Training Animals to Avoid Foods

Sometimes just a single plant prevents managers from grazing herbivores in a particular pasture. In some cases, the obstacle may be a palatable poisonous plant, like locoweed or larkspur, that keeps animals from using other nutritious forages present on the site. In other cases, the barrier is a tasty plant with high agronomic value, like fruit trees or Douglas fir trees. Livestock could easily graze fruit orchards and forest plantations, improving fruit harvest and tree growth, if only they could be persuaded not to eat the trees. In such cases, the key is to train the critters to avoid the palatable food.

How can livestock managers accomplish this useful trick? Herbivores can be trained to avoid particular foods by using toxins to create food aversions, and when properly conditioned, aversions can persist for years. Aversions to plants like larkspur and locoweed have persisted for as long as 3 years with cattle herds of up to 75 individuals. Aversions to shrubs like serviceberry and mountain mahogany have persisted for at least a year in sheep.

Animals quickly learn to avoid a food when gastrointestinal illness due to toxicosis follows food ingestion. This can be accomplished by giving a toxin to an animal immediately after it eats the food. However, if the animal samples the food later while foraging on pasture, and does not experience illness, the positive consequences of nutrients may cause the animal to begin eating the food again. Therein lies the challenge. How can one create aversions that are so strong animals will never sample the food? Here, we outline how to condition a food aversion and some factors that affect how long an aversion will last.

Establishing a food aversion.

The best way to teach an animal not to eat a particular plant is to pair eating the plant with toxicosis. Toxins cause food aversions by stimulating the emetic system of the mid-brain and brain stem, the same feedback system responsible for nausea in humans. Lithium chloride is ideal for inducing aversions because it can be administered in doses high enough to condition strong aversions with little fear of causing death.

During conditioning, animals are allowed to eat the target plant, then given a dose of lithium chloride. The toxin is usually delivered in a gelatin capsule with a balling gun, or in a solution via a stomach tube, immediately after the animal eats the food. Animals are usually trained in pens where access to foods can be controlled and where they can be observed to ensure that each animal consumes the target plant. Once the aversion is established, animals are allowed to forage on pastures or rangelands, with less fear of the animal eating the target plant.

Novelty, amount and frequency.

The strength of an aversion depends on the salience of the food's flavor, its novelty, and the dose of the toxin. Generally, the stronger and more novel (new and different) the flavor, and the higher the dose of the toxin, the stronger and more persistent the food aversion. Aversions to foods are most persistent if animals get very ill the first time they eat the food. That's how many plants deter herbivores. The least palatable plants have strong, novel flavors and maintain high levels of

toxins. Herbivores experience illness every time they eat the toxic plant. It is much harder to condition a lasting aversion to a previously eaten food - especially a nutritious food - because animals are more likely to resample the food. If they sample the food and do not experience toxicosis, the aversion will quickly fade.

The strength of an aversion also depends on the frequency of the flavor-feedback consequence. Allowing animals to eat (resample) the target plant over several days, each meal of the plant followed by a dose of the toxin, reinforces the aversion. Animals often sample some of the target plant the day after dosing, even with a high dose of a toxin like lithium chloride. Generally by the third day they show no interest in the target plant.

Age of the animal. Younger animals can be more difficult to train than mature animals. Older animals are more set in their dietary ways. Thus, they are less apt to eat a new food, provided they have an ample supply of familiar foods, and they are less likely to resample a novel food if ingestion of the new food is followed by illness. On the other hand, young animals are learning about new foods. Thus, they are more likely than adults to eat novel foods and to resample new foods previously paired with illness. When a young animal eats the target food without experiencing illness, the aversion quickly diminishes.

Social Influences. Young animals are prone to eat foods their mothers eat and avoid foods their mothers avoid. Nevertheless, they also learn on their own by cautiously sampling new foods. If young animals experience positive nutritional consequences from a food, even if it is a food their mother avoids, the youngsters will increase the amount of the food in their diet, whether or not their mother eats the food. Likewise, if they experience toxicosis from a food mother eats, the youngsters will decrease the amount of that food in their diet.

Finally, animals trained to avoid a plant should not be allowed to forage with untrained animals that eat the plant. When trained and untrained animals forage together, the trained animals are more likely to sample the plant, which allows nutritional benefits of eating the plant to counter-condition the aversion. A group of cattle trained to avoid larkspur did not eat larkspur for 3 years after the aversion was established. However, when they were allowed to forage with cattle that ate larkspur, the aversion extinguished after 2 weeks.

Nutritious alternatives. Once an aversion is established, it is critical that animals have access to a variety of nutritious alternatives. It is not enough simply to cause an aversion to the target plant. When the option is to eat the target plant or starve, animals eat, even if the plant is toxic. Lack of alternatives can also be a problem in bedding areas and in areas where salt, water, and supplemental feed are placed because these areas tend to be over used. Animals are usually hungry after resting or drinking but often wait for the herd before moving to forage. If the target plant is the predominant food in the area, hungry animals may sample the plant, and in the process extinguish the aversion. Thus, salt, water, supplemental feed, and bedding areas should be in areas devoid of the target plant.

References

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Funding provided by Utah Agricultural Experiment Station and USDA-IFAFS. Produced by Utah State University in collaboration with University of Idaho, University of Arizona, Montana State University and the National Wildlife Research Center with research conducted at Utah State University.

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