DEVELOPING GRAZING STRATEGIES ON ARID AND SEMI-ARID RANGELANDS

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INTRODUCTION

Livestock operators have always sought ways to improve their returns from the land. At first glance the situation appears relatively simple: we wish to graze ranges to optimize livestock production and yet maintain the range in a highly productive state. However, the problem becomes extremely complex when one considers the wide range of climatic and managerial conditions across the rangelands of the world. Use of specialized grazing systems has been one method to increase rangeland productivity. Although intensive research into grazing schemes is fairly recent, specialized grazing methods have been utilized for many years (Hickey 1966, Davies 1976 and Voisin 1959). Many of these methods were developed for use on improved pastures under relatively high precipitation, but principles may apply to rangelands. Most schemes on arid and semi-arid rangelands have been relatively simple.

Interest in specialized grazing systems in the U.S. has peaked and then waned during the last 100 years. During the late part of the 19th and the early part of the present century, early range workers such as J. G. Smith, J. L. Jardine and A. W. Sampson advocated some type of rotational grazing to promote range improvement. Sampson (1913) initiated studies on rotational grazing in the Wallowa Mountains of Oregon. After World War II interest in grazing systems was renewed by work of Hormay (1961) in California and Merrill (1954) in Texas. Two symposia on grazing systems were sponsored by the Society for Range Management (Sampson 1951 and Heady 1969).

However, adoption of specialized grazing systems by private ranchers has been slow. Success stories such as the one portrayed by Leo Merrill at Sonora did not persuade ranchers to develop such systems. Recently, however, a range ecologist from Zimbabwe has again kindled interest in a method of grazing in which intensive management provides the opportunity for high flexibility when grazing livestock. Private ranchers as well as those grazing under permit on public ranges have become interested in short duration grazing, more recently termed the Savory Grazing Method, in spite of relatively high initial investment costs. Since little detailed information is available on short duration grazing in North America, several universities and research stations have undertaken research to test certain hypotheses about short duration grazing.

The purpose of this paper is to review some of the considerations and expectations for initiating specialized grazing strategies.

TYPES OF GRAZING STRATEGIES

The number of grazing systems available to ranchers and federal agencies is almost unlimited. Perhaps the least intensive system is continuous grazing where the livestock are allowed access to the entire range unit for the entire grazing period. When a pasture is divided into smaller units and some of these units are grazed while others are rested, management becomes more intensive. Short duration grazing schemes are the most intensive to date (Fig. 1).

SELECTION OF A GRAZING STRATEGY

Many authors have attempted to classify grazing systems (Heady, 1961, 1970, 1974, 1975, Kothmann 1980). However, terminology still is somewhat confusing (Kothmann 1974, Hodgson 1979, Scarnecchia and Kothmann 1982). Consequently the operator has a confusing array of possible choices when considering grazing strategies. Among the most important considerations are the goals or objectives for the operator. If his goal is range improvement, one strategy might be instituted, but if his goal is to optimize livestock production and maintain the present range condition, then another method may be more appropriate. Operator goals may change over time; therefore flexibility in attaining goals are possible when other than a fixed grazing strategy is used. Grazing can then be tailored so the objectives of the operator will be realized.

Individual livestock operators must work within the conditions over which they have control. Grazing strategies should therefore be flexible and capable of being adjusted to their conditions. Abiotic factors to be considered include length and time of the growing season, while biotic factors include distribution of vegetational types, relative tolerance of importance species to grazing, present successional status and trend, in addition to class, breed and age of livestock to be grazed. In New Mexico the growing season is limited to the summer and early fall, especially in the southern part of the state. This limited growing season has been the primary excuse in NM for not employing specialized grazing strategies. In contrast, plant growth may occur nearly yearlong in parts of the Edwards Plateau of Texas. Here opportunities for specialized strategies grazing are great.

