

Grazing Guides

Knowledge of grazing behavior of cattle can aid pasture management.

by **Heather Smith Thomas**

Understanding grazing behavior can help stockmen optimize production when managing cattle on pastures — so knowing cattle can eat a lot of forage in a short time, graze in the early mornings, again in the late afternoon and into the evening, resting during the middle of the day, graze at night in hot weather and have preferences in forage plants can be beneficial.

Plant selection during grazing is partly instinctive and partly learned. Social factors also affect where and when cattle graze; they travel in groups and defer to the lead or dominant animal to make decisions about where and when they graze.

Bart Lardner, research scientist at the Western Beef Development Center, University of Saskatchewan, says ranchers need to be aware of grazing behavior and to use this knowledge to help control animal

distribution on pastures. “If you let them do all the selection on their own, you may run into problems with some areas over-grazed and others under-grazed,” he explains.

If cattle have season-long use in a mountain area, for instance, they may go too high, too soon and overuse immature higher grasses, leaving the lower elevation grasses to become overly mature. It would be advantageous to keep the cattle in lower elevation pastures first — with fences or herding — to make



cattle use the lower elevations while that grass is still green and palatable, allowing the higher elevation grasses more time to grow.

“Cattle have patterns of grazing behavior regarding time of day, preferring to do most of their grazing in the early morning or late in the day when it’s cool. During the heat of the day they rest in a shady area to chew the cud and then head out to graze again in late afternoon,” he says.

Joseph Stookey, Western College of Veterinary Medicine, Saskatoon, Saskatchewan, says cattle have interesting aspects of grazing behavior. “Their natural diurnal grazing pattern, with the largest grazing bout occurring before sunset, matches the plants’ highest nutrient content after a day of photosynthesis. In a choice test, ruminants prefer forage harvested in the late afternoon and evening rather than forage harvested in the morning from the same field,” he says.

Since cattle tend to graze in the early morning and again in the evening, these are the times of day they may eat more feed. “I don’t think people pay much attention to feeding times in relationship to what the animals would do naturally,” Stookey says. “There has been some study looking at this in the feedlot industry, regarding when is the most optimum time to feed,” Stookey says.

Considering the amount of intake when cattle are grazing, Stookey says they eat more in the evening than they do in the morning. “Logically we’d say this is probably because it helps them get through the night, but you could also say that they’d need a big meal after they get up again in the morning to graze, since they are relatively empty,” he notes. “You could justify either time, but we now

realize that the reason they graze more in the evening is because of the nutrition level of the plants at that time of day,” he says.

A series of United States Department of Agriculture studies published in 1999, 2002 and 2005 looked at animals’ ability to choose different forages. “The researchers cut some hay in the morning and some in the evening and used this in these choice tests,” Stookey says. “They’ve done it now with cattle, goats, sheep, and they all prefer and are able to select the hay that’s cut in the late afternoon and evening. When you analyze that hay in the lab, it shows it has a higher level of carbohydrates because that

plant stored more nutrients during photosynthesis through the whole day.”

Carbohydrate level is much higher late in the day. By morning some of the nutrients have moved down into the roots during the night.

“We can’t see any difference with the eye, but the grazing animals can detect the difference in these forages,” Stookey says. After thousands of years of evolution, the grazing animals are well tuned in to the

differences in the forage plants and have a keen sense of what is most palatable and nutritious.

In cold weather, cattle tend to graze after the sun comes up and to stop grazing soon after sundown. “During sunlight hours they also tend to avoid shade, even the shadows of their herdmates, and they prefer to stand perpendicular to the sun to soak in as much warmth as possible. They absorb a lot of heat from direct sunlight,” he says. At sunup they generally get up from their beds and hike to the spot in their pasture where the sun will hit first.

When feeding cows supplementary forage or protein during winter, knowing their

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grazing habits may enable the producer to feed at the best time of day to aid their total intake.

During summer in a rotational grazing or mob grazing program, knowing the natural grazing habits of cattle may help producers decide when the best time(s) of day might be to move them to the new pasture.

Learned behavior

Young animals are highly influenced by their mothers, learning plant preferences and grazing habits from their dams. If cows have been trained to eat certain plants in certain locations, they pass this behavior on to their calves.

Fred Provenza, professor emeritus at Wildland Resources, Utah State University, has been observing and researching grazing for many years. He has traveled to study animal behavior and to consult with stockmen and land managers around the world. When he started graduate school at Utah State University, he and his wife were on a study project in southern Utah near Gunlock.

