Grazing Systems:

Planning The Future Of Your Range

By Jerry L. Holechek

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During the last 5 years grazing systems have been a major focus of range researchers and managers. Although several papers have evaluated available research on the different systems, an analysis of the conditions where the individual systems should give best results is still lacking. Grazing systems commonly used in the United States include continuous, deferred rotation, rest rotation, short duration, Merrill three-herd/four-pasture, high intensity-low frequency, and seasonal suitability systems. It is my intent to discuss the conditions where each of these systems should provide the best results with special consideration given to riparian zones.

Continuous Grazing

Continuous grazing involves grazing a particular pasture throughout the grazing season year after year. Grazing systems other than continuous are commonly called specialized systems because scheduled moves of livestock from one pasture to another are involved.

The primary problem associated with continous grazing is that livestock have preferred plants and areas for grazing. These plants and areas receive excessive use even under light stocking rates. The preferred areas generally occur where water, forage, and cover are in close proximity. These are often the most productive parts of the pasture.

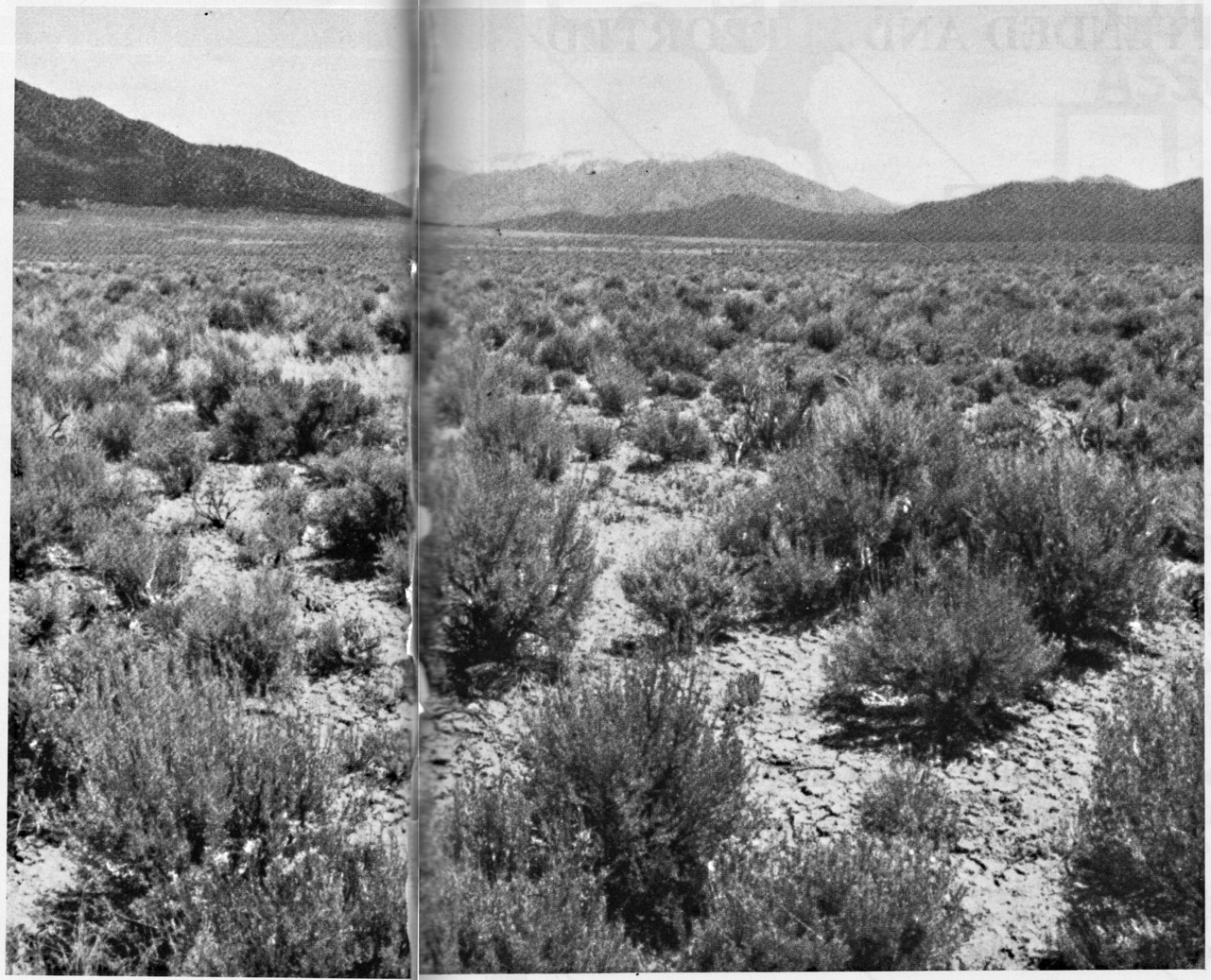
Continuous grazing at a stocking rate that gives moderate use (50% removal of current year's growth) has given good results in the flat shortgrass prairie country of the Great Plains where watering points are usually not farther than 2 miles apart and differences in palatability between forage species is minimal. The shortgrasses, blue grama and buffalo grass, are the primary forage species. They evolved with heavy grazing by bison and are quite grazing resistant. Precipitation in the shortgrass country occurs as several light rains throughout the summer months. Therefore considerable opportunity exists for regrowth after defoliation. The flat nature of the terrain and the close proximity of watering areas minimizes the tendency of livestock to congregate and linger in the most convenient areas. Sacrifice areas can be reclaimed by temporary fencing to allow vegetation recovery. Since most of the sacrifice areas occur around water, control of access to watering points can be used to provide sacrifice areas with periodic nonuse.