Branson (1953) stated that resistance to grazing was related to position of the growing point and the ratio of vegetative to reproductive culms. The capacity of plants to replace tillers and branches removed by grazing is also apparently critical (Dahl and Hyder 1977 and Caldwell et al. 1981). Caldwell et al. (1981) reported that Agropyron desertorum is more resistant to grazing than Agropyron spicatum because of greater flexibility in resource allocation following grazing. New tillers were produced much more quickly for A. desertorum than for A. spicatum following defoliation. Young (1980) working in southern New Mexico found that Sporobolus flexuous produced tillers more readily under grazing than Bouteloua eriopoda.

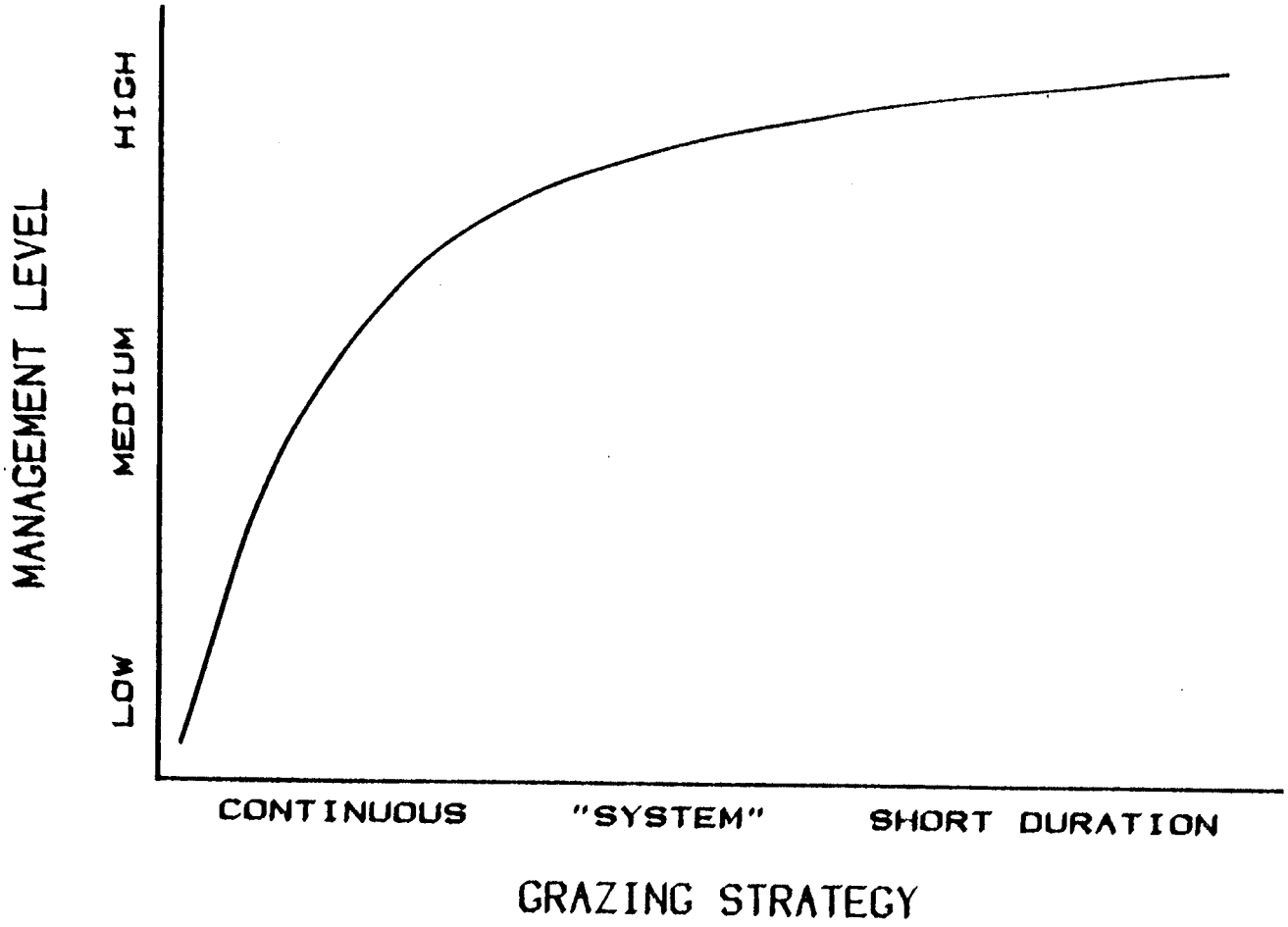

FIGURE 1. Conceptual relationship between grazing strategy and level of management within abiotic, biotic and economic constraints.

Amount and distribution of precipitation and temperature are the most important climatic factors to consider when developing grazing strategies. Precipitation regimes which support both cool and warm season species are likely to allow favorable responses to specialized grazing strategies. Physical features such as existing pastures and their size, topography, stock water availability and patterns of vegetational distribution are also important in developing grazing strategies.

Once these resources have been appraised, the operator must make several decisions in order to take advantage of his physical, biological, and environmental resources. Among these questions are the following:

- How many pastures should there be?
- How large should they be?
- How many herds?
- What should be the length of the grazing and resting period?
- How can special needs of the livestock be met?

WHAT RESEARCH TELLS US

Despite the large numbers of studies (Allison and Wood 1981) dealing with grazing management, there are few generalizations which are possible. Many grazing strategies were implemented for range improvement. Continuous grazing often results in superior livestock performance (Driscoll 1967, Heady 1961, Pieper et al. 1978, and Lewis 1981). Continuous grazing may allow for maintenance of the present range condition if stocking rate is "proper" but is less likely to result in uniform range improvement compared to a specialized grazing strategy involving periods of deferment. Specialized grazing strategies which result in livestock concentrations on subunits of the entire range for relatively long periods of time usually lower individual animal performance (Pieper 1980, Lewis 1981). However, vegetational improvement often results from such strategies (Pieper et al. 1978, Lewis 1981). In many areas combinations of grazing strategies are required for best results (Lewis 1981).

