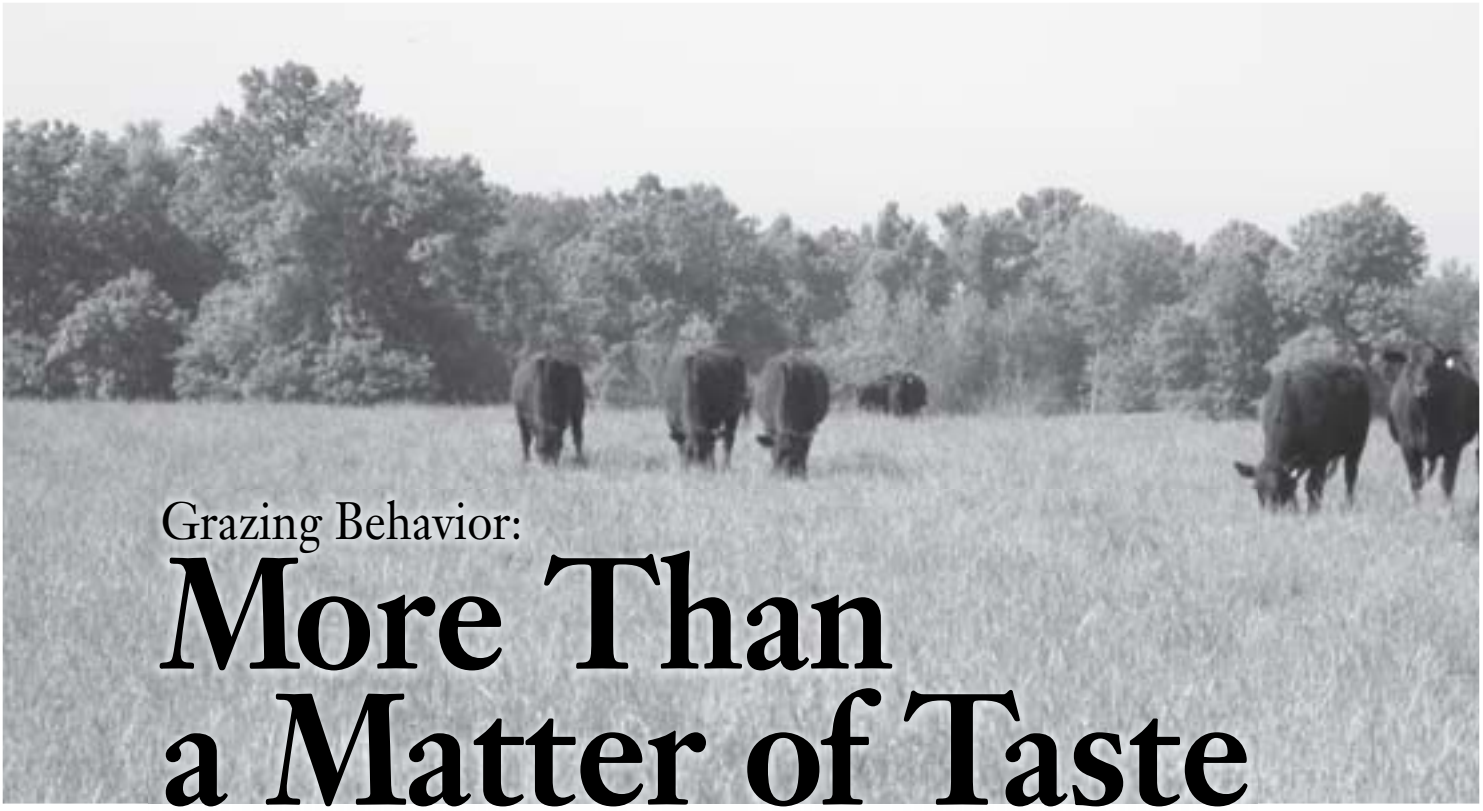


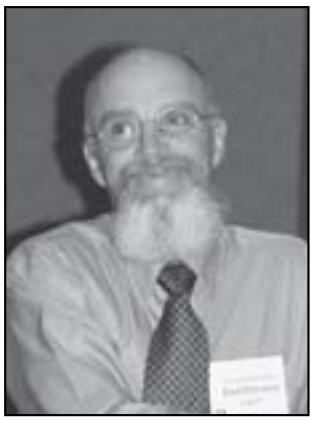
[PHOTO BY SHAUNA ROSE HERMEL]

Grazing Behavior:
More Than a Matter of Taste

Story & photo by
TROY SMITH

Have you ever pondered the reasons why grazing animals behave as they do? Are there reasons why cattle prefer some forages to others? The reasons why livestock select certain species of plants is important to management of grazing lands. Unfortunately, while striving to make a better living, beef producers often ignore the subtleties of how animals make their living.