Continuous grazing has given superior results to specialized systems in the California annual grassland type when use was moderate and practices such as salting, fencing, and water development were used to obtain proper distribution. Annual grasses need only to set seed year after year to maintain themselves, unlike perennial grasses that must store carbohydrates. Differences in palatability between most of the annual grasses are small.

In both the shortgrass and California annual grassland types, livestock performance has been better under continuous grazing than specialized systems. This is explained by the fact continuous grazing allows livestock to exhibit maximum forage selectivity and minimizes livestock disturbance due to gathering, trailing, and quick change in forage quality.

Deferred Rotation Grazing

Deferment involves delay of grazing until seed maturity of the important forage species is completed. Rotation is the movement of livestock from one pasture to another on a scheduled basis. Initial research on this system was conducted by Arthur Sampson in the Blue Mountains of northeastern Oregon in the early 1900's. The system he studied involved dividing the range into two pastures. Each pasture received deferred grazing every other year. Vegetation response under this system has been superior to continuous grazing on bunchgrass and mountain ranges in the northwestern United States and on tall grass ranges in the eastern Great Plains. Deferred rotation grazing provides a better opportunity for preferred plants and areas to maintain and gain vigor than continuous grazing. It works best where considerable difference exists between palatability of plants and convenience of areas for grazing. On mountain ranges, stringer meadows and riparian zones will often receive excessive use by cattle even under extra light grazing intensities while surrounding uplands will receive light or no use. The deferred rotation system provides forage species on the lowland sacrifice areas with the opportunity to store carbohydrates and set seed every other year. Recent research from the Starkey Experimental Range and Forest in northeastern Oregon confirms deferred rotation grazing is superior to continuous grazing from the standpoint of vegetation and equal to continuous grazing in terms of livestock performance on mountain range. Deer and elk at the Starkey Range are benefited by deferred rotation grazing because the ungrazed pastures permit greater forage selectivity and provide an area free from livestock disturbance. These big game animals prefer to avoid livestock if possible.



Big sagebrush ranges with little remaining unde[r]y have shown little response to any grazing system including complete livestock exclusion. Control of big sagebrush will be necessary before any imp[r]ement in productivity of the above range will occur.

Rest Rotation Grazing

Rest rotation grazing was developed by Gus Hormay of the Forest Service in the 1950's and 1960's. This system is unique in that one pasture receives 12 months of nonuse while the other pastures absorb the grazing load. Presently most rest rotation schemes involve 4 pastures. Various sorts of rotation schemes are used on the 3 grazed pastures. The problem with rest rotation grazing is that the benefits from rest may be nullified by the extra use that occurs on the grazed pastures.

