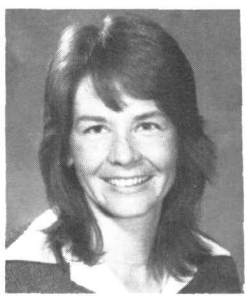
**There are drawbacks, however.**

"I guess my continual exposure to the ranch has clouded my innovation somewhat. That's why I appreciate the interns."

Besides serving on the SRM advisory council and helping to further the field among youngsters, Irene has had a chance to return a favor. Nowadays, when Don Cox, a former SRM president, is able to attend a far-flung range activity, it is often because his former pupil, Irene Graves, has made the effort to get him there. ●

# Grazing Crested Wheatgrass Range in the Intermountain West

**Don D. Dwyer and Mia E. Owens**



*Mia Owens*

Crested wheatgrass has been called the "golden grass of the West" not only because of its late summer and fall color but also because of its grazing value for livestock and wildlife. For most Intermountain ranchers, crested wheatgrass is critical to their livestock production system. The discussion that follows helps to describe why the grass is so important to ranching and how current research is contributing to its use and management.

### Year-long Ranching Enterprise

During the course of a year the typical Intermountain area cow-calf operator uses several kinds of seasonal rangelands, from low-elevation desert winter range to high-mountain forested summer range. Each type of range varies with respect to its inherent productivity, animal carrying capacity, and management problems. Together, they represent the component parts of a rancher's entire year-long enterprise. In general, the principle of limiting factors applies to the extent that the maximum size of the livestock production unit is determined by whichever seasonal range has the smallest total grazing capacity. Throughout much of the Intermountain area the mid-elevation foothill range type (range occupying the 6,000 to 8,000-ft elevational zone) used principally for spring grazing, sets the upper limit on the size of the year-long operation.

*In comparison to mountainous summer range, the foothill* type is limited both in extent and inherent productive capacity. Also, in contrast to desert winter range, the foothill type, while more productive, is much smaller in area. Those operators who must supplement or replace native winter forage with expensive home-produced or purchased hay are increasingly anxious to terminate feeding as early as possible in spring and move animals onto rangelands. This frequently places an extra burden on foothill ranges because of the potentially damaging effects of grazing plants before "range readiness" occurs or before the forage is physiologically capable of withstanding defoliation by grazing.

*Fortunately, of all the seasonal range types, foothill ranges* offer the greatest potential for improvement under informed management. Large areas exist where topography is relatively gentle and soils are deep and well developed. Precipitation, ranging from 11 to 15 inches annually, is sufficient to assure that responses to management will be prompt and likely. Many acres of foothill ranges are producing levels of forage far below their potential because they are dominated by plant species such as big sagebrush and juniper.

### Seeded Ranges

Replacement of low-forage-value native plant communities with seeded stands of introduced wheatgrasses has been a major thrust of range improvement on foothill and desert ranges during the past 30 years. Originally introduced to the United States from Eurasia, crested wheatgrass has been used most extensively on the majority of land area seeded. It is remarkably tolerant of grazing and maintains a long-term competitive position in the plant community. Other species that have also received widespread usage

Authors are professor and head, and research assistant, Range Science Department, Utah State University, Logan 84322.

*About the junior author:* A native of California, Mia E. Owens received a B.S. in animal science in 1975 from California Polytechnic State University, San Luis Obispo. While an undergraduate, she worked at the university's veterinary hospital as a veterinary assistant and took part in numerous extra-curricular livestock breeding and management programs to gain practical experience working with livestock. During her last year, she was awarded "Outstanding Senior in Animal Science."

Upon completion of a Bachelor's degree, Mia pursued a Master's degree in range resources at the University of Idaho in Moscow and received a M.S. in 1979. *Her thesis focused on diet and habitat use of elk, deer, and cattle on big* game winter range in northern Idaho. While a graduate student, Mia held the offices of secretary and councilman for the Northern Chapter of the Idaho Section, Society for Range Management.

Mia has worked as a range technician on the Targhee and Medicine Bow National Forests, and at the University of Wyoming. She has also been an instructor at the University of Idaho where she taught Range Communities. Currently she is a research assistant in the Range Science Department at Utah State University. She was co-editor of "Range Research," a publication on range research at U.S.U., and is presently editing a research publication for the Institute for Land Rehabilitation. In addition, Mia coached the range plant team for the 1983 Annual SRM meeting and assisted in teaching Range Plants at U.S.U.

include intermediate wheatgrass and Russian wildrye. These three species all tend to be drought- and cold-tolerant, are palatable and nutritious for grazing animals and, very importantly, they initiate spring growth considerably earlier than most of their native counterparts. Thus, they afford the rancher a source of early forage that can relieve some of the expense of extended winter feeding.

