



Interpreting Grazing Behavior

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Forage quantity and quality are important factors in determining grazing animal performance. For this reason, livestock producers need reliable indicators of these factors. Direct measures of vegetation, such as clipping and weighing, are useful for estimating the total amount of forage (plant material) present.

However, only a portion of the total amount of forage present is useful to a grazing animal. Therefore, the behavior of a grazing animal may be a better indicator of the quantity and quality of the portion of the forage present that is directly useful to the animal. As a livestock producer, you can use your observations of grazing behavior to gauge the amount and quality of forage being consumed. The development of this observational skill can provide a powerful management tool for use in estimating the expected direction of animal performance and in making appropriate management decisions.

A number of factors influence which plants are eaten and how much is eaten. This situation makes it difficult to directly relate characteristics of the available forage to the diet selected by a grazing animal. For example, grasses

with similar heights but different amounts of leaf and stem may be eaten at different rates and with varying bite sizes.

How do grazing animals eat?

Grazing consists of searching for forage, selecting forage, and grasping and taking the selected forage into the mouth. Ruminants or grazing animals differ in the way they grasp and ingest forages. These differences are related to the types of forage different ruminants prefer.

For example, unless forage is short, a cow wraps its tongue around forage and pulls it into the mouth (Fig. 1), grips the forage between the upper and lower molars or between the lower incisors and the upper dental pad, and severs the forage from the plant with a backward jerk of its heads.

With their wide mouths and inflexible upper lips, cattle can take large clumps of forage into their mouths. This eating method causes a lack of selectivity and results in cattle eating more dead material than do ruminants, such as sheep, goats and deer, that have narrower mouths and more flexible lips (Fig. 2). These mouthparts also make it more difficult for cattle to select leaves of woody plants (browse).



Figure 1. A cow wraps its tongue around forage to pull it into the mouth.



Figure 2. Goats have narrower mouths and more flexible lips, which allow them to graze more selectively than cattle.

Cattle can improve their diet quality by taking smaller bites than they are capable of eating. They restrict bite size when small amounts of green vegetation are mixed with dry forage. This means cattle or large ruminants must eat slower than small ruminants to avoid undesired dry material. As a result, large ruminants will have to spend more time eating. In turn, because small ruminants require less food, they can be more selective and spend more time searching for high quality, tender, green plant growth.

When grazing animals move into a new pasture, they may spend up to 3 days moving around the boundaries before actually moving into the pasture. Cattle tend to move in straight lines between points during grazing, while sheep tend to move parallel to fence lines.

How do grazing animals learn what to eat and what not to eat?

Early in life, animals learn what to eat and what to avoid from older animals grazing with them. The strongest learning bond occurs between the mother and offspring. Learning from the mother begins during gestation with exposure to flavors through amniotic fluid and continues following birth from tasting mother's milk.

Animals also learn from experience. Grazing animals tend to sample new forages in small quantities. If an animal becomes sick from eating a new food, it will either avoid that food or limit the amount it eats in the future. In general, a toxin must be sensed by the brain within 4 to 12 hours of eating a plant for an aversion to occur. Toxins that act slowly over days or weeks rarely induce aversions.

Ruminants use all their senses in selecting forage, but taste is the most important sense. The sense of smell appears to supplement the sense of taste. Undesirable, unwanted or unpalatable forage often is discarded before being swallowed. The sense of sight allows animals to move about and to distinguish between plant groups and sizes. Ruminants do not see colors, but they are able to distinguish between shades of gray.

When do animals graze?

Daily activity of grazing cattle, sheep and goats is divided between grazing, ruminating and resting (Fig. 3). Including search time, livestock generally graze from 7 to 12 hours a day. The daily grazing cycle tends to be very consistent. A typical daily cycle includes a major grazing period that starts around sunrise and generally lasts 3 to 5 hours, a second major grazing period in late afternoon that generally lasts 3 hours, and shorter and less regular grazing periods around midday and during the night. During the early morning and late afternoon grazing periods, cattle are not easily distracted from grazing, especially in early morning.

How do animals know where to graze?

In pastures with uniform plant composition, day-to-day cattle movement is not by chance. Cattle rarely are observed in the same location for more than 2 consecutive days. In pastures where forage quantity and quality vary, observations indicate that cattle may not return to sites with low quality forage for as long as 21 consecutive days.

