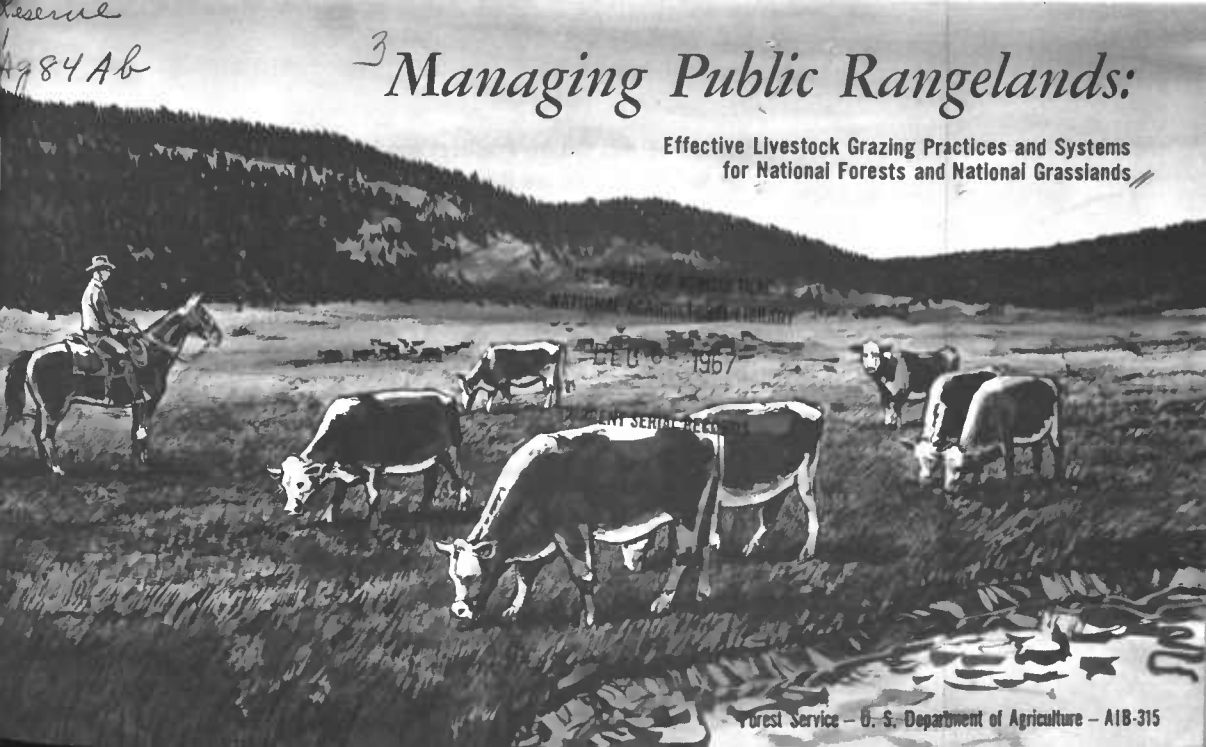
Managing Public Rangelands:

Effective Livestock Grazing Practices and Systems for National Forests and National Grasslands



Forest Service – U. S. Department of Agriculture – AIB-315

Effective Livestock Grazing Practices and Systems for National Forests and National Grasslands

This brochure presents the basic principles of various grazing practices and systems that might be used on National Forests and National Grasslands. No attempt is made to promote the use of a particular system. Rather, it is intended that stockmen and administrators use the following information to help design grazing plans best suited for particular range areas.

COVER.— Well-managed ranges in good condition with healthy livestock contribute to balanced ranch operations compatible with other land resources and uses.

F–474722

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Contents

Grazing Policies on Forest Lands; A Look at the Next 20 Years*

". . . The foundation for grazing of forest range land is firm . . . because of the cooperative approach that has been established between livestock people and managers of public resources . . . The stage is now set for the additional gains that must be made in . . . improved watershed conditions, holding soils in place, social benefits, development of economic strength in rural communities, as well as forage or meat production . . .

"The years immediately ahead will see a continuation of the trend toward more intensive management . . . We will evaluate range condition trends, present and potential grazing capacity, and the need for range development. A package will be tailored for each of the 11,670 allotments. We will continue to want permittees to participate in analysis and management planning.

