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Grazing Management for Sustainable Ranching

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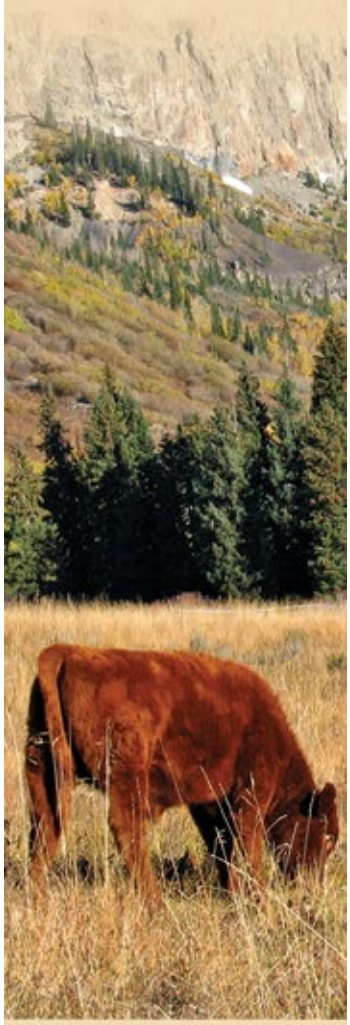

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INTRODUCTION

Successful grazing management is a product of information and technology use, risk management, and a suite of grazing and livestock management practices. An operator's regular and frequent monitoring of economics and production is essential for an effective grazing plan. Adaptive management and built-in flexibility are keys to success.

Prevailing grazing management strategies include manipulating intensity of forage removal (utilization percent or residual forage amount), landscape use patterns, stocking rate, length of grazing and rest period, seasonal timing, and herd density in combinations that foster animal production and resource condition objectives. Research indicates managing forage removal intensity is most effective for improving vegetation and animal production. Management of grazing animals with fences, water, or herding promote proper distribution and appropriate utilization level or residual forage objectives. Management skills, labor, and project infrastructure must increase as more intensive management is implemented.

PLANNING OBJECTIVES

Clearly state the operation and grazing program from the problem and the proposed solution standpoint before setting targets for key management factors. The tool kit includes monitoring the intensity-of-use indicators, residual forage or percent utilization, observing trends in vegetation or other indicators of resource condition such as stream habitat, timing of seasons of use, grazing period length, animal density, animal distribution, training of animals and handlers to the protocols of the program, and selection of the appropriate species or types of animals to graze.

The general condition and anticipated services the management unit will provide set the first goals. Site-specific resource objectives follow such as the vegetation composition and soil cover. Specify site use level targets form a basis for evaluating changes in plant composition and soil. Monitoring environmental conditions affecting plant growth is also critical. Feedback based on monitoring of use levels and weather leads to effective implementation or midcourse corrections. Over time, monitored trends in resource conditions determine whether management strategies and practices were effective and offer insight into the feasibility of specified expectations. Only monitored actions and responses can be managed. Monitoring responses to management and weather prevents being confounded by events with uncertain timing such as drought.

Plant health, diversity, and plant and animal productivity are the most prevalent reasons for developing a grazing management plan for range and pasturelands. Wildlife, water, or other values may also be important. Others might include vegetation structure or heterogeneity for certain wildlife species, efficient harvest of livestock forages including uniform use of the area, consuming a wider variety of the forage species, periodic rest or deferment during a critical growing season, adequate recovery time after grazing, and improving animal productivity. This generally means a grazing program that maintains or

enhances plant vigor, production, and species composition or diversity. Animal production is usually enhanced by increased infrastructure, control of utilization, or other inputs associated with an effective grazing management program. The manager must assure that increased productivity will pay for the additional costs of managing effectively, at least on private lands. Motivations, procedures, and outcomes frequently vary between private and public lands resource management plans. Federal land management goals generally focus on wildlife diversity, recreation, and other ecosystem services.