Rest rotation grazing appears superior to continuous grazing on mountain ranges where livestock distribution problems occur. On semidesert grassland range in southern Arizona, S. Clark Martin has reported good results with a 3-pasture rest rotation system. Under the Santa Rita system, as it is called, stocking rates on grazed pastures are kept at moderate levels. Old herbage from the rest pasture protects early spring growth from repeated close grazing. Benefits from this system are greatest where animals congregate such as around watering areas.

Rest rotation grazing has been

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criticized for reducing livestock performance because of reduced grazing selectivity and forced animal movement from pasture to pasture. On the Starkey Experimental Range in northeastern Oregon, research Martin Vavra and I have conducted has shown little difference in cattle performance and diet quality between rest rotation, deferred rotation, and season long grazing systems. Stocking rates were the same under all 3 systems and resulted in moderate forage use.

From a multiple use standpoint, rest rotation grazing with moderate stocking of grazed pastures has a number of advantags. Small mammals and upland game birds are provided with a good vegetative cover throughout the year on at least part of the area. In eastern Montana waterfowl production was increased three fold when rest rotation was compared to continuous grazing. The rest pasture provided waterfowl with the heavy cover they need for good nesting success. Big game animals, such as deer and elk, that generally prefer to avoid livestock are provided with an area free from disturbance and have maximum forage selectivity in the ungrazed pasture. From an aesthetic standpoint the public prefers to see a certain amount of the range ungrazed. The major drawback with rest rotation grazing is that livestock numbers may have to be reduced to prevent excessive use on the grazed pastures. In areas with large big game populations, the rest pasture may receive heavy use by big game.

The Merrill three-herd/four-pasture system has proven superior to continuous grazing in terms of vegetation, livestock performance, and wildlife on Texas rangelands where effective precipitation can occur at any time during the year.

The Merrill Three-Herd/ Four-Pasture System

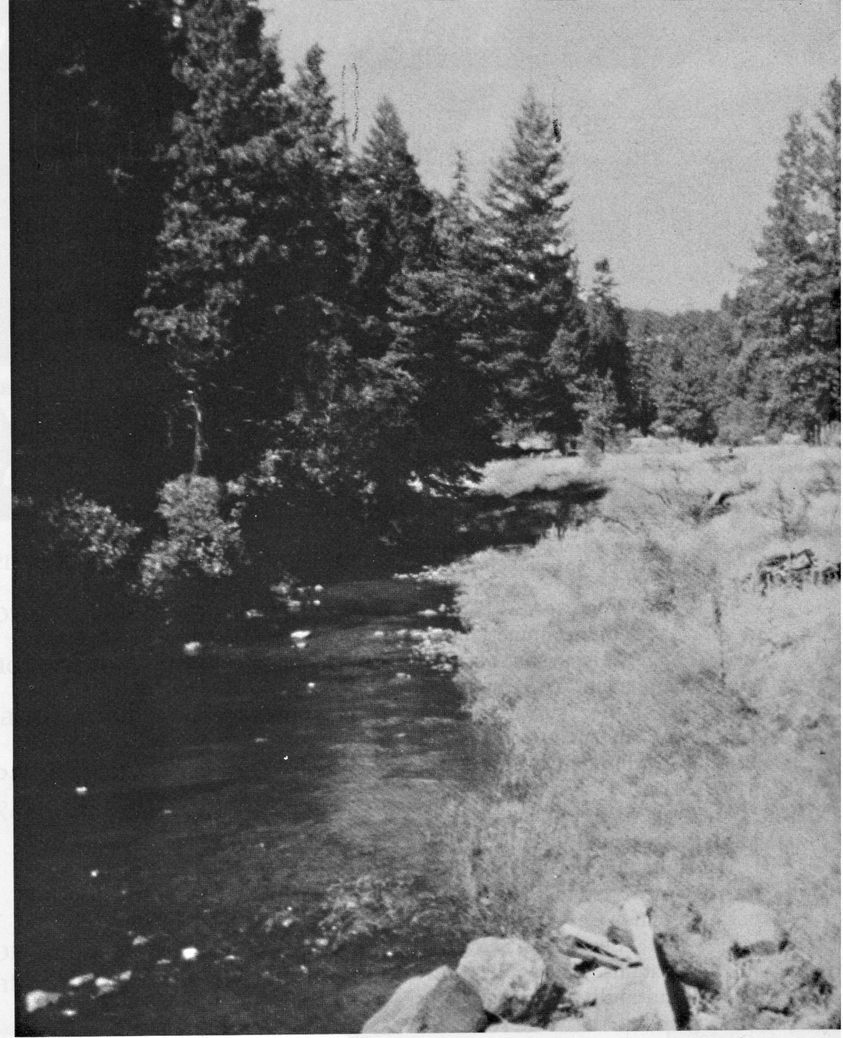
In the early 1950's Leo B. Merrill in south central Texas developed a grazing system involving three herds and four pastures. With this system each pasture is grazed continuously for a year, and then given a four-month period of nonuse. The period of nonuse in each pasture has occurred during all times of the year at the end of a four-year cycle. This system has given good results where effective precipitation and plant growth can occur at any time during the year. It also works well where common use of the range by more than one grazing animal is practiced. In Texas some combination of cattle, sheep, goats, and white-tailed deer graze most ranches. Each grazed pasture is assigned a different type of livestock. Every four months the types of livestock are interchanged between pastures. White-tailed deer prefer the pasture receiving nonuse by livestock. The Merrill system has been the best studied of all the specialized grazing systems. In Texas it is superior to continuous grazing from the standpoint of livestock, forage, and wildlife production. This system should be effective in areas where forage plants have the potential for growth throughout the year and common use grazing is practiced.