"In the next 20 years we will be advancing toward our goal of attaining optimum productivity on National Forest System rangelands by the year 2000 . . . We hope to complete analysis of each of our range allotments by 1972—and get reasonably intensive management under way on all these allotments by 1980.

"We still have a terrific backlog of work to do. For example, there are 54,000 miles of range fences on the National Forests; another 60,000 miles are needed . . . We have 38,000 livestock watering developments; we need another 37,000. We have rehabilitated 2.5 million acres of deteriorated range; another 7.6 million acres need rehabilitation through seeding and plant control . . . Watershed values are becoming more and important . . . Maintaining an adequate plant cover must be one of the measures of our performance.

"Obviously, cooperation will continue to be a most important factor in making all Forest Service range management programs work. The degree of success of management generally has depended upon how well the rancher and ranger have . . . cooperated in sharing their responsibilities. Cooperation in range development has been necessary because Federal funds have been limited . . . We will encourage private investment for improvement on the National Forests where this is in the public interest . . .

"We can sum up all of this looking ahead very simply. It is time to get on with the job . . ."

**From a presentation by Edward P. Cliff, Chief, Forest Service, U. S. Department of Agriculture, at the 20th Annual Convention, American Society of Range Management, Seattle, Wash., Feb. 14, 1967.*

Managing Public Rangelands;

Effective Livestock Grazing Practices and Systems
For National Forests and National Grasslands

by Richard S. Driscoll
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Range Management Objectives

Since 1905, domestic livestock have grazed National Forest lands. This grazing privilege has been extended to qualified livestock operators where forage is available and can be practically managed. Range technicians, administrators, and livestock operators cooperate to develop mutually agreeable plans to make the most efficient use of the range resource. The fundamental objective of these plans is to assure sustained production and utilization of the greatest quantity of high-quality forage consistent with other land uses and values.

National Forest System Rangelands

Livestock graze more than 100 million acres of land subdivided into more than 11,500 grazing allotments or management units on the National Forests and the National Grasslands. About 20,000 ranchers and farmers graze nearly 1.4 million adult cattle, 2.1 million adult sheep, and 3.2 million calves and lambs on these public rangelands. In addition, about 4 million big-game animals, mainly deer and elk, use these lands.

In the West, these areas include the headwaters and drainages of many of the important river systems. They also include large areas where timber production is an important use, and recreation demands are increasing. Consequently, use of these National Forest System rangelands must be coordinated so that each resource is developed with full consideration of all other uses and values.

Many piney-woods ranges of the Southland supply plentiful forage, often yearlong. F–501694

These rangelands vary widely from the tidal marshes and coastal piney woods of the hot, humid South to the cold, high-elevation alpine slopes and meadows extending more than 12,000 feet above sea level in the mountains of the West. Elevation may change from only a few feet per mile in the plains country to over 1,000 feet per mile in the mountains. Annual precipitation ranges from less than 10 inches in the drier parts of the West to more than 60 inches in the mountains or along the coasts, and its seasonal distribution varies considerably.

These factors contribute to extreme diversity in vegetation, soils, and growing seasons throughout the range areas of the Nation. Consequently, the length of time livestock are allowed to graze on range varies from periods of 2 to 6 months where the growing season is short, to yearlong where climate is mild and suitable for plant growth most of the year. Because of these diversified conditions and differences in needs of the various kinds of grazing animals, *each allotment along with its supporting public and private lands must be managed as an independent unit.*

These high-elevation western ranges require careful management, and can be grazed only a short time each year.

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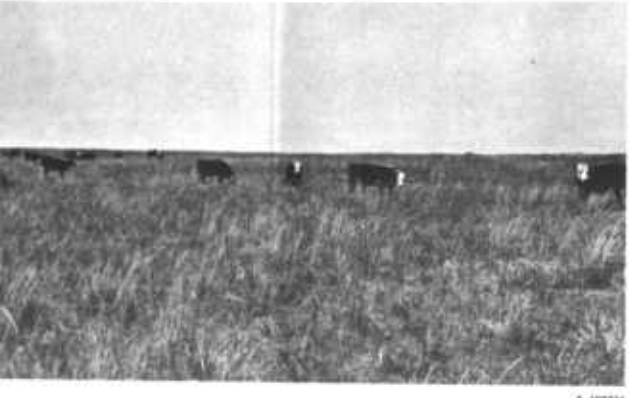

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From the open plains—to the rugged western mountains, rangelands are extremely variable.