Herbivores (plant-eating animals) appear to use two kinds of spatial memory to locate food. Reference (long-term) memory is a map-like representation of the foraging

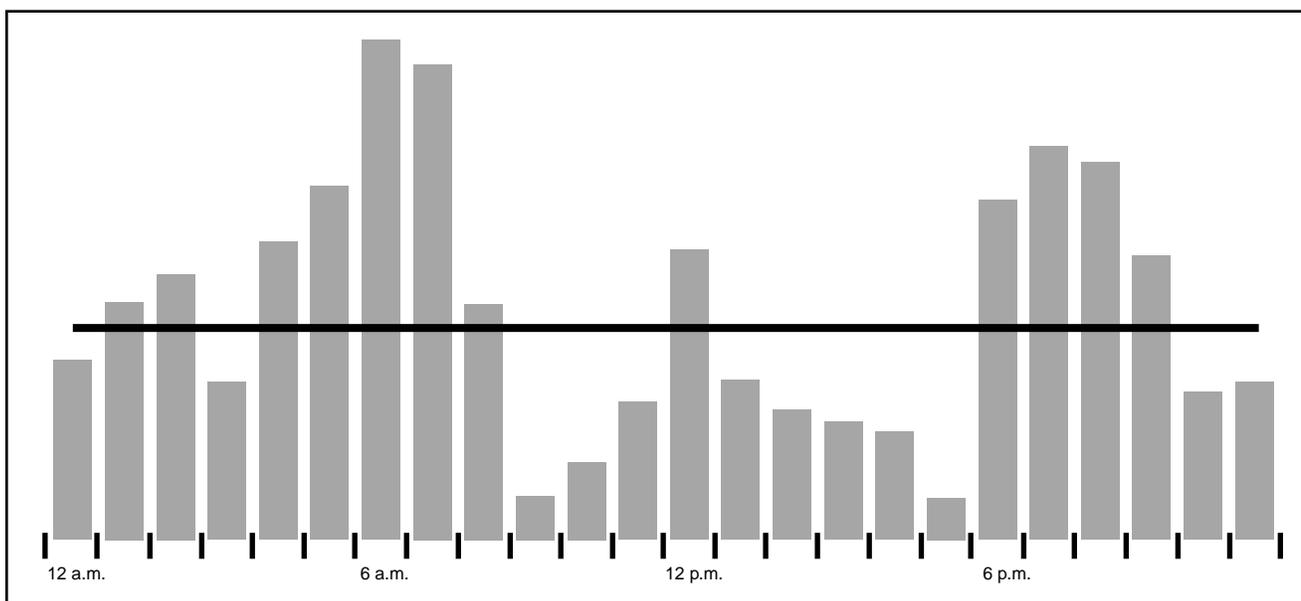


Figure 3. Example of late spring daily grazing periods for cattle. Bars above the horizontal line indicate grazing, while bars below the line indicate resting and ruminating. Note that major grazing periods occurred during the morning from 4 a.m. through 8 a.m. and in the evening from 6 p.m. through 9 p.m. Minor grazing periods occurred from 1 a.m. to 2 a.m. and around 12 noon.

environment. Working (short-term) memory is used to remember which areas have been visited recently. Using working memory, they can remember locations that have been recently depleted for at least 8 hours. Using reference memory, cattle, sheep and goats can remember locations and food availability for at least 20 days and can avoid areas with little or no forage.

Animals could have difficulty adjusting to new foraging environments even if the new location has plenty of forage. 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. New locations with toxic plants are potentially dangerous. Although animals can make the transition to new locations, it usually takes about a year to adjust completely. This transition can be eased if the forage and terrain in the new location are similar to what the animals already know. Young animals and animals with a variety of experiences make transitions easier.

What do grazing animals want?

First, and foremost, grazing animals are looking for green plant material. Their first preference is new green leaves (Fig. 4). When new green leaves are not present, the animals will eat older green leaves, followed by green stems, then dry leaves, and finally dry stems.

This affinity for green plant material remains until almost no green is left. This “chasing green material” explains why cattle often lose body condition during spring green-up. Their preference for new growth overrides their desire to eat quickly until full. Grazing animals also are looking for plants that they consider palatable.

