SHORT DURATION GRAZING

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Edited by: James A. Tiedeman
Extension Range Management Specialist
Washington State University

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Pullman, Washington

LIVESTOCK PRODUCTION ASPECTS

Raymond F. Angell
Range Scientist
U. S. Dept. of Agric., Agric. Research Serv.
Burns, Oregon 97720

ABSTRACT

Short duration grazing is a method of grazing range and pastureland which requires intensive managerial input by the producer or resource manager. Livestock management is the key to realizing maximum production from the resource without causing resource degradation. Livestock physical impact on the land as well as livestock behavior are important factors. Short duration grazing provides the means to place close control over the amount of grazing use a forage plant will receive through a season. Grazing distribution can be greatly improved due to fencing of one large area into smaller units and is most likely the primary factor in stocking rate increases which are noted.

INTRODUCTION

Short duration grazing (SDG) is a term given to any program of grazing which employs generally more than 5 pastures within a grazing unit and uses a pattern of rotation which gives each pasture from about 30 to 60 days rest between grazing periods (Savory, 1978). Grazing period length is altered to account for variations in forage growth rate, with shorter graze periods generally used during rapid forage growth. Many of the concepts involved have been discussed in previous papers. I will discuss a few aspects of livestock production and short duration grazing as well as mention some of the data which we have collected at Squaw Butte, as it relates to SDG.

Throughout this paper I will use the term "management unit" to refer to the parcel of land which is being managed, while "cell" will refer to that portion of the management unit which is being grazed using short duration grazing. "Pasture" will refer to a subdivision within a cell. One management unit could therefore be comprised of more than one cell. Many combinations of pasture size and configuration are possible using short duration grazing. For the purposes of discussion, this paper will consider a hypothetical management unit which uses one cell which has been subdivided into 10 pastures to be grazed by one herd.

Livestock management is a key part of successful rangeland management. Livestock provide us with a very effective tool for maintenance of a healthy plant community. Nutrient cycling, disruption of soil capping, seed incorporation, mulching, and topgrowth removal are several of the more commonly discussed forms of livestock impact on range and pasture.

LIVESTOCK PRODUCTION

Livestock production is measured both per head and per acre. Individual performance is an integrated response to general livestock management.

Livestock producers must arrive at a management system which yields high production per acre while maintaining individual performance at acceptable levels. Grazing systems affect the level of individual production as well as total herd production by virtue of their design. In the past those systems which gave greatest individual performance were generally less intensive forms of management such as season-long grazing or deferred rotation grazing. These systems allowed a tremendous surplus of forage for each animal, resulting in maximum potential for selection of high quality forage by each grazing animal. This surplus of forage allows high individual performance but has several inefficiencies which are becoming increasingly important to those responsible for resource management.

An ideal, production oriented grazing system will take into account many considerations, among them being livestock nutritional requirements for maximum production. Commercial cattle producers must work within the annual nutritional cycle of the beef cow (Figure 1). Growing cattle require higher quality forage than their mature counterparts. During the period just before and after calving breeding cattle have maximal requirements. Any system of grazing which does not take into account these needs will result in (1) lower percent calf crop, (2) lower individual performance, and (3) decreased total production for the herd.

