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Overlooked and Neglected Principles of Grazing Management

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INTRODUCTION

The more one understands about resources critical to ranching the more likely one is to survive hard times. There are many distractions in the range livestock industry from day to day activities to technology overloads at educational meetings. As you sift through your experiences and observations do you ever ask the question, "What will I teach the next generation of management to improve their chances of success?". Hopefully, the answer is, "the basic fundamentals". New technologies, new words and new strategies do not change fundamental principles of rangeland management.

ECOLOGICAL CONSIDERATIONS

It is a privilege to manage the conversion of grass to beef on rangelands. Our challenge is to develop strategies for sustainable levels of grass to beef conversion. In the process of deciding how and when to graze we should remember that these decisions affect the amount of herbage available for other often critical functions. The amount of litter and standing herbage has a profound influence on the amount of precipitation that enters and stays in the soil. Surface runoff and evaporation of soil moisture translate to lost herbage. Grazing management decisions can improve the likelihood of plant growth or make the environment less favorable for plant growth and even reduce the ability of plants to grow when favorable temperatures and good soil moisture occur.

Herbage is technically all non-woody plant growth, above and below ground. Forage is that portion of herbage that can be consumed by animals, domestic or wild. Herbage not used as forage is not necessarily, wasted forage. Solar energy is the primary source of energy in range ecosystems. Only plants can convert solar energy into forms usable by animals. All forms of animal life, insects to mammals, and many micro-organisms are directly or indirectly dependent on plant tissue for energy and nutrients. Heavy grazing leaves less herbage for other organisms in the ecosystem. Heavy grazing may not leave enough plant material to (l) protect the site against wind and/or water erosion, or (2) moderate temperature extremes near the soil surface. As the amount of protective plant cover declines, effectiveness of precipitation also declines.

CONVERTING GRASS TO BEEF

Range livestock managers are in the business of converting grass into beef. Many factors affect the efficiency of this conversion. Grazing management decisions can have measurable effects on forage quality, forage quantity and animal behavior. A target level of animal performance should be an objective of grazing management. When animal performance is used to evaluate the quality of grazing management, all factors should be considered, including the

following:

1. Forage quality
2. Forage quantity
3. Animal behavior
4. Livestock nutrient
5. Water quality/quantity
6. Animal health
7. Environmental stress
8. Supplementation
9. Implants
10. Backgrounding program requirements
11. Weighing conditions
12. Genetics

Forage quality is highest in the spring and early summer when growth is rapid and herbage is mostly leaves. As plants mature, poorly digestible cell wall constituents increase. The relative amount of stem tissue in herbage generally increases and forage quality declines.

Mixtures of plant species on rangeland provide a high quality diet over an extended time period. Grasses are categorized as cool-season or warm-season plants. Sedges are grass-like plants that begin growth in early spring. Rangelands with sedges, and cool-season, and warm-season grasses are excellent for beef production because high quality forage is available for an extended time period. As forage quality declines in one species another species begins rapid growth and produces abundant leaf material. Large elevation gradients in mountain regions also provide extended periods of forage quality. Progressive delay in the beginning of the growing season upslope provides an opportunity to move cattle progressively upslope with no decline in forage quality.

As summer progresses, the average quality of forage in yet ungrazed pastures declines as more species have matured. Stocking rate decisions affect the average amount of forage from which each animal in the herd can select the highest quality diet. Quality of herbage increases as plants mature but quality declines. Consequently, animal performance becomes more sensitive to stocking rate decisions as the summer grazing season progresses.

Animal performance is constant over a range of light stocking rates. As the number of cattle in a pasture increases for a given time period, a critical stocking rate will occur beyond which average daily gains progressively decrease with each additional animal. Critical stocking rates become progressively lower as forage quality declines. Growing cattle often express compensatory growth during the first 30 to 60 days of the summer grazing season, when animal performance is least sensitive to stocking rate decisions.

HERBAGE PRODUCTION

Perennial grasses do not grow well when environmental conditions are not favorable. Air temperature and soil moisture are the most critical factors on semi-arid rangelands. Both must be favorable before grasses can grow rapidly. On upland sites, optimal combinations of ideal temperature and unlimited soil moisture occur for only part of the summer grazing season, generally 30 to 45 days on semi-arid rangelands. Grasses may be green for 90 days or more, but 75 to 100% of the herbage is produced during a 30 to 45 day time period. By the time grasses replace green leaf and stem tissue removed in grazing, favorable growing conditions may no

longer exist.

