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RangeDetect Series

Livestock Grazing Distribution: Considerations and Management

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Grazing distribution is a major concern for livestock managers. Livestock do not graze randomly—they often prefer some grazing sites over others. This tendency can cause grazing distribution to be uneven over the range.

If undetected or uncorrected, grazing distribution problems increase grazing pressure on areas that are used. In managing grazing, ranchers should aim for the greatest safe use over as much of a pasture or ranch as possible.

Livestock preference for some sites over others is influenced by a number of factors, both living and nonliving. Living factors that influence grazing preferences include plant types (grasses, forbs, and woody plants), plant species, forage quantity, forage quality and/or palatability, shade and shelter, animal behavior, insect pests, predators, and human activity, among others.

Nonliving factors include weather, soil, topography, water, salt, mineral, and other feed supplements, and fencing, among others. The greater the differences among areas (vegetation, topography, etc.), the more likely animals are to concentrate on some areas and avoid others.

Solutions to grazing distribution problems may be relatively straightforward, but they may not be easily achieved. For example, although it may be easy to identify apparent water distribution problems, those problems may be difficult to correct because of cost or water availability.

Causes of other distribution problems may be harder to identify. For example, distribution problems may be harder to pinpoint if they are associated with forage preferences or human activities.

Grazing Distribution Considerations

When making decisions about grazing distribution, there are several factors to consider: animal behavior, distance to water, topography, vegetation type, and weather.

Animal Behavior

Animals decide where to graze based on their perceptions of an area, their knowledge of plants consumed in the past, and their memory of potential choices. Cattle studies suggest that livestock quickly explore a new pasture and develop map-like representations of the locations of different areas within that pasture.

It appears that this information is stored in the animal's long-term memory. Based on their long-term memory, animals may return to areas previously grazed to search for forage. Their expectations of an area based on long-term memory change more slowly than changes in forage quality and quantity. In other words, animals may revisit areas where forage has been exhausted, but where they have found forage in the past, until they learn that forage is no longer available.

Grazing animals appear to use their short-term memory to recall which areas they have recently visited. They will use this memory in the near future to avoid or return to these areas. For periods of up to 8 hours, cattle can vividly remember areas where they have recently foraged.

Observations and research have documented that an animal's previous experience strongly influences which plants it eats and which areas it grazes. If it is introduced to a range that is sharply different from the one it is accustomed to, it will spend more time grazing, but eat less than animals familiar with the range. Therefore, intro-

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ducing animals from one type of vegetation and/or topography to a very different type of range can reduce animal performance until the animals learn the new environment, which can take up to a year.

Distance to Water

Livestock need free-choice access to water. When their water intake is restricted, milk production drops, feed intake is lowered, and gain in offspring is reduced.

Several factors influence the amount of water that grazing animals require. More water is needed as increases occur in live weight, lactation, physical activity, air temperature, salt intake, and dry matter intake. Less water is required when the forage has a high water content and for animal species and breeds that use water more efficiently.

When animals are forced to travel great distances between forage and water, they use more energy. Young suckling animals are most susceptible to lack of water availability because they are affected by the reduced milk production of the mother, and they are less likely to travel all the way to water with their mothers on hot days.

Water availability is a major cause of poor grazing distribution (Table 1). Water is the central point of grazing activities. Near water, plants are often used heavily and forage production drops.

The location and number of watering points are the main factors in determining movement, distribution, and concentration of grazing animals. The influence of watering location is affected by vegetation type, topography, season, and kind, class, and age of the grazing animals.

Table 1. An example of the effect of distance to water on forage use.

Distance from Water, miles	% Use
0-0.5	50
0.5-1	38
1-1.5	26
1.5-2	17
2-2.5	12

Work with cows fitted with Global Positioning System (GPS) collars (Figure 1) has demonstrated that grazing distribution is affected by both topography and distance to water. These collars were used to determine the locations of cows within pastures on a 24-hour basis. When cows were only given access to water at the north end of the pasture close to a preferred grazing site (Figure 2), they grazed mostly within 6/10 mile of the watering point. There was little use of the south end of the pasture, which included rougher terrain.