STATUS OF GRAZING STRATEGIES IN NEW MEXICO

Many ranchers have been slow to adopt specialized grazing systems in New Mexico. With technicial advice from the Soil Conservation Service and the Cooperative Extension Service, some of the more progressive ranchers have developed some type of rotation systems. In the 1960's the Bureau of Land Management emphasized rest-rotation systems in which certain sub-units were rested an entire year and then grazed rather heavily for a short period to promote establishment of perennial grass seedlings.

SAVORY GRAZING METHOD

The Savory Grazing Method (SGM) is the predominate new grazing strategy being implemented on privately-held New Mexico ranches at this time. Public land agencies are continuing to implement rest-rotation and deferred-rotation type grazing systems. However, the Bureau of Land Management (BLM) is implementing a small number of SGM types of grazing management. The U.S. Forest Service has emphasized the monitoring of some cells in Arizona before implementing any in New Mexico; however, the Kiowa National Grasslands in northeastern New Mexico has implemented one cell. The Bureau of Indian Affairs (BIA) has implemented two cells and a third is planned as part of their technical assistance role.

The oldest SGM cell in New Mexico has just completed its third growing season. Most ranchers are watching ranches under SGM that are near theirs or in similar vegetation types before implementing any of their own. It is safe to say that most grazing systems have been placed "on-hold" by the ranching industry and many range men until SGM has been evaluated.

Implementation

1982 witnessed more ranches implementing SGM than before. Reasons for implementation vary greatly but the primary ones are: 1) increased cash flow from livestock. 2) ability to monitor animals is enhanced by the physical layout (e.g. artificial insemination, implanting, pregnancy testing, etc.). Other reasons for implementation of SGM may not be held in the highest regard by range professionals, such as increased re-sale value of a ranch employing SGM.