Cattle prefer riparian areas (Photo: Diane Fiedler)

Grazing management tools address goals that vary from conventional livestock production. Clean water and wildlife diversity have been primary goals in many grazing management plans in recent decades. Properly functioning riparian zones provide benefits to many bird, fish, and animal species as well as associated aquatic values such as water quality. Identifying and achieving vegetation objectives along stream banks is important. On upland habitat, providing vegetation structure and desirable plant species for sage grouse has become a major consideration in many areas.

Targeted grazing uses animal species, timing, intensity of grazing, and other tools to achieve specific vegetation objectives. Examples are weed control or structure change in a vegetation community. Nutritional supplements may be used to allow animals to maintain body condition while effectively utilizing target plant species. As an example, reducing sagebrush cover to meet needs of nesting or early-brood rearing sage grouse might be achieved by targeted fall-winter grazing by sheep or goats. Supplemental feeds are required to maintain animals forced to achieve high animal impact. Goats are commonly used to address specific weeds or to reduce undesirable brush cover. Cows can be trained to consume many weeds not generally considered palatable.

INTENSITY AND TIMING OF GRAZING

Intensity of grazing, use level control, is arguably the most important aspect of well-managed grazing. Stocking rate adjustment has historically been used instead of real time assessment of use levels and midcourse adjustment by moving animals when utilization targets are reached. However, the appropriate level of use may change seasonally, depending on the phenology of the forage plants and goals for the specific area. Cool-season grasses and sedges have a defined growth period keyed to the typical peak in spring precipitation between green up and plant maturity. Prior to seed stalk elongation (bolting), grazing has minimal effects on individual plant health and only removes part of the expected annual production. While seed stalks are elongating, grazing can reduce the production and vigor of the plant the current and following year. Repeated heavy grazing yearly at this time generally leads to reduction of desirable plants and replacement with species more grazing resistant. After seed stalks are elongated and particularly after seed ripens, grazing intensity affects plant health only indirectly through effects on soil surface protection provided by grass cover and litter. Additional precipitation during the latter part of the growing season rarely results in substantive regrowth of native cool-season grasses. A moderate level of utilization - generally defined as 40-60 percent utilization of current year's growth - has been found to maintain or improve plant communities in most grazing situations. An alternative to percent use targets is to base animal moves on reaching a residual forage amount or stubble height.

Shortening the grazing period improves management of use, limits regrazing of plants, and increases the recovery period. Grazing at the same place and season annually can favor certain plant species that may not be as palatable while negatively affecting palatable species. Varying seasons of use in each pasture in subsequent years encourages more even grazing on seasonally palatable species and different range areas and distributes grazing during critical plant growth stages to different plant species.

SEASONS OF FORAGE GRASS GROWTH

Wyoming grasses are described in two categories based on season of growth. Some species, such as needle and thread, are cool-season grasses that grow primarily in the

spring. Studies show that production of cool-season plant communities is correlated to precipitation received March-May in Wyoming. Warm-season grasses, such as blue grama, are more responsive to mid-summer precipitation. Cool-season grasses will start to grow if soil moisture is present when temperatures warm in spring and continue until soil moisture is depleted. Once cool-season grasses begin to enter dormancy because moisture is insufficient, growth will not resume in response to precipitation during the hot summer season. Warm-season grasses are better adapted to sporadic growing season precipitation. In contrast to cool-season plants, blue grama growth will continue or start again if sufficient moisture falls.

Needle and thread grass *(Photo: Tracy Bodnar, NPS)*

ANIMAL PERFORMANCE

Animal performance is closely tied to the amount and quality of available forage. Performance of yearling cattle is highest at low stocking rates then declines linearly as forage availability per individual declines. Calves with cows are less sensitive to forage conditions as long as adequate forage is present because the cow's milk supplements protein needs. Thus, even in seasons when grazing has no direct effect on plant health, limiting stocking rates to achieve a moderate utilization level and managing associated residual forage levels is necessary to maintain forage intake for adequate animal performance.