Under rotational grazing, deferment is provided to rangeland vegetation in some pastures for one or more time periods during the summer grazing season. The relative value of deferment to plants is much more sensitive to suitability of growing conditions than length of deferment periods or total number of days from multiple deferment periods. Grazing semi-arid rangeland pastures in two or more short grazing periods during the summer can be detrimental even with a large number of total days of deferment. This is most likely to occur when large percentages of leaf area are grazed from preferred species during the period of favorable growing conditions. Grazing prairie pastures only one time from late May through early September in most years will minimize the likelihood of reducing the vigor of preferred plant species.

Under drought conditions plants may not grow rapidly at all during the year. In dry years more herbage will be produced by not interrupting plant growth until favorable growing conditions no longer exist. Delayed turnout dates and/or rotational grazing can be used to delay grazing on all or some pastures.

When actively growing, native grasses are grazed, they give highest priority to replacing photosynthetically active tissue, green leaves and stems. Under favorable growing conditions heavy grazing may not cause a measurable decline in above ground growth for several years. This top-first response can lead to a false sense of security when the forage resource is, in fact, in serious trouble, especially if drought should occur. Heavy grazing in a single year can reduce root length and weight by 5 to 35% depending on the time of grazing.

SELECTIVE HERBIVORY

Beef cattle preferentially graze immature versus mature plants, leaves versus stems, and plants with fine versus coarse stems. Forage quality is a major factor in selective herbivory. Consequently, seasonal shifts from one preferred species to another often occur when plant species mature at different times during the summer. The likelihood of seasonal shifts in preferred species increases as the number of species increases. Seasonal shifts in preferred species minimize the likelihood of excessive grazing of individual species. Seasonal shifts provide more opportunities to accomplish individual pasture management objectives under rotational grazing. Diversity of plant species generally decreases from excellent to poor range condition or from high to low seral stages. The potential of improving range condition when changing from continuous to rotational grazing increases as the initial diversity of plant species increases.

Preferred plant species can be over grazed during the growing season even at moderate stocking rates. When heavy grazing is repeated over years the competitive ability of preferred species is reduced. When the competitive status of two or more species is altered there are a number of possible outcomes on semi-arid rangeland:

(1) No change in the relative amount of herbage production by different species.

→ Preferred grass species compensate by producing more, but smaller shoots.

→ Smaller shoots indicate reduced energy reserves and root systems.

→ A "time bomb" waiting for drought.

→ Alter grazing management.

(2) Decline in range condition or seral stage.

→ Less herbage from preferred and more herbage from less preferred, possibly unpalatable species.

→ Soil moisture and nutrients used by more competitive species.

→ Alter grazing management.

(3) Loss of preferred species or reduced genetic diversity in preferred species.

→ Full recovery with altered grazing management no longer possible.

→ Adjust stocking rate for site stability and optimal animal performance.

→ Apply optimal grazing management practices to other pastures.

The likelihood of these outcomes increases from (1) to (3) as the number of years of poor grazing management increase and the frequency and severity of drought increase. Altered management should begin with a critical review of stocking rate, time of grazing and the number of grazing periods.

STOCKING RATE

Range livestock managers must use reasonable animal unit equivalents. Clearly, a 1400 lb cow eats more than a 1000 lb cow. An 800 lb yearling eats more than a 500 lb yearling. It is not reasonable to discuss stocking rates in terms of acres per cow or yearling. These units are meaningless without (1) standardized animal units, and (2) units of time. I strongly recommend the following guidelines for determining stocking rates:

(1) An animal unit (AU) is 1000 lb of beef animal.

One 1700 lb bull = 1.7 AU
Six 500 lb yearlings = 3.0 AU
One 1200 lb cow + 400 lb calf = 1.6 AU
Three 1000 lb dry cows = 3.0 AU
Ten 900 lb bred heifers = 9.0 AU

(2) Use average weights for the grazing season to calculate animal unit equivalents.

May 15		Sept 15		Gain
600 lb	→	860 lb	=	260 lb

Average AU/yrlg = .73

(3) Add the weight of calves to the cow weight when the average age of the calf crop is 3-months.