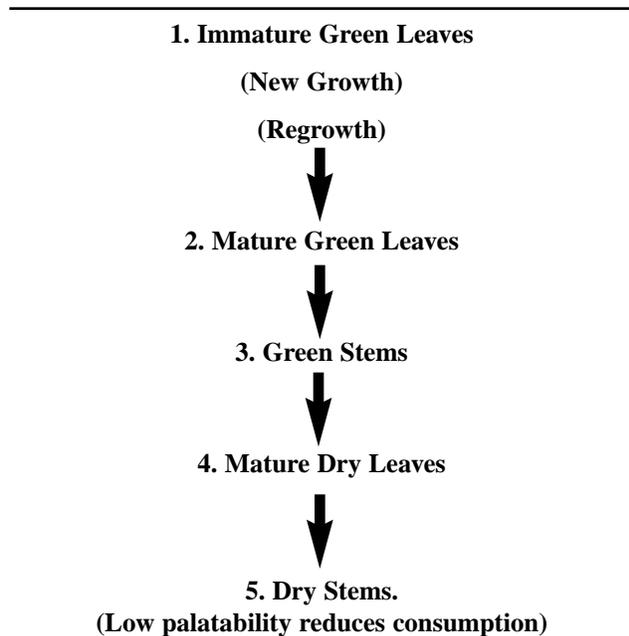


Figure 4. Animal preference for plant parts ranked from highest (top) to lowest.

One theory suggests that grazing animals possess nutritional wisdom, which means that they intentionally or instinctively select forage based on the content of protein, energy or other nutrients. However, there appears to be no scientific evidence to support this theory.

What is forage availability?

Forage availability is not simply the amount of plant material growing in a pasture. Forage availability refers to the part of the plant material that a grazing animal will choose to eat (Fig. 5), and is able to travel to and find. Remember, the preference for green plant material is extremely strong. If green material is present, but only in small quantities, then current forage availability is low.

Cattle can be very selective regarding the species of grasses they eat. In an east-central Texas study, little bluestem and brownseed paspalum made up 81 percent, 95 percent and 80 percent of the grasses in the diets during spring, summer and fall, respectively. In an Oregon study, 79 percent of the diet was made up of two grasses during the vegetative and flowering growth stages. Also, the grass that made up 81 percent of the diet in the vegetative stage made up only 6 percent of the forage standing crop. Some grazing studies have shown that as much as 80 percent of the diet during a season may come from only 1 percent of total forage on rangeland. Preferred forages tend to have a much higher probability of being grazed, of having more bites removed during each visit, and of being grazed again before other forages are depleted.



Figure 5. Initial grazing of Sudangrass leaf blades by goats illustrates selectivity for new green leaves.

How does forage availability affect grazing?

Less time is spent grazing when forage is plentiful and quality is good; more time is spent grazing when quantity or quality is limited. Cattle spend more time grazing when stocking rates are high, pasture is short, or when the standing crop is made up of plant species that differ in the amount of leaf material produced. In one study, heifers increased grazing time by an average of 3.5 hours per day as the amount of available forage decreased.

The demand or high selectivity for limited green material can increase grazing time. In studies under two different grazing levels, grazing time increased when limited green material was available. In lightly grazed situations, grazing time was 8.9 hours on abundant mature growth and 13.9 on short new growth (Fig. 6). In closely grazed situations, grazing time was 6.7 hours on short dry forage and 13.2 hours on short new forage. It seems that if green material is present, grazing animals will spend more time searching for it and will stop grazing when mature forages become scarce.

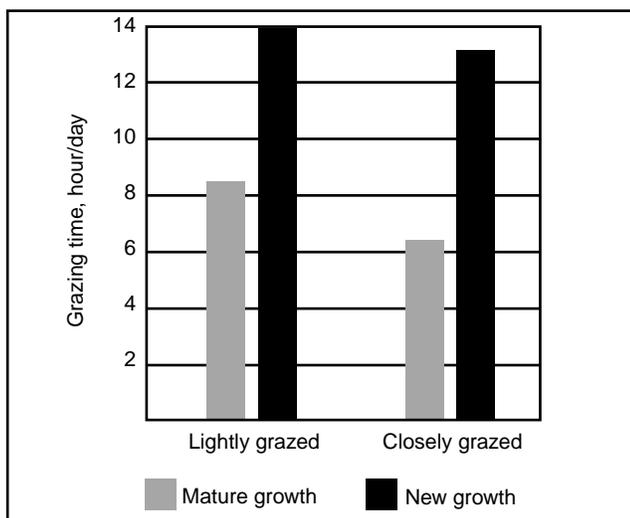


Figure 6. Cattle graze longer to select for short new growth than for either abundant mature or short dry growth.

Group activities also can provide some indication of forage availability. It is normal for cattle in small herds in small pastures to stay together; and it is normal for animals in large herds to be dispersed. On easy topography (level, flat or gently rolling land), cattle grazing in groups of 20 to 30 is normal while groups of six to 10 are more typical on rougher areas. Herding animals tend to graze more as a herd when forage is plentiful (Fig. 7) and more as individuals when forage is scarce (Fig. 8).