According to Fred Provenza, Utah State University professor of forestry, range and wildlife sciences, simple strategies that apply knowledge of animal behavior can improve the efficiency and profitability of grazing operations. The same strategies can improve the quality of life for managers, as well as their animals, and improve the land.



Utah State University professor Fred Provenza says bio-feedback, social interaction and environmental factors influence grazing behavior patterns.

Flavor-feedback interactions

Grazing behavior is thought to be based on plant palatability. It has long been assumed that grazing animals select plants with a more pleasant taste. Sometimes, however, animals will graze "weeds" thought to be unpalatable. Provenza insists that palatability is more than a matter of taste. Rather, it is a result of the interrelationship between flavor and post-ingestive effects or feedback. This feedback, Provenza says, is the body's response to nutrients and toxins contained in the forage.

"Feedback is positive and increases palatability if a food meets nutritional needs," Provenza explains. "Feedback is negative and decreases palatability if the food is inadequate or excessive, relative to nutritional need, or if the food is toxic."

Even nutrients (energy, proteins and minerals) consumed in excess can become toxic. And toxins (plant compounds such as alkaloids, terpenes and tannins) consumed in low doses can have nutritional benefits. It's a matter of dosage, Provenza notes. Generally, grazing animals instinctively seek to rectify an imbalance of nutrients and toxins. While there is no evidence that animals will selectively graze to prevent nutritional deficiencies, they will seek out foods to correct deficiencies.

Post-ingestive effects

By understanding how flavor-feedback interactions change palatability, managers can influence their animals' forage preference and intake. As an example, Provenza notes how animals can be induced to eat plants containing tannins. These astringent compounds are often present in woody plant species. Tannins may lend an unpleasant flavor, reduce the digestibility of protein and energy, and may be toxic. But animals fed small amounts of polyethylene glycol will eat much more forage containing high amounts of tannins. So granulated polyethylene glycol mixed with other supplements can be used to train animals to eat unpalatable plants.

"Polyethylene binds with tannins, preventing their negative effects," Provenza explains. "So it is the aversive post-ingestive effects — not the flavor — that render plants high in tannins unpalatable. Positive feedback can make high-tannin plants very palatable."

Deficiency cravings

According to Provenza, animals deficient in nutrients will seek new foods. They are likely to develop a strong preference for certain foods, no matter how odd, if they correct a nutritional deficit or imbalance. Provenza cites a Utah study involving winter-grazing of goats that showed how animals can develop a preference for unusual food sources. The goats began to eat wood rat houses because the rodent's nests contained urine-soaked (nitrogen-rich) vegetation that helped the goats remedy a nutritional deficiency.

Provenza says getting too much of a good thing also causes animals to reduce their intake of certain foods and seek alternatives. Cows grazing legume pastures may have a diet too high in protein relative to energy, resulting in ammonia toxicity. The dietary imbalance can cause cows to hunger after low-quality forages. Cattle on a high-grain diet will eat bentonite to alleviate acidosis, and, in turn, increase grain consumption.

Social factors

Cows have culture, too, Provenza says, adding that social influences also affect grazing behavior. While scientists and managers commonly focus on how the physical and chemical characteristics of plants influence animal intake, the social environment is a factor. The young animal's interactions with its mother and peers have a lifelong influence on where it goes and what it eats. When managing pastures and range containing a variety of forages and terrain, it is important to understand how social factors

affect animal performance and carrying capacity.

Provenza says dairy cows make a good example. To reduce the high cost of feeding lactating dairy cows in confinement, many dairy producers have turned to intensively managed pastures as sources of lower-cost, high-quality forage. However, a dairy animal reared in a barn, on a processed ration, doesn't know how to forage outside on its own.

Fear and stress of new environments and foods can cause huge decreases in food intake and milk production. Changes in management require animals to learn new patterns of behavior, which can decrease performance (body weight and condition, as well as conception rates) for one to three years, Provenza states. For producers applying holistic management principles, the issue of livestock culture has huge implications. It may explain why so many have struggled with the transition to intensively managed grazing systems.