Sizes of cells vary greatly on New Mexico rangelands ranging from small areas of 1600 acres to larger cells comprising approximately 8000 acres. The vast majority of ranches implementing SGM are cattle enterprises; a few sheep ranches are starting but most are still examining the cost of re-fencing.

A few ranches implemented SGM under the existing pasture layout but most have gone to a radiating fence design. Most ranches have not committed the entire ranch to cells but have one or two on the ranch to evaluate for a few years. However, the majority of these ranchers have their entire ranches planned on paper to be under SGM cells.

With a few exceptions, ranches are being fenced with smooth wire energized by New Zealand-Australia type electric fence chargers. Costs associated with cell development in 1982 vary from a quoted $2.00 to $7.00 per acre in development costs.

The number of pastures or paddocks per cell initially built in New Mexico varies from as few as 5, to as many as 20. The majority of cells being built today are employing more paddocks than those that were built even a year ago. With a few exceptions, most ranchers have increased stocking rates at least two times on the cells. A few who admit that they were overstocked maintained the old stocking rate.

Time of year when SGM types of grazing are started has traditionally been in the growing season; however a few ranchers are gearing the starting day for early in the dormant season. The Cooperative Extension Service and some range conservationists with federal agencies feel this plan of action is worthwhile. Initiating intensive grazing management during the non-growing season allows the operator to fine-tune the stocking rate to correspond with his planned forage budgeting over the dormant period.

Evaluation of SGM

Because many concepts and ideas of the Savory Grazing Method are relatively new and untested, few results are yet available. Apparently livestock distribution is greatly improved with SGM and harvest efficiency is better (less spot grazing). Early research results indicate that primary productivity (Heitschmidt et al. 1982) and vegetation standing crop during the grazing season (Long 1982) may be enhanced by short duration grazing. At the Texas Experimental Ranch near Throckmorton there was no difference in individual animal performance on short duration grazing and continuous grazing (Heitschmidt et al. 1982b). However, additional information is needed before generalizations can be made, especially when animal live-weight is the sole criterion used to evaluate animal performance (Hughes 1976, Anderson 1982).

One facet of short duration grazing which has generated some debate is the relative influence of defoliation and the herd effect in promoting increased plant productivity. Many researchers believe that frequency and intensity of defoliation are the keys to plant response from short duration grazing (Beck 1980, Booysen and Tainton 1978). There is considerable research to support this view. Evidence concerning the influence of animals on soil compaction, infiltration, etc. over very short grazing periods is lacking. However, there is considerable evidence that heavy livestock concentrations over longer periods does increase runoff and sediment production and decrease infiltration (Blackburn, Knight and Wood 1982).

Livestock operators are implementing short duration grazing schemes in New Mexico because of possibilities for increased stocking while improving range conditions. They are receiving advice from the Holistic Ranch Management School, from the SCS, and the Extension Service. The Cooperative Extension Service and the Range Science Faculty at NMSU with limited funding from the SCS are establishing a monitoring program for several short duration cells. We hope to follow range trend on these areas to document the changes.

Studies involving short duration grazing have been established at Fort Stanton on blue grama (Bouteloua gracilis) range and on the Jornada Experimental Range (U.S. Department of Agriculture) on tobosa (Hilaria mutica) vegetation. Both vegetation and cattle responses are being evaluated at these two locations. At Fort Stanton comparisons are being made among a short duration cell, a 4-pasture, 3-herd system and continuous grazing at two stocking levels. On the Jornada, short duration grazing is being compared with continuous grazing (seasonal)

CONCLUSIONS

Specialized grazing systems offer no panacea for our range management problems. They offer a chance to focus attention on the grazing process and to upgrade the overall management level of a ranch operation. However, the operator should be aware of the increased input needed to make the system successful. Grazing systems should provide flexibility and should be designed to take advantage of physical and biological resources available.

Short duration grazing management is very intensive. Perhaps it should be considered a method of thinking which requires implementation of a high level of ranch management rather than just a grazing method. It requires much from the individual manager both in terms of time and managerial skills.

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