Figure 7. When forage is abundant, herding animals tend to graze as a group.

What happens when the amount of preferred forage, such as grass, decreases? Animals are forced to graze other types of plants. Cattle are equipped to eat mostly



Figure 8. When forage is scarce, herding animals tend to graze as individuals.

grasses and forbs (herbs other than grass); in a year, 93 percent of the diet should be composed of grasses and forbs. When forced to turn to browse (shoots, twigs and leaves of trees or bushes), they eat less because they are not physically equipped to select only tender leaves from among twigs or thorns of bushes.

Figure 9 shows the relationship between the amount of browse in the diet of steers and total forage intake.

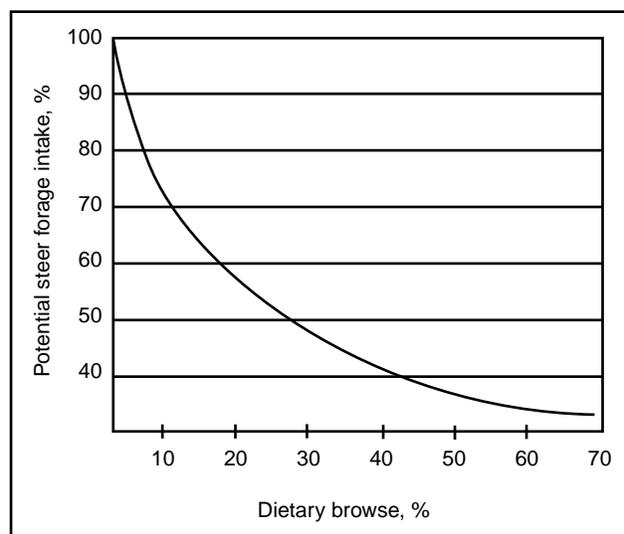


Figure 9. Forage intake for steers in south Texas decreased rapidly when they were forced to eat a greater percentage of browse, a plant type they are not well-suited to eat.

Well-established browse lines (Fig. 10) indicate excessive grazing pressure and a modified grazing behavior. Excessive use of less palatable plants (e.g., prickly pear, juniper, spiny browse) strongly suggests a limited supply of preferred forage.

What is patch grazing?

Sometimes, close and repeated grazing of small patches or individual plants occurs while adjacent patches or individual plants of the same species are left ungrazed or lightly grazed (Fig. 11). This patch grazing is prevalent on sites with high plant density and productivity and with species with fair palatability. Sites that are ungrazed one



Figure 10. Browse lines, especially on low preference plants like juniper, indicate excessive grazing pressure and scarce forage for browsing animals such as deer.



Figure 11. Patch grazing develops from the repeated use of small patches.

year tend to be ungrazed the next year also. The development of ungrazed patches in summer, on mixed prairie with season-long grazing, depends mostly on the patches not being grazed at the beginning of the season. In one study, patch grazing on native mixed prairie was controlled by the use of high steer numbers with intensive, early season stocking. Wolf (large ungrazed) plants tend to develop if the start of grazing in the spring is delayed too long.

Animal droppings also tend to cause ungrazed patches (Fig. 12), while urine tends to cause only an initial aversion. Cattle tend to avoid forage contaminated with their own feces or forage growing near fecal pats. Forage areas that are avoided can be several times as large as the actual contaminated area. With heavy stock density and continuous grazing, rejected areas can cover significant portions of a pasture. This effect can last 2 to several months. In contrast, sheep are not as sensitive to their own droppings.

How does supplemental feeding affect grazing?

The time of day when supplemental feed is offered affects grazing behavior and animal performance. For example, better performance has been observed in steers fed in early afternoon compared to those fed in early



Figure 12. Cattle droppings promote the development of patch grazing.

morning. Steers fed in early morning were fed during a major grazing period and the disturbance of normal grazing resulted in lower performance because steers did not resume grazing for 2 to 4 hours after supplemental feeding.

Feeding interval also affects grazing behavior. During one study, cows fed daily or three times a week came readily to feed when called. However, in the group fed daily, a high level of disturbance was observed among cows, with dominant cows attempting to keep others away from feed. In the group fed three times per week, cows were quieter and less aggressive. Cows fed once a week did not come to feed quickly when called; cows that came first left while feed was still available and cows arriving late were able to eat without being challenged. It appears that fewer feedings of equivalent amounts of protein supplement interfere less with grazing and reduce the amount of time spent at feeding areas.