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Major points to consider in selecting a grazing system for a particular allotment include:

- Kind and class of animal to be grazed
- Kind and amount of vegetation
- Amount and seasonal occurrence of rainfall
- Topography and elevation
- Length of growing season
- Kind and characteristics of soil
- Availability of funds for fencing, water development, and other range improvements
- The needs of the livestock operator

Practical Range Management Practices

Regardless of the grazing system used on any allotment, one of the most difficult jobs in range management is to get all parts of the area grazed uniformly wherever practicable. On most ranges livestock concentrate on some areas, avoiding other areas. Many factors, including topography, nature and habits of the livestock, inadequate watering facilities, and inadequate grazing management, contribute to this poor distribution.

When some common range management practices are coordinated so as to complement each other, many grazing distribution problems are alleviated or prevented. These practices include salting, supplying water, installing fencing, and range riding or herding for better distribution of animals.

Every effort must be made to prevent excessive concentrations of livestock, and encourage use where forage is abundant.

Salting

A good salting plan must be flexible. It should describe the location of grounds and list the dates and amounts to use. Instead of just a few permanent salt grounds, many temporary locations should be used. Too few salt grounds may encourage damaging concentrations of animals. The use of many locations allows for progressive movement of salt during the grazing season from areas of adequate use to other suitable areas where forage has been lightly used. This practice encourages uniformity of forage use, which may eventually improve range conditions. The number of salt grounds needed should be determined by how livestock use the range area, and by the amount of forage and water available.

F–464616

The area around this permanent salt ground has turned into a quagmire because of excessive use for many years.

POOR PRACTICE

Salt usually is not placed near water, except when it might be needed to attract livestock to newly developed areas. Salt may also be placed near water when salting and watering are done simultaneously, as on winter sheep ranges.

The per-animal salt requirement varies with the succulence of the forage, the salt content of the forage and drinking water, and the occurrence of natural salt licks. Generally, on most mountainous summer ranges, mature cattle require one to two pounds of salt each per month, and mature sheep require one-third to two-thirds pound of salt each per month.

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This temporary salt ground was easily established and can be quickly abandoned.

F-440119

When there are not enough watering places on the range, damage like this may result from too many animals concentrating at one spot.

Water Development

Water can be used effectively to control the distribution of livestock. One can either develop it where needed, or remove the source when the herbage has been sufficiently grazed (as by fencing off springs and reservoirs). Every effort should be made to provide the water needed by livestock to fully develop the grazing potential of an allotment. This would include development of springs or seeps with a known supply of season-long water, ponding of runoff, construction of ponds in areas of seasonally high water tables, or use of drilled wells and windmills. Some of these structures may supply only a few head of livestock with water for only a short time, but they will frequently encourage grazing in areas formerly unused. The number and spacing of watering places on a range area depends on terrain, forage supply, and grazing habits of the livestock.

If natural watering places cannot be developed, or if normally dependable stock-watering places are dry in drought years, water can be provided by hauling. This will encourage use of herbage that might otherwise be untouched and help discourage livestock from congregating too much on certain areas.

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Well-placed and properly developed water contributes to full and proper grazing use of the forage resource, and to optimum livestock production.

This small pond supplies 10–15 head of cattle with water for only 30–40 days, but it helps relieve the grazing pressure where use is excessive.

Hauling water on dry ranges makes available herbage for grazing that otherwise could not be used.

Fencing

Cattle ranges are frequently fenced to obtain more uniform use. On many rough western ranges, the time that vegetation and soils are ready for grazing in the spring often varies greatly within a single allotment, depending on vegetation type, altitude, and other factors. Short drift fences may be used to control movements of animals to higher elevations until the range there is ready for use, and at the same time encourage full use of the lower ranges. This practice must be used cautiously since livestock will tend to concentrate near fences if the fences cross natural travel routes. Fences are often used to isolate particular vegetation types, such as meadows that remain soft and wet late in the season, or other choice grazing areas until they can be used to the best advantage of the vegetation and the livestock.

The location of fences, especially boundary and division fences, is important to assure more uniform use. Concentrations of livestock may be reduced by locating fences on or near ridgetops (see photo below); where possible, avoid fencing near water or across drainages. Maintenance costs are usually reduced by fencing along ridges because of less possible damage by wind-thrown timber or snow.

