idea of volume distribution in grasses and should prove helpful in practical utilization estimates on the range. Once a set of proper use tables is built up from definite data on range in good condition, the examiner has a fairly reliable index of proper use. The grazing to normally proper degree of key plants at a substantial time before the close of the usual grazing season is one of the best indicators that the range will be over-

utilized at the end of the season. Distinctly observable utilization on unpalatable species is also a good indication that the range is apt to be overused.

Although prepared sets of utilization standards are helpful, the formulation of specific local adaptations of such standards, and their application in every day range management is really a part of the job of every range man.

Considerable progress in sound range management has been made, especially in the past decade. In the ten years just begun, additional management practices now in the experimental stage should come into common use. With the welfare of the great western farm and ranch industry at heart, the private stockman, the public land administrator, the researcher and the extension man can together work out and apply improved range management that will help livestock units and dependent communities to overcome many of their difficulties and maintain a stabilized range resource.

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