How does weather affect grazing?

In Texas and the rest of the South, heat and humidity probably negatively influence grazing behavior most of the year. For example, in an Oklahoma study, grazing time was decreased by about 2 hours per day when the temperature exceeded 85 degrees F and humidity exceeded 45 percent.

During summer, midday grazing tends to be reduced or even eliminated and nighttime grazing increases. During prolonged hot weather, night grazing can account for as much as 80 percent of total grazing time. Midday grazing during overcast summer days is normal; midday grazing during sunny summer days indicates that forage quantity is limited (Fig. 13).

Coat color and breed type of cattle also interact with heat and humidity. For example, black cattle typically seek shade earlier in the day than lighter colored animals. British breeds are less tolerant of heat than Brahman-influenced breeds that have heat adaptations such as greater skin surface area and sweat glands to dissipate heat.



Figure 13. Midday grazing in summer is an indication that forage quantity is limited.

What are some recommendations to follow?

Because animals select preferred plant parts (green leaves) or preferred plant species, not all of the plant material present can be considered available to grazing animals. In other words, the amount of forage available for animal use can be limited even though total plant material is abundant. If observations indicate that forage

availability is limited, consider giving animals more area to graze, reducing stocking rates, or weaning early to reduce nutrient requirements.

If purchasing replacement animals, buy from areas with similar topography and plants or plant types to help animals make a faster transition to their new environment. This approach is especially important if toxic plants are found in the new environment.

Offer supplemental feed during midday to avoid interfering with the major morning or late afternoon/evening feeding periods and a possible reduction in forage intake. Consider feeding all-natural, high-protein (greater than 30 percent) supplements once a week. This approach reduces competition at the feeding area and encourages animals to search for forage rather than becoming dependent on supplemental feed.

Finally, use your power of observation to study grazing behavior to gain valuable insight into forage conditions and possible management strategies. Figure 14 can help in interpreting grazing behavior under certain conditions.

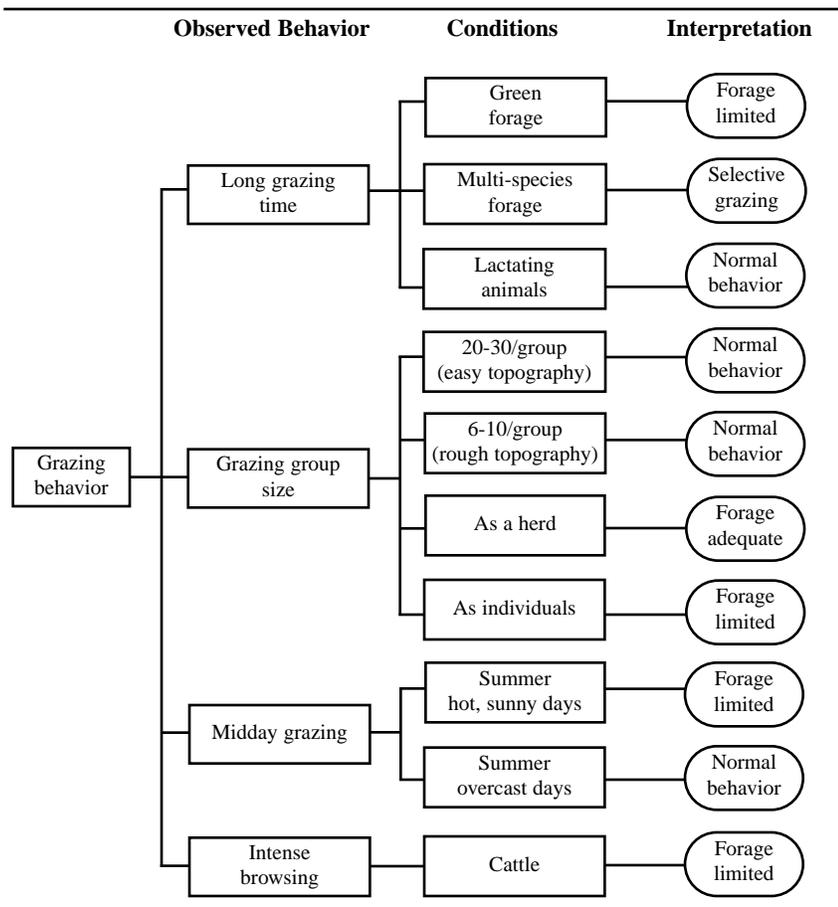


Figure 14. The relationship between grazing behavior and conditions can indicate forage availability.



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