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Riding and Herding

Adequate salt, water, and fences seldom assure uniform grazing of available forage without the aid of a rider or herder. The good judgment of a competent rider or herder cannot be replaced by physical structures. Competent riders and herders are concerned with the welfare of both the range and the livestock.

A good range rider or herder knows the country and the way cattle or sheep naturally tend to use it. He knows if there is enough forage in an area to make it worthwhile to develop a small spring. He knows if a new salt ground would be just as effective to get uniform grazing of forage. He recognizes the signs of correct forage use which help tell him when, and from where, to move livestock to areas of unused forage. He is

cautious to avoid "uniform overuse" of the range.

Where sheep are controlled by a herder, slow, open grazing must be practiced. Dogs should be used only in moderation. Herding should be so planned as to allow the animals to feed quietly without bunching, move only enough to secure fresh forage, and bed down at a new location each night.

A competent range rider or sheepherder is important for good range management, regardless of the grazing system.

F-495391

The Grazing Systems

A grazing system is a planned program of livestock management to accomplish a desired result. The kind of system chosen should be one that can be integrated with the stockman's business and still allow proper management of the land, water, timber, and wildlife.

The basic purpose of any grazing system is to promote the most efficient range management practicable. It should maintain or improve range condition, and at the same time allow a high level of livestock production. Range condition can frequently be improved through better distribution of livestock by using the foregoing practices. It can also be improved by intensifying or altering an existing grazing system.

Grazing is either continuous throughout the grazing season, or specialized and intensified by dividing a range area into a number of units and periodically moving livestock during the grazing season. The degree and kind of specialization must be designed specifically for each range area; considering growth and maintenance requirements of the livestock and forage plants, the grazing habits of the animals, and the amount and location of forage.

Five common grazing systems are:

1. **Continuous:**

Livestock are allowed free access to any part of a range area throughout the grazing season, which may be either seasonal or yearlong. Use of the area follows the same general plan each year.

2. **Rotation or alternate:**

The orderly alternation, both within and among years, in the grazing use of two or more portions of a range area to avoid grazing the same unit at the same time each year, but without specific regard for plant reproduction. The system is well suited to avoid uneven grazing use and to promote plant vigor.

3. **Deferred:**

The delay of grazing during the growing season, specifically to promote plant reproduction and restore or maintain vigor of existing vegetation.

4. **Deferred-rotation:**

Rotating the deferment of two or more units of range area to promote plant reproduction and improve plant vigor. Grazing is normally allowed on all portions of the range allotment for at least part of each grazing season.

5. **Rest-Rotation:**

Refinement and combination of the deferred and rotation grazing systems, which provides the additional component of complete rest on certain parts of the range area during certain years or grazing seasons to promote reproduction and more complete restoration of plant vigor.

Other systems may be referred to but they are usually based on the concepts of rotation and/or deferred grazing.

With cattle, all systems will usually require the construction of fences and other physical improvements such as water developments. As the system increases in complexity, such as a 5- or 6-unit rotation system, the outlay for physical improvements increases progressively. With herded sheep, fences are not always necessary. However, sheep are being managed successfully in fenced allotments without herders on many ranges. On these allotments, fences are needed to provide the control required for the particular system being applied.

Continuous Grazing

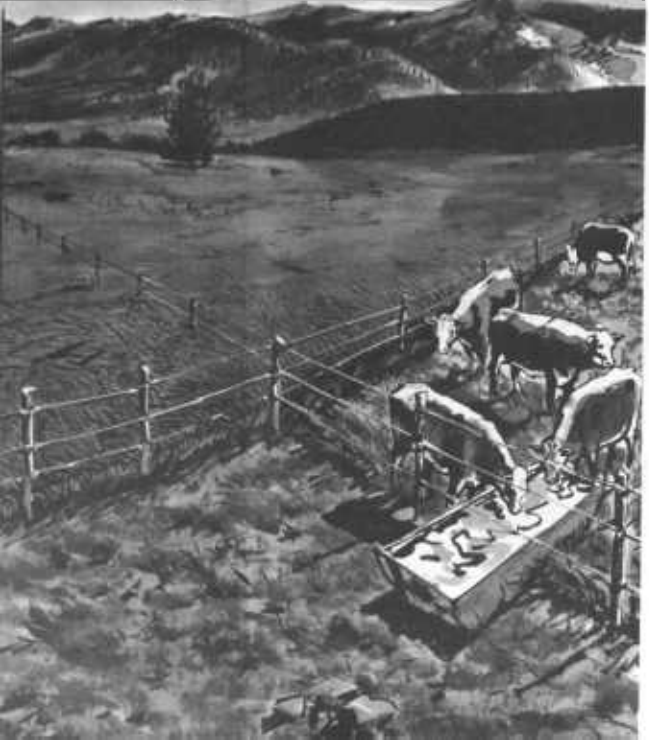
Under this system, livestock are allowed to graze a specified area throughout the grazing season, year after year. The grazing season may be either seasonal, such as summer grazing on mountain ranges or winter grazing on some desert ranges, or yearlong where the climate is mild all year. Use of the area follows the same general plan each year. (*See illustration at left.*)