However, when given access only to water close to the rougher terrain in this pasture (Figure 3), the cattle grazed more evenly across the pasture.

Figure 1. Cow fitted with a GPS collar to determine areas of use and non-use within pastures.

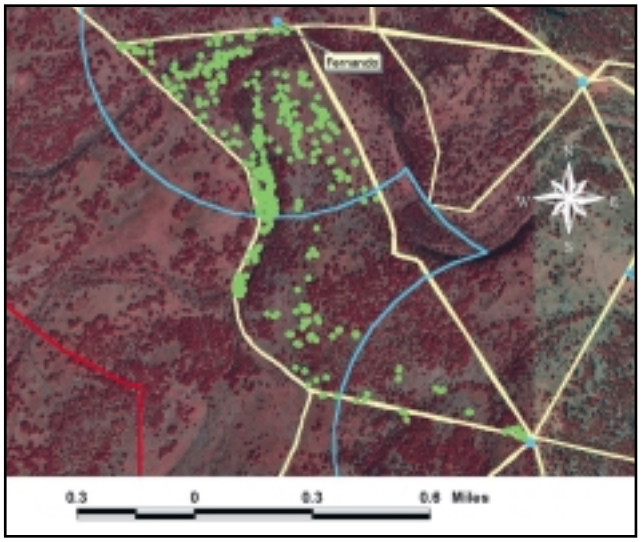

Figure 2. GPS locations (green dots) for cows show that cows avoided the south end of this pasture where the rockiest terrain was located when given access to water only at the north end. Concentric rings indicate 0.5 and 1 mile distances to water.

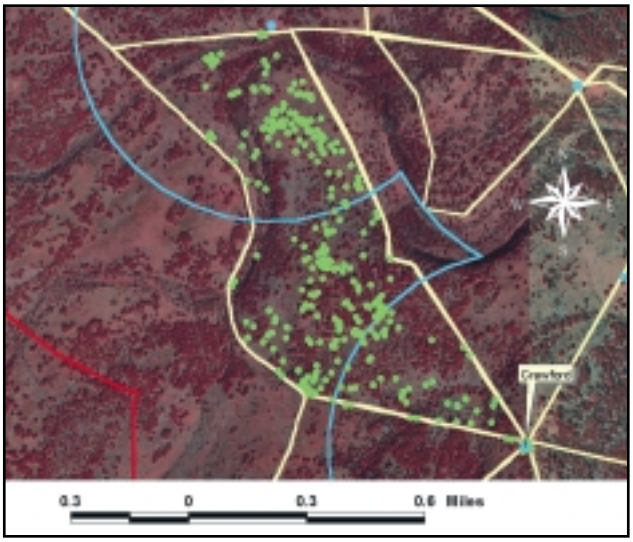

Figure 3. GPS locations (green dots) for cows show a more even grazing distribution when cows were given access to water only at the south end of this pasture where the rockiest terrain was located. Concentric rings indicate 0.5 and 1 mile distances from the water source.

Topography

The second most important cause of poor grazing distribution is topography. Cattle seldom use areas with greater than 10 percent slope (slope is the percentage of vertical drop over a surface distance of 100 feet). On the other hand, sheep make good use of areas with up to 45 percent slope.

Topography is more important in the hilly or mountainous parts of the state. The effect of topography varies with the kind of grazing animal. For example, cattle prefer easily accessible areas (Figure 4) that are flat and gently rolling, including valley bottoms, low areas between drainages, level benches, or mesas.

Figure 4. Cattle make little use of areas with greater than 10 percent slope. They prefer flat, gentle to rolling terrain.

The fact that cattle, horses, and bison will graze on slopes during some seasons of the year suggests that they may be more unwilling than unable to graze steeper slopes. Cattle will cross steeper slopes if they have easy access to the slope and contours that cross the slopes.

Sheep and goats, which are smaller, more agile, and more surefooted, can make more use of steeper and rougher topography. Yearling cattle are also more agile than mature cows and will travel further and use more rugged areas.

