Grazing Patterns

Elk and cattle on the V Bar V

The controversy over multiple use of rangelands in Arizona often focuses on whether or not cattle grazing interferes with wildlife grazing, particularly elk. What the debate lacks is reliable data to show exactly how cattle and elk grazing patterns do or do not overlap.

A study now in progress on the V Bar V Ranch, a University of Arizona research facility in northern Arizona, is designed to provide some of this missing information. Lacey Halstead, a graduate student in the School of Renewable Natural Resources in the UA College of Agriculture, is measuring forage use in an existing grazing allotment to determine the feeding patterns of both cattle and elk.

The study site, characteristic of other ranches at this elevation, is located in the Cedar Flats portion of the ranch, at an altitude of 5500-6000 feet. This part of the ranch has six pastures; Halstead is monitoring four of them, about 600 acres. The University of Arizona is authorized by the U.S. Forest Service (USFS) to graze up to 550 head of cattle on the allotment (*see sidebar*).

The cattle will graze two of the pastures this year, and the other two next year. This USFS plan theoretically rests half of the allotment by attracting elk to pastures recently grazed by cattle, Halstead says. "The USFS system also aims to promote equitable and sustainable levels of forage use by cattle, elk, and other wild ungulates, and improve forage quality by encouraging removal of older growth."

Halstead, who is working with professors Larry Howery, George Ruyle and Paul Krausman, all from the School of Renewable Natural Resources, wants to determine how the elk interact with the cattle in this system.

"Does the grazing system encourage elk to use pastures recently grazed by cattle?" she asks. And does that keep the elk from using the pastures that have been rested from cattle grazing? Halstead also wants to find out what effect the grazing system has on relative forage use by cattle and elk in rested and grazed pastures, and whether the USFS height-weight technique is as reliable for measuring forage use as another method called the paired-plot technique.

The two-year study, begun in March of 1997, has three goals: 1) to determine relative forage use in pastures scheduled for rest and for cattle grazing, immediately *before* cattle enter the grazed pastures, 2) to determine relative forage use by cattle and elk *after* cattle exit grazed pastures, compared to relative forage use by elk in rested pastures, and 3) to determine total forage use in rested and grazed pastures *three to four months after* the cattle have exited the grazed pastures.

Halstead measures relative use by checking the difference in the amount of forage in caged or protected plots versus unprotected plots. The paired-plot system involves setting up sturdy metal cages, also called exclosures, at random intervals across the allotment, and marking off plots of corresponding size without cages.

"Each pasture has three key areas, with six cages per key area, or 72 in all," Halstead says. "The cages have a base four feet square and are pyramid-shaped to keep them from getting stepped on or knocked over. Each time we go out we sample from two cages per key area by pulling them up to clip the vegetation. The cages are portable and can be moved from year to year. We also sample from four unprotected plots per key area."

Along with the paired plots, Halstead is measuring height-weight relationships of grasses along transects, where she checks the height of plants along a premeasured, staked line, and clips some of the grass to weigh it. She uses the grass weights to make a height-weight relationship gauge that translates heights of grazed plants into percent weight removed and then to percent utilization. She's comparing the two monitoring techniques using western wheatgrass, a key species in the area as an indicator of forage use.

"The context of this study is that these federal land grazing permits are being managed with a lot of resources in mind, not just livestock management," Ruyle says. "You need to have all these other concerns for wildlife in your grazing plan. The specific issue in this study is the elk. The grazing system itself is planned so that cows are in pastures a short period of time. It's aimed at fairly light utilization, with grazing periods as short as a few days all year long, then no grazing for months."

L. Howery

Lacey Halstead with enclosure cage in pasture (March 1997).

D. Womack

Note growth around cage in June, 1997.

Ruyle adds that the data Halstead is collecting will be important not just for elk management but also for the whole multi-resource scheme. Besides elk, other ungulates that graze in the area include pronghorn, mule deer, and white-tailed deer.

Preliminary results, from data Halstead gathered during the spring and fall of 1997, indicate that the grazing system may be working differently than it was originally intended.

"We're finding that the elk are grazing where the cattle are not," Halstead notes. She thinks timing may make a difference. "This grazing system is designed to attract elk to the pasture after the cattle are there. In the winter, it does that. But in the spring they're on the opposite side of where the cattle are. They're where the cattle were last year. There are reasons for that--topography is one, the amount of tree cover is another. We have more tree cover, which the elk prefer, on the pastures not grazed this year by cattle."

The researchers found that levels of utilization in the pastures were light, Ruyle says. The study has another year to go, and it may help the USFS with its original goal of designing a grazing system where the cattle and elk both benefit.

"Hopefully the agencies will be able to use this data to adjust grazing management in the future," Halstead says. "You can't really herd elk around but you might be able to manage elk grazing by managing cattle, and that's a really important thing to know."

— Susan McGinley

The Study Area

The V Bar V Ranch and its associated Walker Basin allotment are located in the Beaver Creek and Long Valley Ranger Districts of the Coconino National Forest. The grazing allotment is divided into two main portions running west to east, with three seasonal grazing divisions, (i.e., winter, transitional and summer) in each portion. Each year, the cattle are moved up the elevational gradient through pastures on either the north or south half of the allotment during the growing season and then moved down the elevational gradient on the same half during the dormant season. The other half of the allotment is rested the entire year. Within the grazed half of the allotment, cattle are moved among pastures about every 10–14 days to promote uniform grazing on current growth and to prevent cattle grazing on regrowth.

L. Halstead

David Womack measures range grass.

— Lacey Halstead

Parasitic Wasps

Protecting greenhouse tomatoes

Parasitic wasps don't sting and they're hardly larger than the whiteflies they attack. Yet with careful monitoring both exotic and domestic species are becoming successful biological control agents on greenhouse tomatoes in the U.S. Southwest and in Europe.

Oscar Minkenberg, an entomologist in The University of Arizona College of Agriculture, and his staff raised nearly 30 million wasps last year for inundative release in commercial greenhouses and research facilities.

"We're currently producing three strains of wasps from Israel, the United Arab Emirates, and Pakistan," he says. "They were collected in the field over there by collaborators in the USDA/ARS. At the UA we developed a unique, mass-rearing technology that enables us to produce large numbers of the wasps for release here in Arizona, and in other states and countries."

Why use a mini-wasp? Most of the chemical sprays that kill whiteflies also kill the bumblebees that pollinate the tomatoes in greenhouses. Growers have been searching for ways to handle their insect problems without using pesticides.

Whiteflies damage plants by piercing leaf surfaces, sucking vital fluids and potentially transmitting viruses. They exude a sticky substance called honeydew that turns leaf surfaces black, cutting off the light the plant needs for photosynthesis. In Arizona the Bemisia species, or silverleaf (sweetpotato) whitefly has caused crop losses in cotton, melons and other vegetables, and has attacked greenhouse vegetables and flowers as well.

Parasitic wasps attack whiteflies by laying their eggs on or under the whitefly nymphs. As the wasp larvae feed, they destroy the whiteflies and emerge as adult wasps to begin the life cycle again. They do not injure the plant or other beneficial insects. The trick is to keep the balance between predator and prey steady enough to ensure the wasps a constant minimum supply of food while minimizing crop damage.

Arizona cotton growers, the Arizona Cotton Research and Protection Council and USDA/APHIS support biological control, according to Minkenberg, and they have funded mass rearings of parasitic wasps for release in Arizona.