Integral to managing both intensity of plant use and animal performance is an adaptive management strategy of animal numbers based on available forage in a given year. Spring precipitation varies, and forage production in cool-season forage environments responds predictably to March-May precipitation amounts. Stocking adjustments can be based on the predicted forage yield. Early weaning, herd components that can be sold early in forage-short years, maintaining rotating reserve pastures, or taking in outside livestock in high-forage years are solutions for limited forage production or for utilizing higher forage yields in higher precipitation years.

LENGTH OF GRAZING PERIOD AND ANIMAL DENSITY

If an operator wants to optimize animal production and vegetation condition, how long to graze a pasture depends on stock density and when a target residual forage or utilization level has been reached. In contrast, fixed grazing periods and fixed animal numbers in properly stocked management units result in significant yearly variation in utilization (or residual forage) and animal performance because forage production varies annually with precipitation. While remaining adequate in most years, animal production usually declines in forage-short years. However, vegetative condition generally responds as expected to the long-term average use level.

Low herd densities favor selective grazing and higher individual animal performance. Higher densities provide more even distribution of grazing across plant species and habitats, generally increasing the efficiency of forage harvest and providing greater stocking potential. Smaller pastures, shorter grazing periods, and higher stock density provide a longer recovery period for grazed plants. Residual forage amounts or utilization percent can be more easily observed and managed.

DISTRIBUTION

Improving distribution of grazing across habitats and forage species increases the amount of total forage available for harvest and generally limits concentration upon preferred habitats or plant species. The greater uniformity of use where grazing is well-distributed while beneficial for plant health and animal performance may negatively affect habitat values for certain wildlife species with unique habitat requirements. For example, low forage structure is desired for some prairie birds and prairie dogs while sage grouse prefer taller plants. All these species may occur in the same management unit.

LEARNING AND TRAINING

Grazing animals learn, and they are trainable. Training cattle to consume weedy species not usually eaten has been demonstrated. Untrained and young animals learn from their mothers or herd mates what habitats and forage species to graze. To achieve grazing management goals, animals may be trained through repetition and low-stress handling techniques. Unrestrained grazing animals tend to develop seasonal home ranges. Frequent movement among areas requires initial training but soon becomes easy with little human labor. Rapid movements of livestock also change relative availability of habitats and forages and require adjustments by animals. Especially at higher densities, grazing competition becomes more intense so each animal must learn to effectively compete for forages. Older animals may not adjust as quickly, and some maladapted animals should be culled. Animal performance may be adversely affected at the outset; however,

Sheep responding to fresh pasture in an intensively managed grazing system (Photo: Diane Fiedler)

experienced practitioners suggest that within three years individual animal productivity levels will be comparable to those prior to the grazing changes.

Training animal handlers involves teaching low-stress handling techniques and recognizing when forages have reached targeted residual levels. Some commentators speculate that training animal handlers is harder than training the livestock.

ANIMAL SPECIES

The effectiveness of many grazing strategies is determined by how different grazing animals use forages and terrain. Animal grazing behavior varies across animal species. Designing appropriate management techniques and tools requires assessment of these animal characteristics. Livestock species selection can be particularly important for good distribution. Larger grazing animal species tend to consume largely graminoid plant species and select habitats with soils and terrain favoring those plants. Smaller grazing animal species are more selective for forbs and shrubs and will use a wider variety of terrain features. Specific vegetation objectives requiring targeted grazing will usually focus attention on the animal best suited for the task. Goats and sheep are recognized for their abilities to control weeds and change shrub abundance although cattle can be trained to consume some sagebrush subspecies.