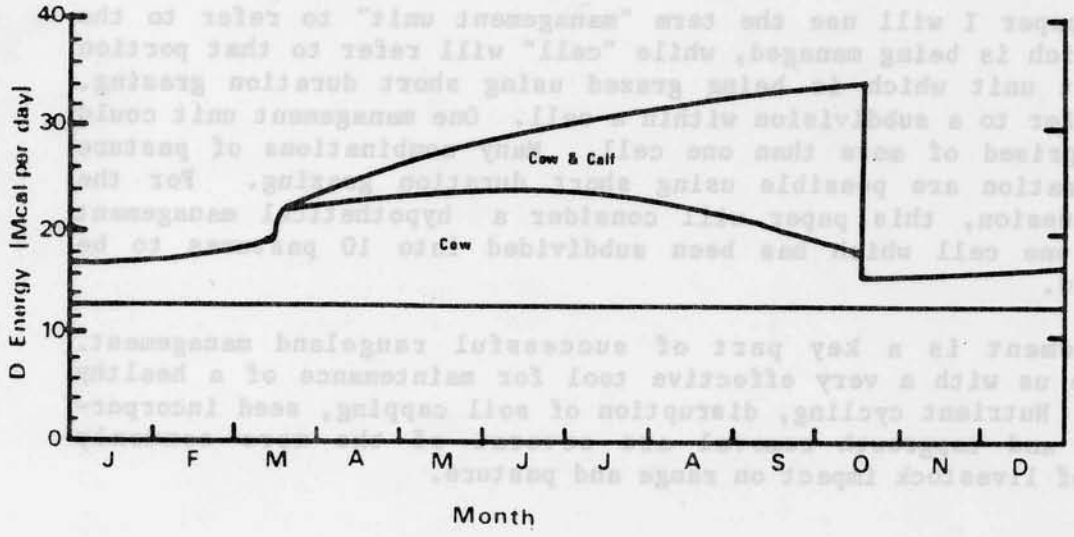

Figure 1. Generalized annual nutritional cycle for a cow calving in March.

In the northwest where we have such a strongly defined seasonality of forage production, and a short period of forage growth, we must plan a grazing strategy which will allow the livestock to capture this top quality forage. Proper grazing management may allow us to prolong the period during which forage quality is at or above the needs of cattle. Short duration grazing has the potential to allow the range manager greater control over several aspects of forage utilization. Intensity, frequency, and distribution of grazing are three major considerations. In this scheme of management it is better to think of having increased management options rather than being in a fixed schedule of rotation.

Intensity of use affects livestock diet quality and herd production in that at high stock densities such as are found in SDG, the total amount of forage available per animal (daily herbage allowance) is greatly reduced so that we no longer have the excess of forage discussed above. Cattle are faced with a rapidly declining forage resource each day of the grazing period. Cattle also selectively graze the most preferred plants and plant parts first which means that as forage availability declines during a grazing period, so also does forage quality (Allison and Kothmann, 1979). The manager must be observant and not allow cattle to remain in a pasture so long that they no longer have sufficient forage to maintain diet quality and intake.

In order to provide for maintenance of forage vigor, a certain amount of rest is required between successive grazings. This must be balanced with the knowledge that too long a rest will allow forage to become mature and of lower quality, resulting in lower potential animal performance.

Forage growth is influenced by many factors such as precipitation, soil and air temperature, soil type, and aspect. Since the management unit is not uniform with respect to all these items, we must devise a management scheme to take advantage of this disparity if we are to maximize livestock production as well as meet the needs of the range resource. Cool season plants common to the northwest begin growth early in the spring when soil temperature increases and provide top quality for a relatively short period (Figure 2). Cheatgrass (Bromus tectorum) is a common annual which produces grazable forage early in the year but provides low quality forage later in late spring and summer. Short duration grazing can provide the manager with greater control over the location of livestock which can allow for better utilization of annual or ephemeral forages.

Livestock production may be sustained at a higher level if the forage quality decline due to maturity can be delayed or annuals such as cheatgrass can be utilized while they are still of high quality. Short duration grazing is proposed as a method of maximizing the period of high quality forage by more uniformly grazing the forage across the entire cell and thereby keeping the forage in a less mature, vegetative state. Research at Squaw Butte indicates that this may occur for crested wheatgrass. Forage clipped in August and September contains greater crude protein and is generally more digestible if it has been previously grazed or clipped (Figure 3). The trade-off for the resource manager is that regrowth potential of the forage decreases very rapidly as summer approaches (Figure 4), due to decreasing soil water content. Soil water in sandy soils at Squaw Butte has become limiting for plant growth by July even during the recent wet years. In areas such as ours, where summer

precipitation is infrequent, any intensive scheme of livestock management needs to account for this decreased potential for forage production during summer. Managers using SDG or any other intensive grazing method must be able to capitalize on summer growth after a shower, but must not depend on it to support the herd. Predictive models have been generated which estimate forage growth based on climatic data (Sneva and Britton, 1983). These, along with other pertinent site data, can provide a starting point for estimating annual forage production potential.