“The goal was to use goats to prune shrub blackbrush during winter to stimulate new growth,” he says. “This would be like pruning any shrub to encourage more new growth, which is much higher in energy and protein, minerals, etc. than the unbrowsed plants.”

continued on page 78...

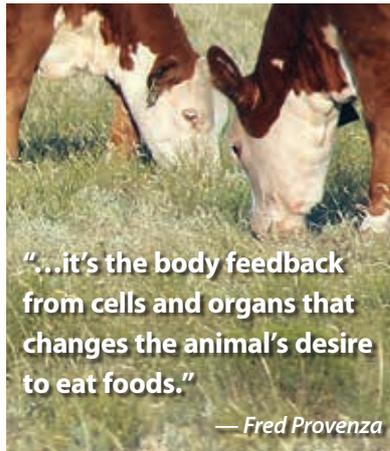
This was 45 years ago, looking at the use of animals to target-graze. “We did this with goats and were able to show that it would stimulate new growth. But the goats wouldn’t eat the new growth. This spurred my interest in grazing habits. We weren’t sure why the goats refused to eat new growth even though it appeared to be most nutritious,” he says.

Provenza eventually found that ‘secondary compounds’ were present in high levels in the new growth compared to those in the old growth, and is the presence of these compounds was the reason why the goats were avoiding the new growth. “The compounds in the new growth bark were about 70% condensed tannins. It was a little bitter, but we came to realize that it wasn’t the taste that deterred the goats. They avoided it because of what happened once they digested it and the tannins got in their bodies,” Provenza says. The tannins probably made them feel nauseated.

“At first we thought they innately knew to avoid the new growth, but we found out later that they did try it — and learned to avoid it after the first bad experience. They were learning, and really quickly. Unless you saw them the first day when they were sampling the new growth, you’d never see them eating it,” he explains.

Provenza had 20 goats in a trial and offered them pelleted chow with tannin on it. On the first day, each goat ate all of the chow. “We were stunned because we’d thought for sure this was the ingredient they were avoiding. So we decided to try it again the next day. On the second day, the goats wouldn’t touch it. We realized they were learning to avoid it based on the consequences after the food got into the body — giving them indigestion.”

Provenza says this was a major discovery because until that time he and his team had thought it was just taste and that animals innately know what’s not good for them. “What this study taught us, and led us to be able to train sheep to avoid the vines in vineyards while using them to keep down the grass



and weeds, is that it’s the body feedback from cells and organs that changes the animal’s desire to eat foods,” he says.

Biodiversity, nutrition and health

Provenza and his team studied grazing behavior for many years, looking at primary compounds (energy, protein, minerals) and secondary compounds (phenolics, terpenes and alkaloids) with relationships between the two.

He says this work led to many insights into the relationships among the different compounds in foods. It also led to a realization that biodiversity is important for health through nutrition — for all animals, including humans. All plants have different kinds of phytochemicals, the secondary compounds.

“When we were starting to study this, the main researchers were at poisonous plant research labs,” Provenza says. “They were looking at things like pyrrolizidine alkaloids or one of the 23 alkaloids in larkspur. Alkaloids were viewed as toxins. But what we were not considering was that in small doses these things can have health benefits.”

When there is a diversity of plants on a landscape, animals learn to mix their diet and to eat only a little bit of each one. “These compounds have an adverse effect on an animal if they eat too much, or cause them to reach a point that they don’t want anymore, ensure that only a little bit is eaten. So the animals mix and match and eat many different things,” he says. This selection ensures that they have a varied and healthy diet, containing all the different things they need.

This is one reason that going away from a natural grazing diet, in which grazers sample a little bit of everything, can be unhealthy, such as forcing animals to graze a monoculture like a pasture planted to just one type of grass.

“As we selected for quantity, such as planting a pasture to a single, high-producing species high in energy and protein but low in secondary compounds, rather than phytochemical richness, we shot ourselves in the foot. Now we have to add a lot of fossil fuel input in agriculture to try to replace the roles that plant diversity and secondary compounds used to play.”

When animals eat a variety of different foods, those foods compliment one another. “There are thousands of compounds that work together and the body utilizes them,” Provenza says. “In agriculture people went to monocultures and sacrificed quality for quantity, trying to maximize production to feed the world — not realizing the drawbacks. What they didn’t know is that when you have enough complexity and quality you don’t need so much quantity,” he explains.