Continuous grazing does not mean simply closing the gate behind the livestock and letting them graze at will. Every possible effort should be made to secure uniform grazing of all areas by the management practices of salting, watering, fencing, and riding or herding. Such husbandry alone will often help to promote range improvement.

The main advantage of continuous grazing, as compared to other systems, is that it requires the least investment for range improvements. Other advantages include (1) minimum handling and movement of livestock, and (2) generally, use of different classes of forage when they are most nutritious.

Some disadvantages of continuous grazing as compared to other systems are:

- Animals tend to concentrate in the same places at the same time year after year. This may cause serious forage deterioration and possible soil destruction, especially on mountainous ranges.
- Forage that might otherwise be used is wasted because of poor distribution of livestock and uneven utilization of herbage.
- Even if the whole allotment on the average is "properly" grazed, the better forage plants where the livestock prefer to graze are likely to be heavily grazed continuously, and may eventually be destroyed.



Rotation or Alternate Grazing

This system provides for the orderly alternation, either within or among years, in the grazing use of two or more portions of a range unit *without specific regard for plant reproduction.* The rotation may be during the same grazing season or calendar year with short rest periods between times of grazing, or it may be among years so that some unit is rested from livestock grazing for at least one grazing season. Use of the same unit at the same time in successive years is avoided when the grazing season includes all or part of the growing season.

The basic objectives of rotation grazing are to (1) maintain the vegetation over the entire range in a good state of vigor, and (2) avoid excessive soil disturbance. These objectives are accomplished by encouraging uniform grazing over the entire range, and providing periodic rest during critical growth periods. This system is best adapted to ranges in relatively good condition, where primary interest is the maintenance of existing vegetation and the reduction of uneven grazing use. A simple design for rotation grazing on a summer range with a 4-month season would include *four* units, each grazed 1 month. (*See illustration at left.*)

Many different rotation systems can be designed. The number of units used depends on the intensity of management, kind of vegetation, and physical characteristics of the land. Fencing or careful herding is usually required. The system might be utilized effectively, however, by changing yearly the place livestock begin grazing seasonal ranges, and controlling livestock distribution by riding or herding, salting, or water access.

Deferred Grazing

Deferred grazing systems are designed specifically for ranges where the grazing season includes all or part of the growing season. Generally, deferred grazing is best adapted to areas where the range needs improvement. Grazing is delayed until after reproductive systems of important forage plants fully develop. *Therefore the specific purposes of this system are to promote reproduction and restore or maintain vigor of important forage plants.*

An entire allotment need not be deferred to use this system. Grazing on a part of the allotment in most need of improvement can be deferred until it meets some standard of improvement, while the remainder of the area is grazed during the regular grazing season. Generally, however, deferment is combined with rotation so that all units periodically receive the benefits of deferred use.

Deferred-Rotation Grazing

The ideas of deferred and rotation grazing are frequently combined into a single system. One such combination is known as deferred-rotation. Under this plan, grazing is deferred on some portion of the allotment during the growing season for one or more years; then, by rotation, other areas are successively deferred. Finally the entire allotment has benefited from these short rest periods, and the area originally deferred is again due for rest during the growing season. Grazing is allowed on all portions of the allotment for at least part of each grazing season.

In application, the number of divisions of a range area needed for this system is based on the period of grazing left after the reproductive systems of the important forage species mature. For example, the design for deferred-rotation grazing would be simplest when the

seed matures midway through the grazing season. Under this circumstance, only two units would be needed, and deferment would be rotated yearly between the units.