Average Birth Date	July 1		Oct 31		Gain
April 1	220 lb	→	460	=	240

Average Cow Weight
1050 lb

Average AU/calf = .34

May	June	July	Aug	Sept	Oct
1.05 AU pair			1.39 AU pair		

(4) For each pasture or meadow record the date of entry, date of exit, and average weight for all livestock that graze the pasture in a twelve month period beginning with spring growth, March or April. This will provide a record of when estimated quantities of each year's herbage resource were used.

(5) Calculate the total number of animal unit days (AUD) in each pasture. Estimate the average animal unit (AU) equivalent by dividing the average weight of each class of livestock by 1000 lb. Multiply the average AU equivalent by the number of animals or pairs in that class, then multiply that number by the number of days for each grazing period. To convert AUD's to animal unit months (AUM's), divide AUD's by 30.

(6) Calculate stocking rates (AUM/ac) for each grazing period by dividing AUM's by the acres in the pasture. This provides a complete description of stocking rate. Animal units have been standardized and units of time have been added.

(7) Total stocking rate for each pasture or meadow is the sum of stocking rates over the 12-month period beginning with spring growth.

Precipitation records, notes on livestock distribution and animal performance and notes on herbage production factors such as frost, hail, fire or grasshoppers provide a good basis for cause and effect evaluation of individual pasture response to stocking rate and other management

decisions.

SUSTAINABLE STOCKING RATES

Date and length of grazing periods can have a profound effect on sustainable stocking rates. An optimal stocking rate for a grazing season from May 1 to November 1 can be excessive when concentrated into a short grazing season when plants are growing most rapidly. Grazing during periods of rapid plant growth provides high quality forage for livestock but may also reduces the ability of plants to maximize herbage production from the available soil moisture and nutrients. Heavy grazing is most likely to reduce total herbage production during the period of rapid growth, regardless of grazing strategy. Clearly, cattle must graze in one or more pastures at this time in a summer grazing season. Moderate stocking rates will be optimal for continuous or rotational grazing at this time.

Reducing the length of a grazing season without change in stocking rate increases the amount of leaf material removed per day. The number of cattle must be increased to achieve the same number of AUM's/acre with shorter grazing seasons. Green leaf area is critical for maximum herbage production during the relatively short time period when temperatures and soil moisture are optimal for plant growth on semi-arid rangelands.

There is a growing interest in running large yearlings on early summer grass for 60 to 90 days to capitalize on high quality forage prior to the feedlot phase of production. At current summer grass lease rates, the practice could be very profitable when done in close proximity of a feedlot. However, this practice can not be sustained at the same stocking rates established for 4 to 6 month long summer grazing seasons. The following suggestions should be reviewed when considering this practice:

(1) Account for large yearling weights by standardizing to animal unit (AU) equivalents.

(2) The relative value of early summer, high quality AUM's of forage is greater than summer seasonal averages. Average daily gains are greater early versus late in the summer grazing season.

(3) On semi-arid rangeland, early season stocking rates should be lower than summer seasonal stocking rates to maintain plant vigor and provide herbage for other ecosystem functions.

(4) Light stocking rates will provide maximum opportunity for yearlings to grow at their genetic potential.

(5) If early season stocking rates are light and growing conditions are favorable, it may be possible to graze another group or class of cattle during the dormant season.

(6) Full growing season deferment every 2 to 3 years in average or above average precipitation years will increase the likelihood of sustaining this practice.

Rangeland vegetation is least susceptible to grazing when plants are dormant. Therefore the highest sustainable annual stocking rates will occur with a combination of dormant season and growing season grazing periods. Cow-calf enterprises are more likely to have higher sustainable annual stocking rates than yearling enterprises because of the opportunity to graze year round. Cow-calf enterprises also provide an opportunity to capitalize on lower quality forage with dry cows especially during periods of low nutrient density requirements during the second trimester. Adjusting reproduction schedules and selecting appropriate size and lactation potential of cows provides several methods of improving the efficiency of grass to beef conversions.

When the entire rangeland resource is committed to a summer livestock enterprise, inability to use dormant season grazing is a huge loss from the list of management options. No other management alternative will improve plant vigor, herbage production potential, efficiency of precipitation (associated with root development and protective plant cover) or range condition as much as full summer deferment. The only way to capitalize on herbage would then be dormant season grazing.