Provenza says they were thinking in terms of energy and protein, rather than phytochemical richness and complexity, not realizing it’s all tied together. “Many of the things those phytochemicals do are now missing in feeds, and we’ve ended up substituting fossil fuel inputs — everything from pesticides, dewormers, to fertilizers,” he says.

Some plants produce natural pesticides and compounds that hinder internal parasites, especially if animals can move to new grazing areas in combination with eating these plants. “There is research now on tannins, alkaloids and terpenes in certain plants that reduce internal parasite loads. When you have a variety of those plants, animals can move around the landscape and eat them, and parasites are not an issue,” he says.

Cattlemen who have decided to avoid the vicious cycle of using chemical fertilizers, dewormers, etc. are finding they don’t really

need them. They just need to figure out how to manage pastures and animals to minimize the problems and to add fertility naturally to pastures. This helps producers stay in business because it cuts costs.

Species diversity

In nature, grazing animals move over the landscape in herds, eating a variety of plants and moving on. Mob grazing simulates this and helps promote plant diversity because all of the plants are allowed

to fully grow and to mature before the cattle come back to that area. Favorite species are not repeatedly grazed and weakened and killed out. Moving frequently as a large herd into new pasture also makes cattle very competitive; they eat aggressively and learn to mix their diets less selectively.

“The frequent movement, and the challenge to eat a variety of plants, helps them learn to mix their diet,” Provenza says. “In nature, animals are always moving.

It is healthy for them, and for the land and plants, to move across the landscape and utilize different foods. They rarely stay long in the same places. This helps them escape predators and also means parasites can’t build up. The movement is important.”

Provenza says it’s healthiest for cattle when they can be encouraged to move to new pastures. There are many benefits that come from eating a variety of plants. **HW**

Learning from mom and nature

The culture we grow up in, human or animal, shapes us. “In our studies we’ve done a lot of work with wild and domestic animals, showing you can change the habits of animals,” says Fred Provenza, professor emeritus, Wildland Resources at Utah State University.

Nature is the guide, and some ranchers are working with what’s natural for their livestock. “We try to think about how these natural systems work, and get back in sync with this,” he says.

Ranchers can utilize natural tendencies of grazing animals for better management and can change some of these animals’ bad habits — such as training lazy pasture cattle to climb up out of riparian areas and lowlands and use more of the upland areas for grazing. It’s all part of the culture they learn, regarding the foods they eat and places they go. Calves learn their habits from their mothers, so if producers can train the cows to utilize a range more efficiently and effectively, the calves will develop those same good habits.

“This is where we can have a positive influence. We all get into habits that are not the best for us, and sometimes need to be re-trained.” Flatland-pasture cattle that haven’t had to climb hills and work for their feed, or have depended on someone bringing feed to them, are reluctant to change unless someone shows them another way. Cattle take the easy way, welfare mentality, if producers pamper them too much and kill their creativity.

“When we were working with Bob Budd at Red Canyon Ranch, Bob was showing people that with good stockmanship

they could change the culture of a cattle herd from bottom dwellers to ambitious animals that live in the uplands. Once you change their culture you don’t have to do as much, because the cows teach their offspring.”

Budd hired a rider full-time the first summer to continually move cattle to uplands to show them there was good feed there. They learned the advantages of being on the ridges where there was a cool breeze and fewer flies—and more forage. “The first year is the toughest, and by the third year you have the job done,” he says. If producers keep replacement heifers from those cows, those replacements already know good habits, learning from their mothers.

“For better land management, we can use cattle grazing and stockmanship, as well as strategic supplements that help cattle use plants like sagebrush,” Provenza says. “In our work we’ve done a lot of this to integrate cattle and sheep for sagebrush control rather than using herbicides or mechanical treatments. If we implement livestock into the system, they become a part of rejuvenating their own landscape.”

Provenza found the best time of year for grazing sagebrush is late fall/winter. The deterrent compounds in sagebrush—terpenes—are at low concentration then, and it’s easier for the animals to utilize sage as part of their diet.

“Producers with sagebrush land can strategically supplement cattle out there, moving them across the landscape,” he explains. “This creates mosaics and patches of changed vegetation. You can’t change thousands of acres all at once, but you can work at it to rejuvenate the landscape.” **HW**