However, because even smaller, more agile livestock have their limitations, rugged terrain can still limit use. For example, sheep have been reported to use slopes up to 45 percent fairly evenly, but reduce use by as much as 75 percent on steeper areas.

The studies with cows fitted with GPS collars mentioned above have demonstrated that cattle prefer some range sites over others because of the terrain. On a ranch with predominantly two range sites (Figure 5), cattle strongly preferred the Gravelly Redland site over the Low Stony Hill site. This preference appears to be related to the presence of loose and imbedded rock on the Low Stony Hill range site (Figure 6).

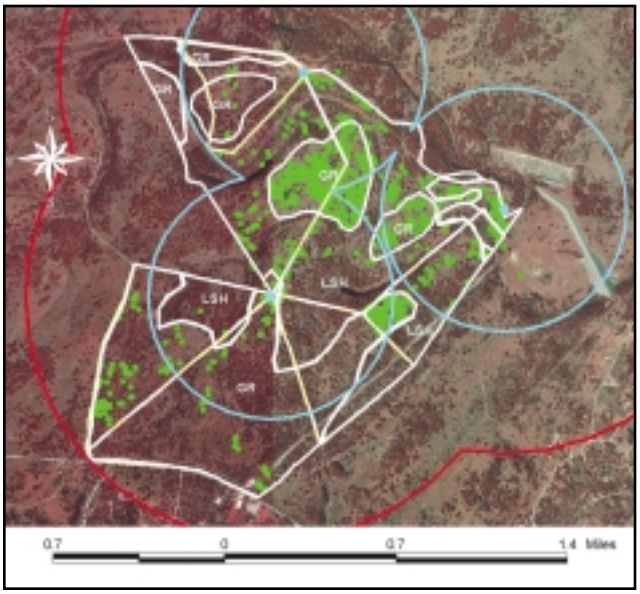

Figure 5. Site preference exhibited by cows (green dots) fitted with GPS collars. Cows showed a strong preference for the Gravelly Redland range site (GR) over the Low Stony Hill range site (LSH). Range sites are delineated by the irregular white lines. Concentric rings indicate 0.5 and 1 mile distances from water sources.

Figure 6. Loose and embedded rock discourage use of areas by cows.

In this study, preliminary results indicate that use of areas by cows declined steadily as rock cover increased and almost no use occurred with more than 30 percent rock cover (Figure 7). As a practical guide, if rock makes walking difficult for a person, it will also be difficult for cows. For example, with more than 30 percent rock cover, it is difficult for a person to walk without twisting an ankle, and running is almost impossible.

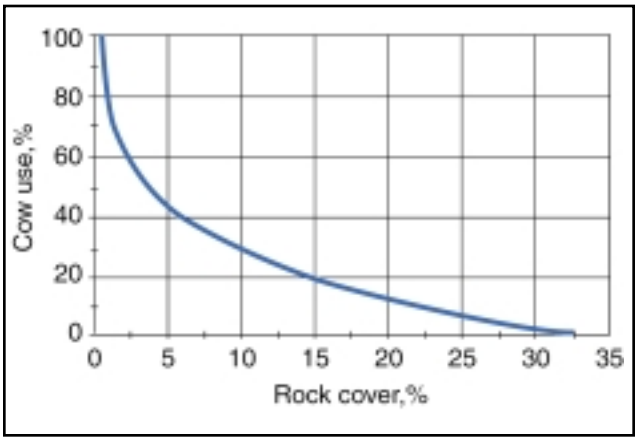

Figure 7. The effect of rock cover on use of areas by cows in the GPS collar study. Preliminary results indicate that cows avoided areas with more than 30 percent rock cover.

Vegetation Type

Forage preferences of different livestock species have a strong influence on grazing distribution. For example, cattle, with their strong preference for grasses, tend to avoid dense brushy areas (Figure 8). As brush becomes more dense, cattle grazing decreases.

Figure 8. Dense brush creates a barrier to livestock movement and usage.