On many western ranges with summer grazing seasons, however, about one-third of the grazing season remains after seed maturity. Here, *three* units would be needed: Grazing would be delayed in each unit for two-thirds of the season at least every third year *(see sketch)*. When growing conditions are poor because of climatic differences, or the range is in quite unsatisfactory condition, deferment of a unit for two successive years would be preferable. In all cases, allotments must be divided so that the apparent grazing capacities of all units are similar.

Rest-Rotation Grazing

This grazing system includes further refinement and combination of the deferred and rotation grazing systems by having the additional component of complete rest on certain parts of a range area during certain years

or entire grazing seasons. The long periods of rest under this system provide for more complete restoration of vigor of the desirable forage species, and encourage more complete establishment of seedlings from these species.

The system is based on two theories: (1) that close cropping of vegetation and intensive trampling of the soil during any season is not harmful, provided rest periods immediately follow this use; and (2) that trampling by high concentrations of livestock for short periods of time after seed maturity helps regeneration by "planting" seed of desirable forage plants. Although the system has been designed primarily for use on perennial bunchgrass ranges in the West, it may have application in other areas.

Since rest-rotation grazing emphasizes improvement of plant vigor and reproduction, it is necessary to rest the range from grazing periodically during the growing season to (1) restore plant vigor, (2) insure development and ripening of seed, and (3) insure establishment of seedlings. The general form of rest-rotation

grazing, therefore, consists of four basic steps in the following sequence:

1. Graze for maximum livestock production
2. Rest until plant vigor is restored
3. Rest until seed ripens, then graze for maximum livestock production
4. Rest until reproduction becomes firmly established

The number of units of a range area needed to accommodate a rest-rotation grazing system will vary from range to range. A *five*-unit plan will probably satisfy the requirements for improvement of most perennial bunchgrass ranges. (*See illustration on previous page.*)

With this five-unit plan, one full season of rest is used to restore vigor of the desirable species before grazing, and two seasons are needed to make sure seedlings are well established after the area has been grazed in late season. The grazing schedule would be to place all livestock to graze a range area in a particular year or season in one unit until seed of the primary forage plants on a rested unit is mature. The animals are then moved to this unit for the remainder of the season where, because of high animal concentrations, ripened seed falling on the ground may be covered with soil by pounding of hoofs to provide a planting effect.

The other three units, particularly on severely deteriorated ranges, are not grazed so as to provide (1) rest for one season to restore vigor of grazed plants, and (2) rest for up to two more seasons to insure establishment of seedlings. The order of grazing is altered in the succeeding years so that the unit grazed first in one year is rested to restore vigor the next, and the unit rested the longest for seedling establishment is then grazed first.

According to this plan, the major forage species are fully grazed during the critical growing period only once every 5 years. More or fewer units may be used, depending on the growth requirements of the important forage species.

Advantages of Specialized Systems as Compared to Continuous Grazing

There has been some doubt whether the difficulty involved in following specialized systems of grazing is justified on rangeland. Experience has shown, however, that both vegetation and livestock can benefit. The livestock operator and the range administrator must develop a system that both perpetuates the forage resource and produces animal products at an acceptable level. Any system used must be suited to local conditions.

Fifty reports on studies comparing livestock and vegetation responses under continuous grazing versus some other system were examined by the author of this booklet. Twenty-nine of the reports compared livestock weight gains or losses. They may be summarized as follows:

- In 12 studies, livestock weight gains were greater under continuous grazing as compared to some other system.
- In 8 studies, livestock weight gains were greater under a special system as compared to continuous grazing.
- In 9 studies, there was no appreciable difference in weight gains of livestock under continuous grazing as compared to some other system.

Results of these studies showed no consistent relationship between livestock responses, a specific grazing system, and a particular kind of vegetation. Local conditions, such as quantity and quality of vegetation, the management history of the animals, and the season, apparently have profound effects on how animals respond to a system and to the vegetation of the area.

Thirty-nine studies compared the responses of vegetation, measured by increases or decreases of desirable species, under continuous grazing versus some other system. They may be summarized thus:

- In 3 studies, vegetation condition improved under continuous grazing.

- In 31 studies, vegetation condition declined under continuous grazing as compared to some other system.
- In 5 studies, there was no appreciable difference in vegetation condition under a continuous as opposed to a specialized grazing system.