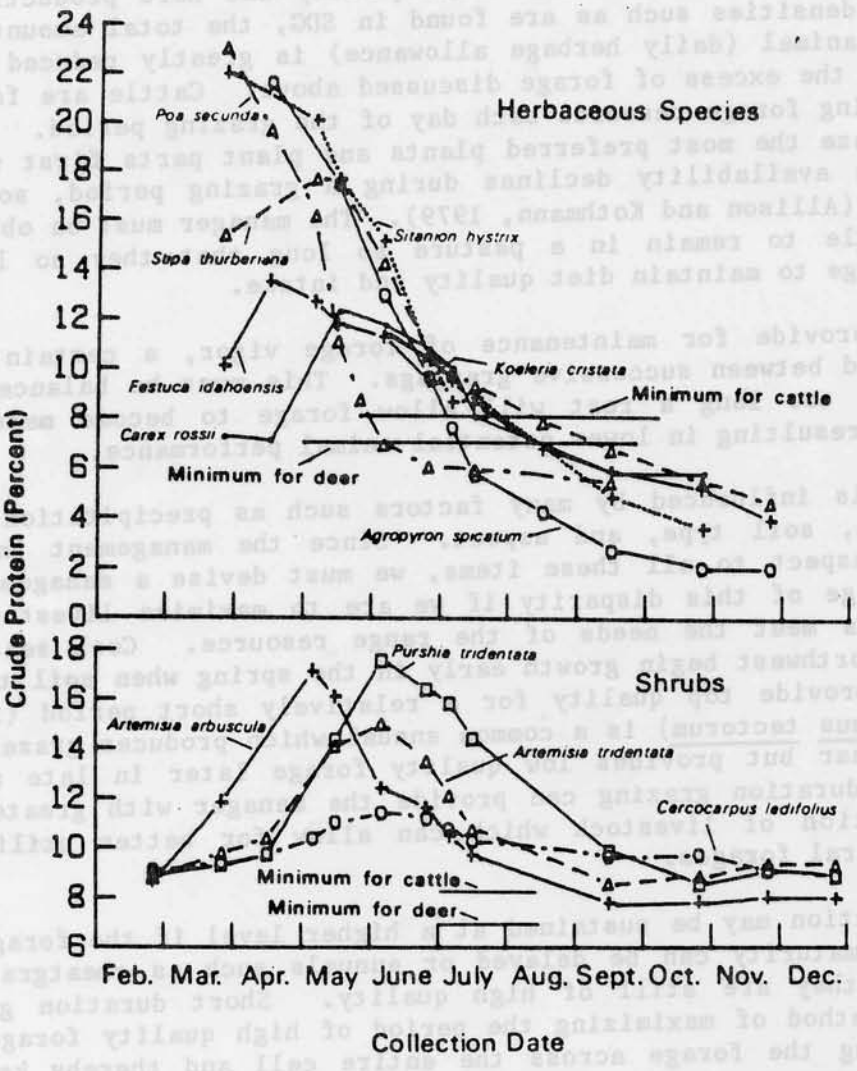

Figure 2. Seasonal crude protein changes for several species associated with advancing maturity (from Hickman, 1975).