Forage species play a major role in grazing distribution. Although different plant communities may be located next to each other, they may receive different grazing pressure because they contain different kinds of plants. Plants may differ in palatability or in the amount of leaf material available. These differences greatly influence where animals choose to graze.

However, even in a grass monoculture, pasture use may not be uniform (Figure 9). Plants often produce succulent new growth after having been grazed. Because they prefer this new growth, grazing animals sometimes revisit plants and patches previously grazed and avoid plants and patches with older growth not previously grazed or areas where feces have been deposited.

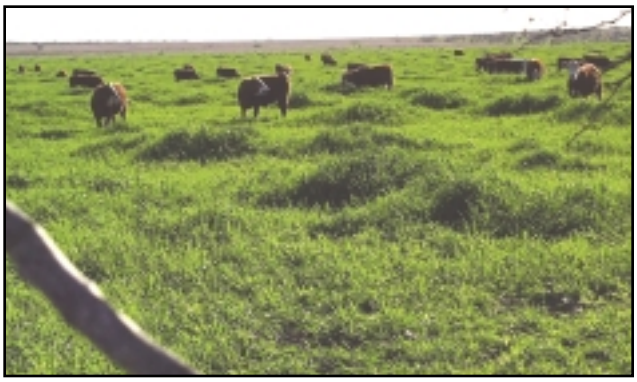

Figure 9. Even with a monoculture such as ryegrass, uniform use may not be easily achieved.

Riparian areas (the banks of rivers, lakes, and ponds) are favorite grazing sites of many livestock and wildlife species. These sites offer a variety of high-quality forage plants that are highly palatable.

Riparian areas tend to stay green longer than those in adjacent areas. When forage nearby is succulent, riparian areas are not as inviting. However, grazing pressure within riparian areas increases as adjacent areas dry out and forages mature.

Weather

Grazing may also be limited by temperature changes, snow, and excessive rainfall. Across Texas, high temperatures are the most consistent weather factor affecting grazing distribution. When temperatures exceed 85 degrees F, both cattle and sheep seek shade and may walk far to find it.

Distribution tools and recommendations

Water

To improve grazing distribution, water sources can be developed in a number of ways, including drilling wells and building drinking troughs, earthen reservoirs, or pipelines to transport water to new locations.

An effective way to draw animals to desired areas without additional fencing is to control and change their access to watering points (Figures 2 and 3). When taking this approach, however, use fencing that does not exclude wildlife.

To make the most efficient use of water sources, use temporary water when available and permanent water in dry periods. As a last resort or temporary measure, water can be hauled to poorly used locations.

In general, do not require cattle to travel more than $^1/_4$ to $^1/_2$ mile from forage to water ($^1/_2$ to 1 mile between watering points) in steep, rough terrain; or more than 1 mile (2 miles between watering points) on level or gently rolling ground. Spacing for sheep and horses can be wider. Generally, plan for no more than 50 cattle and 300 sheep, or 50 to 75 animal units, per watering facility.

Fencing

Fencing is a direct way to alter grazing distribution. Fences can separate areas that need different grazing management: riparian areas, irrigated pastures, or areas subject to seasonal use. Fences can also be used to subdivide large pastures into more manageable sizes.

When establishing fencing, make the best use of existing or projected watering points. Permanent water facilities should serve more than one pasture. Make sure that each fenced area has enough watering points. Consider the range site and potential forage production where possible.

However, it is usually impractical to fence individual plant communities because of their small size and random distribution across the landscape. If multiple livestock species are to be grazed, use the appropriate fencing materials for the species.

Supplemental Feeding

Because livestock tend to go from water to grazing to salt, it is not necessary to place salt at watering points. Salt consumption tends to stimulate the appetite of grazing animals. To encourage grazing in areas where livestock need to be drawn, place salt where it is accessible within those areas.

Purposely locate salt, minerals, and other supplements not less than 580 yards ($^1/_3$ mile) from water on pastures of 640 acres or more. On smaller pastures, place them no less than about 350 yards ($^2/_{10}$ mile) from water. Because bed grounds are already being used, locate salt and other supplements away from them. Move salt and supplements frequently except during birthing seasons.