Provenza says grazing animals, like humans, also prefer variety. He cites a study where cattle fed barley, corn, alfalfa and corn silage separately were compared with animals fed a mixed ration containing those same ingredients. Averaged throughout the trial, the intake of animals offered the mixed ration was slightly greater, but they did not gain at a faster rate than animals offered a choice. Gain per unit of feed (efficiency) was similar for both groups, but feed costs were less for animals offered a choice.

The study suggests that animals meet their needs for energy and protein more efficiently when offered a choice among foods than when fed a mixed ration, even when the mixed ration is nutritionally balanced. Provenza says allowing individual animals to choose their own diet may be less stressful, thereby reducing illness and improving performance.

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"Boom-bust" grazing

Provenza says Montana rancher Ray Banister's experience illustrates the significance of animal behavior. Bannister changed from a rotational grazing system, where pastures were grazed for relatively short periods followed by periods of rest, to "boom-bust" management consisting of intensive periods of grazing followed by two growing seasons of rest. Bannister's cattle were no longer allowed to eat only the most palatable plants, as they had under the previous grazing system. Instead, they were forced to eat all of the plants.

And instead of monitoring only the most favored forage species, Bannister began monitoring the least palatable plants, such as sagebrush and various weeds, as indicators of when to move cattle to another pasture. Cattle are moved only after their use of the unpalatable species reaches high levels. In doing so, the unpalatable plants lose the competitive advantage they had when cattle were allowed to graze selectively.

Ultimately, the cows learned to mix their diets in ways that better enabled them to eat a greater variety of plant species. Cattle likely mitigate the negative effects of tannins by eating more palatable and nutritious plants along with the species containing high levels of tannins. The higher the nutritional plane of the animal, the better the animal is able to neutralize toxic compounds found in all plants. But the cattle did not adapt overnight.

"It took Ray's cows three years to adapt to the boom-bust style of management. During that time, the weaning weights of calves plunged from robust animals well over 500 pounds to scrawny individuals that weighed closer to 350 pounds — and then rebounded back to over 500 pounds," Provenza offers.

"Once the older cows made the transition to a new way of behaving, the young calves were able to learn from the mothers how to thrive under boom-bust management. The calves that Ray keeps as replacements never have to make the harsh transition. They were trained by their mothers that all plants are food at Ray's place."

Provenza says Bannister's change in management has increased carrying capacity, reduced soil erosion and made his operation less subject to the adverse effects of drought. A diversity of micro- and macro-habitats has been created, with a reduction in undesirable plants. Boom-bust management taught Bannister's cattle to use a greater variety of plants, mixing the best with the rest. Unfortunately, Provenza laments, generations of managers have been trained to do just the opposite. By focusing on key species, they take the best and leave the rest.

"Scientists and managers often ignore the power of behavior to transform systems, despite compelling evidence. We know that the environment acting on biological steps is as important in shaping creatures as their genetic code. For those willing to understand how environment interacts with the genome to influence behavior, the potential is virtually unlimited," Provenza states. "People who understand and use behavioral principles in management can enhance the welfare of animals and the integrity of the land."

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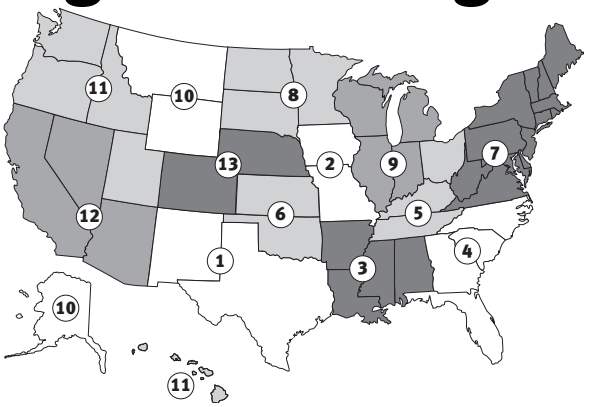

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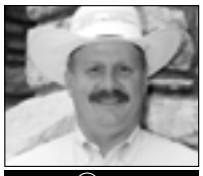

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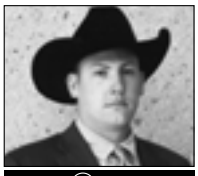

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