Short Duration Grazing

Short duration grazing was developed in Rhodesia and is described by Sid Goodloe (JRM, 1969, 22:369). A modification of short duration grazing called the Savory Grazing Method is discussed by Allan Savory and Stanley D. Parsons (Rangelands, 1980, 2:34). This system typically involves a wagon wheel arrangement of fences with water and livestock handling facilities located in the center of the grazing area. It is recommended that no fewer than eight pastures (paddocks) of equal grazing be built that radiate as spokes from the central area where the water is located. Each paddock is given a short, intensive period of grazing followed by a long period of nonuse. Ideally the grazing period of each paddock should be five days or less followed by seven weeks of nonuse. The high stock density is supposed to improve water infiltration into the soil as the result of hoof action, reduce selectivity so that more plants are grazed, improve the leaf area index, and give more even use of the range. It is claimed that these benefits permit stocking rates to be substantially increased compared to continuous grazing. Presently lack of research prevents drawing definite conclusions about the effectiveness of short duration grazing.

From a theoretical standpoint rapid rotation grazing should work best in flat grassland areas which have an extended period of plant growth (at least three months), small differences in plant species palatability, and at least twelve inches of average annual precipitation. These conditions apply to most of the prairie region east of the Rocky Mountains. In the drier, more rugged parts of the western United States, fencing and water distribution problems make rapid rotation grazing less feasible. Concentrating livestock in the early part of the grazing season has the potential for severe trampling of plants and soil compaction on mountain and sagebrush ranges where much of the effective precipitation comes from snow melt and heavy, early spring rains. These areas typically have growing seasons that are under three months. If plants are heavily defoliated, there is little opportunity for regrowth. Differences in plant palatability are great and livestock will starve before they will accept many of the shrubs such as big sagebrush or rabbitbrush.

There are many potential problems with short duration grazing on desert ranges in the Southwest. The biggest of these problems is that a tremendous amount of fence must be built per paddock to accommodate a reasonable number of livestock (100 head of cows) due to the sparse nature of the vegetation (good condition desert grassland ranges typically produce 300-400 pounds of forage per acre compared to about 800 pounds per acre for shortgrass prairie). In most years growth of the perennial grasses occurs in less than a 60-day period, which minimizes the positive aspects of repeated light defoliation. Precipitation that does occur is often from one or two intense thunderstorms. Concentration of animals, therefore, has the potential for severe soil compaction. Another problem is that most of the desert grasses are very low in grazing resistance unlike the prairie grasses that evolved with bison grazing. One failure to move cattle at the correct time under the rapid rotation system could severely damage grasses such as black grama or Arizona cottontop. Lowlands dominated by tobasa grass and big sacaton are productive because they collect water runoff from uplands and have deper soils. On these ranges short duration grazing may be practical.