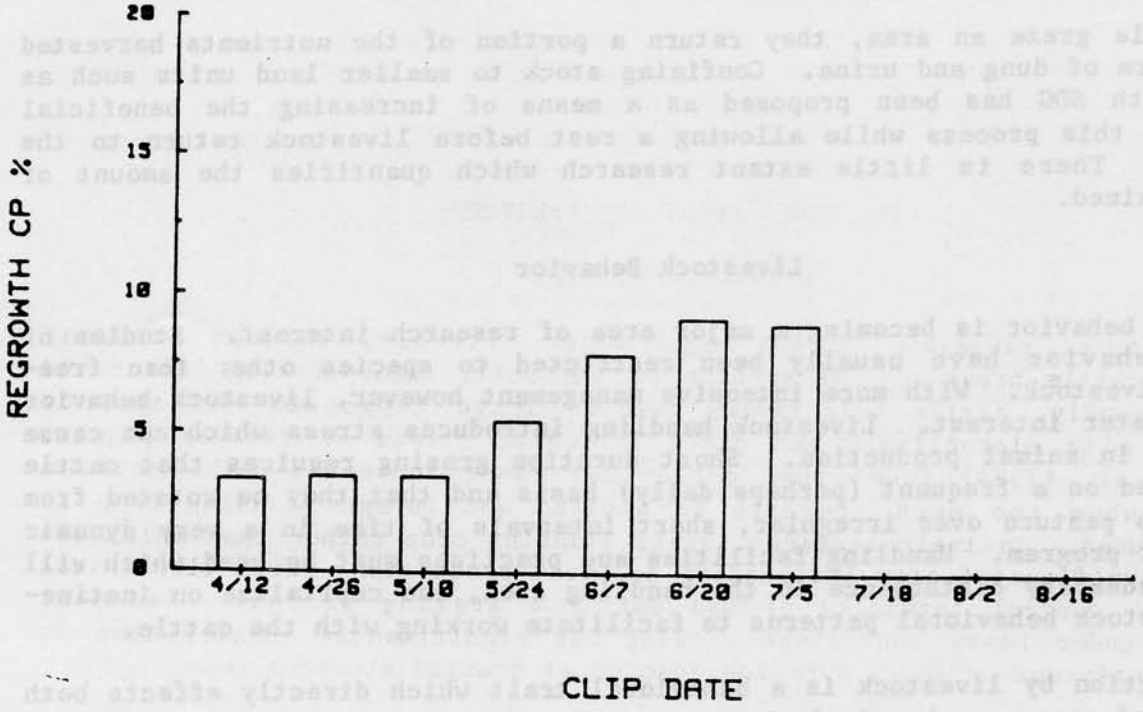

Figure 3. Effect of length of time since last clipping on August 16 crude protein of crested wheatgrass regrowth. No regrowth was recorded after mid-July.

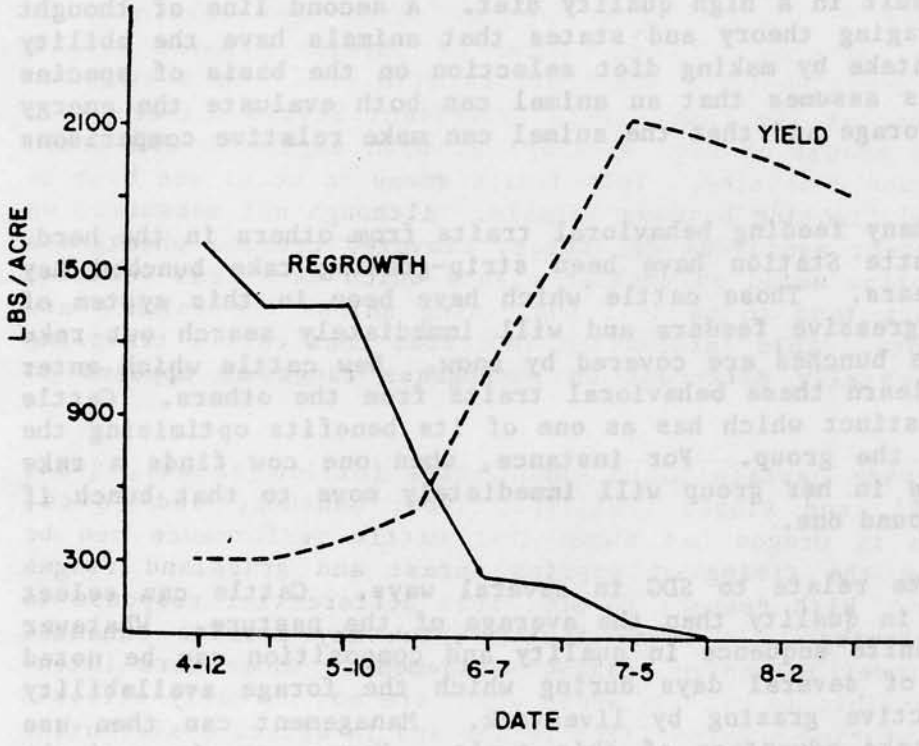

Figure 4. Total yield of crested wheatgrass compared to regrowth potential after clipping on various dates.

LIVESTOCK IMPACT AND BEHAVIOR

Livestock Impact

Livestock impact rangeland in two major ways. Firstly, through physical trampling, cattle break up the surface of the soil, incorporating litter and seeds. Secondly, cattle selectively remove forage topgrowth and thereby alter the site microclimate and place increased stress on favored plants. McCalla et al. (1984) found that cattle can cause increased soil erosion potential when too much pressure is applied and forage standing crop is greatly reduced. In their research, grass standing crop rather than mulch was the most significant factor influencing sediment production, which illustrates the need to control intensity of use during a grazing period. Sediment production under heavy continuous grazing was significantly greater than on moderate continuous or short duration grazing at doubled stocking rate.

