Grazing Intensity: Critique and Approach

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Few subjects in recent years have stirred up more controversy in the range profession than the issue of using utilization guidelines in public rangeland management. Herbage utilization is now becoming a part of management goals on Forest Service and Bureau of Land Management rangelands in some western states. Arguments against herbage use as a primary range management tool are given by Sharp et al. (1994), Frost et al. (1994), McKinney (1997) and Burkhardt (1997). Collectively these papers develop the case that percent use is difficult to determine and grazing timing is more important to plant welfare than degree of use. We believe that these papers make some valid points, but can be misleading and fail to consider all aspects of the situation. Therefore, we have prepared a response along with suggestions on how grazing intensity can be appropriately used in range management decisions.

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Grazing Intensity Defined

Grazing intensity and percent utilization are often used interchangeably but actually differ in what they describe. We define grazing intensity as the cumulative effects grazing animals have on rangelands during a particular time period. In contrast utilization is the percentage of the current year's herbage production consumed or destroyed by herbivores. Percent herbage use provides only one measure of grazing intensity. Others include amount of forage standing crop remaining at the end of the grazing cycle, percentages of grazed and ungrazed plants, plant stubble heights, litter, or carry over vegetation from previous years and visual appearance. For important backgrounding on the advantages and disadvantages of these approaches we refer the reader to Jasmer and Holechek (1984). In our discussion we will address grazing intensity recognizing that there are several ways it can be evaluated.

How Important is Grazing Intensity to Rangeland Health?

We believe many ranchers and range managers are probably confused because some range experts have written that grazing timing and/or frequency are of primary importance in grazing outcomes (Frost et al. 1994, Sharp et al 1994, Burkhardt 1997) while others have emphasized grazing intensity (Pieper and Heitschmidt 1988, Heady and Child 1994, Holechek et al. 1998). This issue has emerged as an important controversy in range management.

This controversy has created a serious dilemma for public range managers. Should they base their management around prescribed numbers of animals for prescribed periods of time for prescribed seasons or should they use flexible systems that continually attempt to keep animal numbers in balance with forage resources?

Basically, the case for use of grazing intensity as a primary tool in range management decisions centers around 30 long term grazing management studies conducted at various locations in the United States and Canada. These studies generally show that financial returns from livestock production, trend in ecological condition, forage production, watershed status, and soil stability are all closely associated with grazing intensity.

We consider these studies the cornerstones of scientific range management, and would hope that all ranchers and range mangers would read at least the ones applicable to their area. These studies are reviewed in some detail in range management textbooks by Vallentine (1990), Heady and Child (1994), and Holechek et al. (1998).

Grazing Systems Versus Grazing Intensity

Various studies comparing the effects of continuous and rotation grazing systems on rangeland vegetation were reviewed by Van Poollen and Lacey (1979). They found that forage production was on average about 13% higher under rotation schemes. However, a much greater increase (35%) occurred when heavy stocking was reduced to a moderate rate. Generally, rotation systems were most advantageous in terms of improving vegetational composition and forage production in the more humid prairie ecosystems. However, they had limited or no benefit in the more arid range types.

In a long-term study comparing rest-rotation and continuous grazing systems in southcentral Arizona, neither forage plant densities nor herbage production differed after 12 years. In northwestern Arizona, a rest-rotation grazing system did not improve vegetation composition over a 10-year period. Even though average utilization was light (30–35%), high utilization (above 50%) that occurred in some years harmed desired grasses even when followed by rest. It was

concluded that rotation grazing systems have little or no value in improving range condition in the Mojave Desert. Keeping utilization within safe limits (below 50%) in all years was considered the critical aspect of management. Rest and deferment were not sufficient to overcome the effects of periodic heavy use (65%) on primary forage plants when rest-rotation grazing was applied on big sage brush range in northern Nevada. References for the above examples include Martin and Severson (1988), Hughes (1982), and Eckert and Spencer (1987).