In Oregon separate fencing and delay of grazing until late summer has been beneficial in terms of vegetation, livestock and wildlife on riparian zones in mountainous areas.

High Intensity-Low Frequency Grazing

High intensity-low frequency (HILF) grazing differs from rapid rotation grazing in that periods of grazing are typically longer than two weeks and nonuse periods are over 60 days. This system requires at least three pastures per herd of livestock. Stocking rates must be light to moderate under this system or severe declines in livestock production and excessive defoliation will occur. This system, like short duration grazing, works best in flat terrain with an extended growing season and forage species of similar palatability. An important objective of the HILF grazing system is to force use of old, coarse, unpalatable but grazable forage. Because this system has negative impacts on animal nutrition and forces heavy plant defoliation, it has been largely abandoned in favor of short duration grazing, which allows greater animal selectivity, permits lighter levels of defoliation, and prevents more of the forage from maturing prior to grazing.

Seasonal Suitability Grazing

Seasonal suitability grazing involves partitioning a range into pastures based on vegetation types or conditions classes. The best pasture from a nutritional standpoint is used for each season of the year. This system was first proposed by Kenneth Valentine (JRM, 1967, 20:395) for use on desert ranges in southcentral

In the Intermountain West lowland shrub range such as shown above is most efficiently used in the winter while upper elevation areas are optimally used in the summer. This type of grazing scheme is called seasonal suitability grazing.

New Mexico. When seeded pastures are used in used in conjunction with native range this system is often called complementary grazing. In areas such as the Southwest where local rains can cause considerable difference in forage availability between pastures, livestock are moved to pastures where green forage is available. Under these conditions the grazing scheme is called the "Best Pasture System." Presently all these systems are now commonly referred to "Seasonal Suitability Grazing Systems." The application of seasonal suitability grazing to various regions of the western United States is discussed in detail by Holechek and Herbel (Rangelands 1982, 4:252). Seasonal suitability grazing is most practical in the intermountain regions of the western United States where ranches usually have a diversity of forage resources. Fencing costs associated with this system can be minimized in arid areas by fencing watering areas and using water availability as a tool to control where livestock graze.

Grazing Systems for Riparian Zones

Continuous grazing is most damaging to streamside areas (riparian zones) and wetlands because livestock congregate and linger on these areas due to convenience of forage, water, and cover. Riparian zones are the most important part of the range from the standpoint of wildlife, water quality, aesthetics, and forage productivity. Many managers and researchers have concluded that the only means of restoring and maintaining these valuable areas is complete livestock exclusion. However, this alternative is unacceptable to ranchers. Recent studies have shown improvement of riparian zones may be possible without complete livestock exclusion.

Replacing cattle with sheep that are herded is a workable solution in some areas where livestock operators graze both animals or can switch from one animal to another without economic hardship. Herding of sheep permits careful control of grazing timing, frequency, and intensity on riparian zones.

Researchers in Oregon have found that fencing and delayed grazing of riparian zones on mountain rangeland can be beneficial to wildlife, livestock, and vegetation. Their scheme involves restriction of cattle to upland areas until late summer when the gates are opened to the riparian zones and meadows. By this time nesting birds and small mammals have completed critical activities associated with reproduction. The growing season is over so impacts on vegetation are minimal. The intensity of grazing can be controlled by the time at which cattle are permitted access to the riparian zone and are removed from the zone. Livestock performance under this strategy has been found to equal or exceed season long use of the riparian zone. Problems associated with gathering cattle for removal in the fall are greatly minimized because the cattle are concentrated on a small area of flat terrain with good visibility. The only drawback to this scheme is the cost of fencing.

Conclusions

Specialized grazing systems involving rotation of livestock are necessary on some but not all ranges to prevent destruction of preferred forage plants and areas. There is no one system that will work best for all situations but each system can give good results under the right conditions.

For any grazing system to work it must be tailored to the needs of the vegetation, terrain, type or types of livestock, and the particular ranching operation involved. It is important to recognize that wide fluctuations exist in the forage resource from year to year. Therefore both stocking rate and time of grazing must be flexible. Any system that involves excessive use of one pasture in order to rest another will probably fail from livestock, wildlife vegetation, and soil standpoints.