It is apparent from this review that some system of grazing other than continuous or season-long will probably be needed to improve the vegetal conditions of most rangelands. The primary advantage of some form or combination of deferred or rotation grazing is that the desirable forage species are periodically rested from grazing during the growing season. This rest encourages improvement of vigor and reproduction. Furthermore, dividing a range area into units, and grazing each unit with the total number of allotted livestock provides more complete use of the forage resource through better livestock distribution.

Other advantages of special grazing systems are evident, especially when certain parts of a range area are completely rested from grazing, as with rest-rotation grazing. Seeding and control of undesirable species may be integrated into a rest-rotation grazing plan without additional fencing for grazing control.

Generally, specialized grazing systems provide for various periods of rest and grazing so as to control use and encourage establishment or maintenance of desirable range plants. *In some parts of the mid-continental prairie region, however, especially in the tall grass areas, and in the South, deferred or rotation grazing has questionable value.* In these areas, herbaceous vegetation frequently becomes excessively rank and loses its palatability and nutritive value for livestock early in the season (June).

In the South, a special kind of rotation based on burning is used to remove accumulated plant debris, and to improve availability and quality of new herbage. A good plan is to divide a range unit into three areas of approximately equal grazing capacity, and burn in the spring one subunit per year on a 3-year rotation. The fire stimulates plant growth and improves availability, quantity, and quality of herbage. This causes livestock to concentrate on freshly burned range, where they take advantage of higher quality grazing. Rotating the burning schedule shifts this use pattern to provide

periods of relatively light grazing so that the vegetation can recover from any possible damage caused by the burning and subsequent close grazing.

Where timber is an important resource, properly timed burning in the South can benefit the trees as well as the herbage. The fire destroys brown spot, a destructive fungus attacking the needles of young longleaf pine trees, and may destroy other tree-disease organisms. *The burning must be done when there is the least chance of harming the trees.*

Limitations of Specialized Grazing Systems

The major objection to any specialized grazing system is the cost of improvements needed to provide the control for the system. Fencing and water development are probably the two most costly items.

For cattle grazing systems other than continuous, the area must be cross-fenced into the required units. The cost may be reduced by use of short drift fences, natural barriers, or perhaps movable electric fences. Well-planned salting and riding may be used in some instances to control stock movements. Although these latter methods may be less expensive than complete fencing, they are not as effective.

Fencing is not a major problem where sheep are controlled by herders. The herds can be guided to graze certain units at certain times in a particular year, with the order of use varied during the next grazing season.

Poor distribution of water is probably the most difficult problem to overcome when planning some form of deferred or rotation grazing. Seldom is there a range area with an adequate supply of stock water. The water must be available season-long, for during rotation a given unit will be required to support livestock at any time during the grazing season. A unit with only early-season water could not be included in a rotation plan.

Frequently animals are forced to graze coarser, less palatable, less nutritious forage on some parts of the range when specialized grazing systems are used. Also, the grazing pattern of livestock, especially cattle, is disturbed when they are moved from area to area during the season. These factors may depress livestock gains.

Which is Best?

There is no magic formula that will tell which kind of grazing system or management plan is best for any range area. Each area must be considered as an independent unit that will be used by a particular group of livestock. Its vegetation and soils will have specific management requirements. Therefore, the plan of use for any area must be developed cooperatively by the user and the manager, and designed to fit particular needs and capabilities of the area.

The decision to propose any grazing system in this plan must be based on facts, but tempered with judgment. In deciding upon a grazing system, the nutritional needs of the livestock must be known, and every effort should be made to supply these needs. The quantity and quality of forage available should be known, and it must be understood how the range can be grazed so as to provide a sustained high yield of quality forage. The characteristics of the soils—at least those related to susceptibility to compaction and accelerated erosion—must be known. All these items dealing with livestock, vegetation, and soils must be considered to assure efficient use and management of ranges.

No single management practice—including system of grazing, season of use, rate of stocking, or distribution of livestock—will by itself improve any range area. All these must be integrated into a well-planned management program to be successful in getting the most efficient use of the range without jeopardizing other resources.

Investments for improvements are needed to apply specialized management systems. To be justified, the investments must provide reasonable returns to the livestock operator and the range manager. If range improvement and better grazing is not provided where needed, everyone loses. The productive potential of the land is not realized, and the income of the locality is reduced.

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