Thirty Years of Research in Less Than a Page
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How do livestock learn?
1. They learn which foods to eat from mom, other adults or peers.
2. They learn to avoid plants that mom avoids.
3. They learn about foods in utero and from mother's milk.
4. They remember foods that cause aversion or preferences for at least 3 years.
5. They form preferences due to positive feedback from energy, protein, minerals and recovery from illness.
6. They learn to avoid foods that cause nausea or are Low in nutrients.
7. They learn more efficiently in familiar rather than unfamiliar environments.
8. They must learn how to eat (acquire foraging skills).

What can livestock learn to do?
1. They learn to use medicines (tannins for internal parasites, bentonite or bicarbonate for grain acidosis, PEG for tannins, etc.)
2. They learn to balance their own diets on pasture, rangeland or in feedlots better than the human balanced diets we often provide.
3. They learn about foods with long delays between food ingestion and illness.
4. They learn to mix foods that contain toxins to safely increase intake.
5. They learn to use supplements that help them eat more foods that contain toxins.

Factors affecting preference for foods and habitat:
1. They prefer familiar to novel foods.
2. They prefer to forage with companions than strangers.
3. They prefer to eat a variety of foods rather than a single plant or food.
4. They prefer to eat foods with similar rates of protein and energy degradation.
5. Food preferences depend on an animal's physiological stage, available foods, and its past dietary experience.
6. Experiences early in life can change the physiology, morphology and neurology of the body.
7. They prefer the home ranges of their mothers.
Understanding livestock behavior may enable us to:

1. Increase consumption of sagebrush by sheep and cattle to reduce winter feed costs and improve habitat for wildlife.
2. Improve riparian and upland conditions using low-stress livestock handling or molasses blocks to improve livestock distribution and extend the grazing season.
3. Reduce feed costs and possibly reduce output of N and P in manure by giving dairy and beef cattle a choice of feeds.
4. Improve livestock gains and health on grasses high in alkaloids (endophyte infected grasses).
5. Reduce mineral costs and prevent mineral deficiencies by allowing animals to regulate intake of needed minerals.
6. Control noxious weeds by training sheep, goats, and cattle to eat weeds and using appropriate grazing management.
7. Improve utilization of and productivity on poor-quality roughages by exposing animals to poor-quality roughages early in life.
8. Reduce hay feeding in winter to improve ranch economics and sustainability.
9. Train animals to mix their diets to achieve better utilization of all forages on rangeland.
10. Create pasture mixes to increase productivity and better utilization of nutrients.
11. Train animals to self-medicate on pasture and range to reduce parasite infestations and bloat.
12. Reduce predation by bonding sheep and goats to cattle.
13. Change feeding practices in early spring to reduce nitrogen in animal waste and improve performance.
14. Improve acceptance and animal performance on unpalatable plants by feeding pregnant animals unpalatable plants, such as sagebrush, to expose their offspring in utero.
15. Use animals to control weeds in orchards, vineyards or berry patches by averting animals to berry plants, grapevines or fruit trees.
16. Improve intake and feedlot performance by exposing animals to concentrates early in life.
17. Improve gain and reduce illness in feedlots by offering a choice of appropriate foods and using low-stress livestock handling.
For 30 years, researchers at Utah State University studied why livestock eat what they eat and live where they live. Their program known as BEHAVE (Behavioral Education for Human, Animal, Vegetation and Ecosystem Management) is the foundation for new ways to manage livestock. Understanding principles of behavior may enable managers to create livestock that fit rangelands rather than changing rangelands to fit livestock.

Managers can increase their profitability while turning their livestock into an economical and environmentally friendly tool by:
- turning weeds and sagebrush into forage
- improving wildlife habitat
- lowering finishing costs
- extending the grazing season

How do animals learn?

**Behavior is Flexible**
Many of the early studies on behavior simply described the behavior of livestock. Researchers treated behavior as if it were set-in-stone, but any behaviorist can tell you that behavior is flexible and can be shaped throughout an animal's life.

**More Than Genetics**
Every animal is the sum of its genetics plus experiences in its social (mom and peers) and physical (where it was raised) environment. These experiences can cause changes in physiology, the nervous system and physical structures of the body. Animals change throughout their lives based on their experiences. However, experiences early in life often have the greatest effect on animals and can even affect gene expression.

**The Simplicity of Behavior**
Understanding the behavior of any animal is simple: behavior depends on consequences. Positive consequences increase and negative consequences decrease the likelihood of a behavior reoccurring. The flexibility of behavior helps animals adapt to different or changing environments. It gives managers opportunities use consequences to change the behavior of animals.

**It all Begins with Mom**
Early in life, food preferences are shaped by a young animal's interactions with its mother. Learning from mom is efficient. She's a good role model because she's been successful enough at foraging to grow up and reproduce. She knows which plants are harmful and which are nutritious. She passes this knowledge on to her offspring because young animals graze close to their mothers, eating the foods she eats and avoiding those she avoids.
Animals Can Detect Nutrients and Toxins
After weaning, animals continue to learn about foods through trial and error learning. They sample novel foods carefully. If they experience positive nutritional consequences, they increase intake of food. If consequences from food are negative because it is toxic or contains too many or too few nutrients, they learn to avoid or reduce intake of the food. Thus, animals prefer or avoid foods by pairing a food’s flavor with its post-ingestive consequences. Flavor is the combination of odor, taste and texture. Post-ingestive consequences result from feedback from cells and organs after an animal eats a food. Thus, foraging behavior depends on consequences.

Animals Can’t Be That Smart
Forming food preferences isn’t a matter of intelligence because changes in palatability occur automatically. Animals don’t need to think about or remember the flavor-feedback event. The same is true for digestion. We don’t have to tell the pancreas to release a dose of insulin after we eat sugar. Even when animals are deeply anesthetized, feedback still causes changes in the palatability of a food. When sheep eat a nutritious food followed by a toxin dose given during deep anesthesia, they become averse to the food because the negative feedback of the toxin still occurs even when the animals are deeply asleep.

How can understanding behavior help land managers?

A spoonful of nutrients helps the sagebrush go down.
The key to getting animals to eat certain plants might be supplements. For example, sheep, cattle and goats eat more sagebrush despite its terpene content when they’re supplemented with protein and energy. Grazing sagebrush in the fall when forbs and grasses are dormant can reduce sagebrush abundance, increase plant biodiversity, improve wildlife habitat and lower winter feeding costs.

Cows Learn to Eat Noxious Weeds
If you can’t beat ‘em, eat ‘em. By understanding how animals learn to eat new foods, researchers have developed a simple process to teach cows to add a new weed to their diets in just 5 days. When weeds become forage, we can manage grazing to reduce their abundance, use of herbicides and costs of weed control. To date, cows have been taught to eat Canada, distaff and Italian thistle, leafy spurge, spotted and diffuse knapweed, black mustard and more.

Extend the grazing season
Molasses-based blocks can extend the grazing season on rangelands with ample dry forage. They work by luring animals to areas far from water or steep and difficult to graze. Benefits include longer forage stubble height in riparian areas, maintaining body condition of cows in summer and fall, and lower feed and labor costs by replacing hay with less expensive forage.

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