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Season of Use Versus Grazing Intensity

It is often suggested that heavy utilization in periods when plants are dormant has little effect on their vigor. However several studies have shown that in order to maintain plant productivity grazing intensity must be kept at moderate levels even in periods of plant dormancy (See review by Holechek et al. 1998).

Some of the most comprehensive studies on the benefits of controlled timing of grazing in arid areas were conducted on the Santa Rita range in southcentral Arizona (Martin and Cable 1974). It was found that perennial grass cover was higher on yearlong than seasonally grazed pastures. Perennial grass production was closely associated with degree of grazing use, and was highest where percent grazing use was lowest. In this study winter-spring grazing with summer-fall rest was inferior to yearlong grazing from the standpoint of productivity and density of desirable perennial grasses.

Heady and Child (1994) reviewed the long term (20 year) results of various grazing management practices applied on 95 different pastures on the Vale Oregon District, Bureau of Land Management. All seasonally grazed pastures started with moderate grazing and had increased forage production during the 20 years. Season of use made little difference. There was no evidence that rotational grazing schemes had any advantages over season long grazing in terms of improving range condition or forage production. The key factor in range improvement appeared to be the reductions in grazing intensities that were applied when the project was initiated in 1966. Several recent studies reviewed by Holechek et al. (1998) have indicated that stocking rate reductions have more potential to improve rangeland botanical composition than rotation grazing systems.

Multiple Use and Grazing Intensity

Watershed Impacts

The various studies of grazing impacts on rangeland soils and watershed status are highly consistent in showing that vegetation residue is the primary factor determining degree of soil erosion and water infiltration into the soil. As residue is depleted by heavy grazing, soil erosion increases, water infiltration decreases, and water overland flow increases (see reviews by Holechek et al. 1998). However the adverse impacts of moderate grazing relative to light or no grazing have been small and unimportant. Rotation grazing schemes that concentrate animals into small areas for short periods of intense grazing have consistently increased soil erosion and adversely impacted water quality compared to strategies that kept animals well distributed and involved moderate use of forage.

Riparian areas have undergone degradation under continuous or summer season-long livestock grazing even when light stocking rates were applied. Rotational grazing schemes and/or carefully timed grazing can be useful in improving these areas if grazing intensity is kept at light or moderate levels. Heady and Child (1994) listed proper degree of forage utilization as their first principle in riparian zone management.

Wildlife

Grazing strategies that involve periodic heavy use are less suited for many desirable wildlife species than those that apply moderate intensities year after year. White-tailed deer, mule deer, pronghorn, Mearn's quail, sharptailed grouse, and prairie chickens are important game animals that can be adversely impacted if periodic heavy livestock grazing is part of a rotational grazing strategy (see reviews by Krausman 1996 and Holechek et al. 1998).

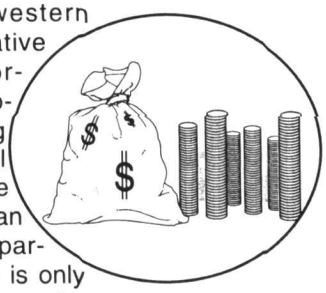
Sharp-tailed grouse. Photo by Hyland P. Armstrong

Esthetic Values

On public rangelands esthetic appearance is becoming an important management objective. Even if properly timed heavy grazing levels permitted sustaining primary forage species, they would be incompatible with the multiple use mandate. Heitschmidt and Walker (1996) suggested that plant species composition does not impact society's acceptance of a given grazing practice nearly as much as amount of standing biomass, ground cover, number of fecal patties, etc. They concluded modern grazing technology requires moderate stocking rates be employed to insure rangeland agriculture is ecologically sound, economically viable, and socially acceptable.

Conservative Grazing Controversy

Conservative grazing involves routinely stocking rangelands 10–30% below grazing capacity. In contrast Burkhardt (1997) makes the inference that across-the-board conservative use standards to public land grazing is poor resource management and poor public policy. Burkhardt's statement runs contrary to several grazing studies reviewed by Holechek et al. (1998) that show conservative stocking lowers rancher risk and will often maximize financial returns on western rangelands dominated by native plants. Lower animal performance, lower vegetation productivity, higher ranching costs, and the risk of financial crisis during drought all make routinely stocking at capacity an unsound strategy. Generally partial destocking due to drought is only needed in about 1-2 years out of 10 with conservative stocking compared to half the years when rangelands are fully stocked.