Behavior around water sources and distances typically travelled away from water are major considerations. Examples include how cattle drink then lounge around the tank or riparian zone until motivated to graze. Herding animals away from water soon after they drink or shorter grazing periods minimize these impacts. In contrast, horses and Mexican Criollo cattle will drink and leave the water source with much less impact unless there are too many waiting to drink. Cattle and horses prefer areas with the greatest amount of grass and sedge forages available unless forage quality is much better in other places, such as sites with earlier forage green up. Smaller cattle such as yearlings tend to use more varied terrain than older, large cattle and some breeds reportedly have better distribution

characteristics. In contrast to large herbivores, sheep and goats readily use a wider variety of terrain, especially when herded. Sheep particularly like to drink then graze uphill to overnight on ridgetops. Both eat a wider variety of forages than cattle. Goats tend to eat more forbs and shrubs than sheep.

Travel distances for grazing can be important in low productivity, arid environments. Cattle will travel perhaps two miles from water but usually less, and as terrain steepens, far less. Because travel distance increases as temperatures decrease and water requirements decrease, distribution will vary by season. Horses have been documented using areas up to eight miles from water sources and will use hillier terrain. Sheep have lower water requirements and can be herded a greater distance from water sources than cattle and usually go farther and longer without water.

FACILITATION TOOLS

Grazing management revolves around controlling where animals graze and for how long. Tools most commonly used to facilitate distribution of grazing include fencing, water development, herding, salt and/or mineral supplement, dry protein molasses blocks or similarly attractive supplements, and shade or wind protection structures. Water first, then fencing or herding effectively control where and for how long animals use an area.

Space water developments close enough that animals will travel out to available forages between locations and provide sufficient water for the number of animals. Pipelines supplied by springs or wells are widely used in areas without natural sources. Proactive management of animal's locations prevents an increasingly large circle of over-use around the water source over time.

Regulating access to water sources can be an essential part of a livestock grazing plan. Developed water sources, where access can be regulated with a fence or shutting off the pipeline, can regulate place and length of grazing time in areas without fences and with few other grazing distribution tools. Water is turned off as grazing use targets are reached in one location and turned on in the next. Cattle readily learn the routine and move to the next location when a regular pattern is used or may be herded as needed. A key factor is having sufficient water volume available to service the number of animals. Hauling water to livestock is effective where other options for providing water are not feasible.

Dry protein molasses blocks or lick tubs reportedly increase utilization in remote parts of a pasture by up to 25 percent. The product increases forage digestibility, and its effectiveness increases as forage matures so these supplements are most effective in late summer-winter or whenever forages are dormant. Custom-formulated blocks can be used for a mineral supplement as well. Salt is not an effective tool for keeping animals in an area to increase grazing use and might best be used as an attractant for a mineral mix. It is not a nutrient requiring supplementation.

Herding using low-stress handling techniques is effective in getting animals where they are wanted for achieving time- and use-level targets and then moving them on to other areas. Herding requires training both animals and handlers. A herd familiar with low-stress techniques will stay together and move responsively for their handler. Low-stress techniques are described in the reference "Stockmanship" by Steve Coty available from the Butte Soil and Water Conservation District, Arco, ID 83213. Trained and appropriately herded animals can be settled in areas away from water with adequate forage but will go to drink then return.

Other tools effective in appropriate circumstances include providing shade in summer and wind shelters in winter environments. In Wyoming, wind shelters attract cattle and provide the additional benefit of reducing the heat loss and additional feed associated with cold temperatures and wind.

Fencing, while effective, is the ultimate in infrastructure cost for managing where animals graze. Pasture size and the number of pastures tend to determine intensity of grazing management. Innovations in electric fence construction

and maintenance have increased interest in more intense management. Monitored private grazing operations have demonstrated resource condition and animal productivity gains. Well-trained animals and one- or two-wire electric fencing are all that many managers use for effective, short duration, long-recovery period grazing plans on range and irrigated pastures. Conventional barbed wire fencing costs and high maintenance requirements may preclude continued widespread use of conventional fencing. Impacts to feral horses, wildlife, and visual resources have resulted in a de-emphasis of barb wire fences on federal ranges.