Cattle do not place their feet in a random manner while walking (Balph and Malechek, 1985), but will avoid crested wheatgrass bunches. Balph and Malechek noted that cattle showed the strongest avoidance of trampling on the largest bunches. This documents what one might expect; that cattle attempt to follow the path of least effort while grazing. Except at very high stocking levels, cattle cannot be expected to trample large bunches which may contain large amounts of standing dead material. Other forms of physical impact may be manifested at elevated stock densities which occurs with SDG. In a research project currently underway at the Squaw Butte Experiment Station, there is a definite increase in the amount of stem breakage of both sagebrush and green rabbitbrush at higher stock densities. This damage seems to occur due both to grazing under canopy, and fighting between animals. Although not measured, we have also noted an apparent avoidance of larger, elevated crested wheatgrass bunches, with most trampling noted on smaller plants which have less vertical development. Wolf plants tend to be self sustaining unless the animals are forced to graze the plants. This information indicates that cattle trampling effects may be fundamentally different on bunchgrass range as opposed to effects noted on sod.

Cattle preferentially graze certain plant communities (Gillen et al., 1984; Roath and Krueger, 1982), and slopes (Phillips, 1965; Ganskopp and Vavra, 1985). Recent research in Oregon has shown that cattle performance can be enhanced by manipulating the timing of grazing forest and grassland ranges (Holechek et al., 1981). With respect to SDG, this differential response to time and location of grazing is a major factor which may provide enhanced individual performance under intensive grazing management. Under more intensive management it is possible to utilize areas which are not normally utilized by livestock, thereby capturing underutilized forage and in effect distributing the grazing load over a larger area. This improved distribution, along with the potential for enhanced diet quality may allow for stocking rate increases to occur. Improving livestock distribution with SDG will help lessen the utilization of more preferred sites such as riparian zones and coupled with the control over timing of use, could provide a viable means of habitat improvement.

When cattle graze an area, they return a portion of the nutrients harvested in the form of dung and urine. Confining stock to smaller land units such as occurs with SDG has been proposed as a means of increasing the beneficial effect of this process while allowing a rest before livestock return to the pasture. There is little extant research which quantifies the amount of benefit gained.

Livestock Behavior

Livestock behavior is becoming a major area of research interest. Studies of animal behavior have usually been restricted to species other than free-ranging livestock. With more intensive management however, livestock behavior is of greater interest. Livestock handling introduces stress which can cause a decline in animal production. Short duration grazing requires that cattle be observed on a frequent (perhaps daily) basis and that they be rotated from pasture to pasture over irregular, short intervals of time in a very dynamic management program. Handling facilities and practices must be used which will avoid unnecessary disturbance in the handling area, and capitalize on instinctive livestock behavioral patterns to facilitate working with the cattle.

Diet selection by livestock is a behavioral trait which directly effects both animal performance and animal impact on the plants within the pasture. Two major, differing theories exist as to the way animals select dietary components. One line of thought suggests that animals simply eat what is most pleasurable to them; items such as succulence, odor, and texture could influence selection in the diet. These items could be correlated to quality factors which would result in a high quality diet. A second line of thought relates to optimal foraging theory and states that animals have the ability to maximize nutrient intake by making diet selection on the basis of species nutrient content. This assumes that an animal can both evaluate the energy content of a patch of forage and that the animal can make relative comparisons between patches.

Cattle probably learn many feeding behavioral traits from others in the herd. Cattle at the Squaw Butte Station have been strip-grazing rake bunched hay during winter for 4 years. Those cattle which have been in this system of management are more aggressive feeders and will immediately search out rake bunches even when those bunches are covered by snow. New cattle which enter the strip grazed herd learn these behavioral traits from the others. Cattle also have a herding instinct which has as one of its benefits optimizing the acquisition of food by the group. For instance, when one cow finds a rake bunch, the other cattle in her group will immediately move to that bunch if they have not already found one.

These behavioral aspects relate to SDG in several ways. Cattle can select forage which is higher in quality than the average of the pasture. Whatever means they use, a definite sequence in quality and composition can be noted over a grazing period of several days during which the forage availability decreases due to selective grazing by livestock. Management can then use various strategies to take advantage of this trait. Young, growing animals require higher quality diet than older animals. Given their ability to select top quality forage, one means of maximizing nutrient intake of young animals is to graze them in a group one pasture ahead of the mature cattle in the

grazing sequence in a SDG system of management. Total grazing time of the two herds would not exceed that which would be used if they were together, thereby avoiding overutilization during a grazing period.

SUMMARY

Livestock production is influenced by seasonal changes in forage availability and quality. Short duration grazing provides greater control over the timing and duration of a grazing period and may be able to influence seasonal forage characteristics. Grazing distribution is one of the major improvements seen when using SDG. Management units which were previously managed extensively, and had poor distribution of grazing may see immediate benefit by intensive management, with less pressure on preferred plant communities.

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