Reports vary concerning whether salt is an effective tool for altering grazing distribution. It does not appear to overcome the influence of water, favored forages, favorable terrain, protective cover, or shade. In addition, salt is less useful where naturally salty vegetation or salt licks are present.

Move creep feeders away from watering and concentration areas as soon as calves, lambs, and kids learn to eat.

Protein and energy supplements or salt-meal mixes are more likely to be effective in influencing grazing patterns than salt alone. Place pelleted or cubed supplements on the ground or in movable bunks to encourage animals to move from feed grounds to poorly used areas.

Grazing behavior and distribution are also affected by the feeding interval for supplements. In a Texas study, cows fed a protein supplement daily or three times a week came readily to feed when called; however, cows fed once a week did not come to feed quickly when called. Less than daily feeding of equivalent amounts of protein supplement appears to reduce the time spent at feeding areas and to encourage a wider grazing distribution.

Kind of Livestock

Match the livestock species to the vegetation. Place cattle in a habitat where grass is readily available. Consider using goats in areas that have a high proportion of woody (browse) plants.

Some classes of livestock fit the terrain better than others. For example, yearling cattle are more agile and tend to travel farther than cows with calves, and, therefore, make better use of rugged terrain.

Animals may have difficulty adjusting to new foraging environments even if the new location has abundant forage. Previous grazing experience affects the kinds of plants, plant parts, and grazing sites the animals select. New locations with toxic plants are potentially dangerous.

Naive animals tend to spend more time grazing but eat less, walk greater distances, suffer more weight loss, and are more likely to eat toxic plants. Although animals can make the transition to new locations, it usually takes about a year to adjust. This transition can be eased if the food and terrain in the new location are similar to what the animals already know.

Shade

Shade influences grazing distribution on hot summer days. Livestock have been observed to travel considerable distances to reach shade on hot days.

Cattle and sheep routinely seek shade around midday on summer days when temperatures exceed 85 degrees F. *Bos indicus* (Brahman and similar breeds) influenced cattle are less likely to seek shade during the hot midday and more likely to rest in open areas. Cattle with dark hair coats tend to seek shade earlier and for longer periods.

Cattle are more likely to stay around water if shade is available. In comparison, sheep are less likely to rest and loaf near water.

Providing shade has been shown to increase summer-long weight gain in yearling steers. On desert or prairie ranges that have few trees or tall shrubs, artificial shade may help attract animals to undergrazed areas. However, results have been inconsistent with using artificial shade and cover to improve distribution.

Improving Palatability

Some treatments can improve the palatability of forages and/or increase the length of the green period. These treatments act by removing unpalatable species or old growth or stimulating palatable growth. The theory is that improving palatability could attract grazing animals into previously unused or underused areas.

For example, nitrogen fertilization is known to lengthen the green period. Nitrogen can also improve the palatability of some species. However, the economics of fertilizing native grasses only to improve grazing distribution is questionable. Justification for this practice must be based

on the potential to increase forage production and ultimately to increase profit.

Prescribed burning can be used to improve palatability. Burning improves palatability by removing old growth, thus making new growth more accessible. However, be careful to avoid too much grazing pressure by removing less than 50 percent of the new growth. Probably the best approach is flash grazing—grazing for a short period in the spring after a winter burn and then allowing the burned areas 3 to 6 months or longer to recover to a point where normal grazing is feasible without damaging the plants.

Applying herbicides has been suggested as a means to improve palatability. Many weed species are more palatable to grazing animals after herbicide treatment. However, several weed species can be toxic. A management recommendation for these toxic weeds is to avoid grazing after herbicide treatment. Like the use of fertilizers, the use of herbicides to improve grazing distribution is seldom economically feasible.

Recommendations

Each ranch is unique regarding grazing distribution problems. Ranchers should try to solve those problems that are feasible to solve. For problems with no feasible solution, the rancher should understand that these problems exist and adjust stocking rates to account for the reduced carrying capacity they cause so that grazed areas are not overused.

For more information

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