The real problem with mandatory conservative stocking on public lands is that some ranchers would end up taking large cuts in their grazing permits that would reduce their net worth and force them into insolvency with their lending institutions. For this reason, we advocate incentives that would encourage conservative grazing, but not make it mandatory. These incentives might include lower grazing fees or access to low-cost drought insurance. Another approach would be to pay ranchers for the animal units they forego if they volunteer for conservative stocking.

Flexibility in Grazing Intensity Guidelines

Many ranchers and range managers have vigorously objected to grazing intensity guidelines on public lands because if rigidly or improperly applied they can cause undue hardship or make grazing economically impractical. Here, we agree with Burkhardt (1997) that inflexible, rigid standards aimed at forcing conservative use on all parts of the range would put ranchers in an impossible situation. Under the best grazing management almost any piece of rangeland will have small areas that are heavily grazed in certain years. There must be a reasonable balance between what is practical for the rancher and what is needed to sustain and improve rangeland health.

In our opinion, it seems reasonable to allow public land ranchers to exceed grazing intensity guidelines (stubble heights and/or residues) on 30 percent of the key areas during any particular year. We believe that these guidelines should be tailored to management objectives for specific allotments. Considerable information is available from various grazing studies that allows development of specific guidelines based on residues, stubble heights, and/or percent use. Generally, management changes are needed if grazing intensity guidelines are exceeded on over 30% of the pasture or allotment for two consecutive years or in any two years out of five. If in any year grazing intensity becomes severe (complete lack of stubble height) on one-third or more of the range, management changes should be implemented. An important part of this approach is to encourage ranchers to avoid exceeding residue or stubble height guidelines year after year on the same key areas, and to make every effort to keep individual key areas from being severely grazed in any year. A practical, proven method for conducting grazing intensity surveys using ocular reconnaissance and stubble heights is given by Anderson and Currier (1973).

Prescription Versus Information Based Range Management

Our consideration of the various grazing studies shows that keeping animal numbers in balance with forage resources is an essential part of any ranching operation on public or private lands. Various measures of grazing intensity, although imperfect, remain as our primary means for decisions on how well this is being accomplished.

Successful use of grazing intensity as a range management objective requires considerable effort, flexibility, and judgement. It is an information-based management approach. In contrast, past range management approaches on public lands have relied heavily on prescriptions of set animal numbers for set grazing periods, with the primary goal being a certain desired plant composition that may never be attainable.

Prescription range management has provided certainty to ranchers. It did not require annual residue checks by ranchers and range managers, and there could be no real assessment of management effectiveness until 5-10 years had passed and trend could be assessed. At one time, the prescription approach relied heavily on active vegetation manipulation (brush control, seeding) funded by the federal government. More recently, reductions in livestock numbers have been widely used. With set stocking rather than flexible stocking, livestock numbers must be about 30% below grazing capacity to avoid range degradation.

Under the information approach, ranchers should not be tied to set stocking rates or grazing periods. A rancher's report card might center around what percentage of his allotment was kept in compliance with residue or stubble-height minimums, while his longer term grade might place more emphasis on plant composition objectives. Lower grazing fees, tax incentives, recreational fees, low-cost drought insurance, and biodiversity trust fund fees are ways ranchers might be rewarded for doing well on their report cards. In order for information-based range management to be effective, ranchers need appropriate incentives, considerable flexibility, and better access to sound information. The role of public rangeland managers as educators, mediators, and facilitators should increase. Both ranchers and range managers should be aware that range management is much more a journey than a destination. Success depends on being constantly prepared for the uncertainties of climate, livestock prices, political policies, and unforeseen biological and economic events.

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