GRAZING "SYSTEMS"

"Grazing system" indicates a prescriptive or planned way to achieve livestock goals. Due to the variety of ways grazing is being managed to achieve desired time and intensity across the wide variety of rangeland landscapes, planned grazing might be a better term.

Planned grazing management is a continuum of activities that effectively regulate where, how long, and how much animals graze. On one end, the manager focuses on effective grazing distribution tools while at the other end the focus is on managing animal density, length of grazing period, and associated recovery period. Infrastructure costs and management skills typically determine where in the spectrum the appropriate management approach falls. Upfront and recurring costs for fences, water development, and additional cattle test the innovativeness of managers embarking on increasingly intensive management strategies.

Turning animals out in a large area with no management inputs other than available water could be considered planned grazing. The objectives would be quite limited. The heterogeneity associated with limited distribution of grazing might satisfy habitat needs of a suite of prairie birds. Any increase in livestock production or uniform vegetation condition objectives requires additional management inputs, primarily distribution practices.

Conventional, commonly used grazing systems on many ranches and most federal grazing allotments consist of three to six pastures subdividing an area. Common systems include deferred rotation and rest rotation. Holistic management, mob grazing, and management intensive grazing are newer terms used typically for single herd, multi-pasture programs with a larger number of pastures (also referred to as paddocks).

In deferred and rest rotation, one herd is moved between pastures on a calendar basis or upon reaching residual forage or utilization percent targets on monitoring points, the latter becoming more common. Normally, a different pasture is sequentially selected as the starting pasture each grazing season. Additional animal management tools are usually employed to minimize use on the target monitoring area and spread use to other less-preferred areas. These systems prevent repeated seasonal grazing and

A stark difference in grazing methods and rangeland management can be seen in this fenceline contrast. *(Photo by USDA NRCS)*

improve a manager's abilities to manage the distribution, season, and level of use. Modest improvements in animal stocking rates and vegetation plant species composition are possible.

A rest rotation grazing system differs from a deferred rotation primarily in that at least one pasture is rested for a full season. In most cases, overall stocking rates are decreased to compensate for the rest pasture. Wildlife requiring taller vegetation are favored by the rest pasture.

The planned grazing continuum is increasingly moving beyond the conventional systems to multi-pasture programs that may have 40-60 pastures. Mob grazing is a practice defined by short-duration grazing with a recovery period of more than a year with little consideration of the actual residual forage or utilization level. In a modest contrast to mob grazing, management intensive grazing uses the residual forage amount or utilization level as a clear target for moving animals, and animal numbers are adjusted to allocate forage supplies for livestock over the desired period. Maintaining a targeted residual forage probably causes less variation in livestock intake and potentially better performance and body condition. Mob grazing practitioners indicate that cattle adapt to the system in a few years from behavior and performance perspectives. Stocker cattle might not be a good choice if using this grazing plan. The benefits of more intensive grazing systems are there is a much more even use of forages, both preferred and not so preferred, because of the high stock density, and harvest efficiency is greatly increased. The long recovery periods have been demonstrated through monitoring of vegetation and soil cover to increase the proportion of better forage species and, at least in some cases, greatly reduce formerly troublesome species of lower value. The higher intensity of management control of livestock use through monitoring in such systems would also allow more effective adjustment of residual forage structure for the benefit of grassland birds if that were a desired objective.

SUMMARY

Effective grazing management based on monitored resource and animal stocking rate objectives has been accomplished through implementation of combinations of several recognized tools for controlling the location, timing, time, and intensity of use on rangelands. These tools have included attractants like protein molasses blocks and low-stress handling techniques for herding, in addition to more conventional water developments and fencing. Successful operations have used pasture use strategies ranging from one area with the combination of distribution tools to many small paddocks managed with short grazing and long recovery periods. There is no universal prescription for effective grazing management. In general, the desired outcomes increase with the additional management skill, effectiveness, and inputs.

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