### Grazing Value of Crested Wheatgrass

For the sole purpose of producing usable livestock forage, seeded wheatgrasses are clearly superior to poor-condition native rangeland, at least for spring and autumn grazing. For example, research conducted by Cook (1966) near Eureka, Utah, demonstrated a six-fold advantage to crested wheatgrass over native sagebrush-juniper range (1,148 vs 190 lb forage per acre). At the nearby Benmore Experimental Range Station with slightly less annual precipitation, smaller but still major advantages favored crested wheatgrass over similar native vegetation (965 vs 199 lb per acre). Other research in the Intermountain area has demonstrated comparable levels of production.

When translated into terms of animal production, crested wheatgrass continues to demonstrate superiority to native rangeland. Yearling daily gains of 1.4 and 2.0 pounds for native and crested wheatgrass ranges, respectively, have been shown in Utah during a 6-week spring grazing period (Cook 1966). Over an 11-year period at the Benmore Experimental Range Station, an average of 43 pounds of animal gain per acre was measured under moderate spring grazing of crested wheatgrass (Frischknecht and Harris 1968). Additional work in Wyoming (Kearl and Cordingly 1975) suggests that cows that have the advantage of abundant early spring forage from crested wheatgrass will rebreed much quicker after calving than cows on native shortgrass range. Thus in terms of economics, reseeding native range can be a highly profitable venture if potential increases in livestock gains and reproductive efficiency are considered in conjunction with the usual benefit of enhanced grazing capacity.

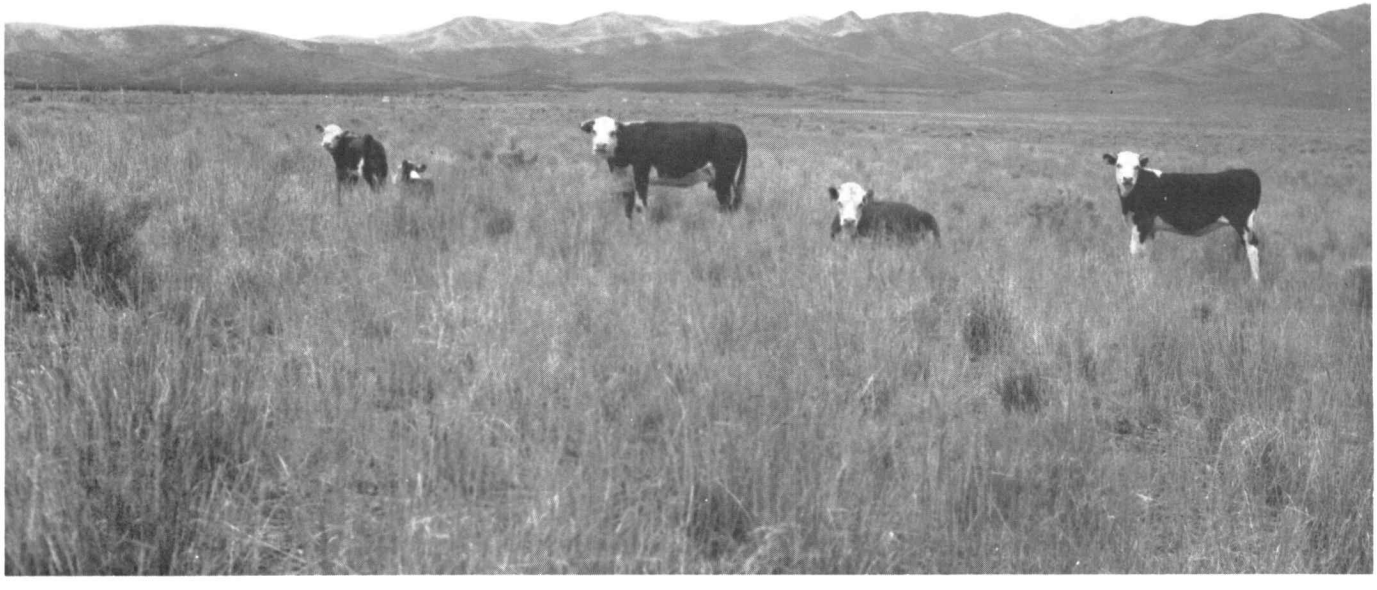
### Current Research

Many of the crested wheatgrass stands in Utah and other areas of the Intermountain West are presently in a reduced state of grass production due to shrub reinvasion. This degradation has prompted a research program conducted by the Range Science Department at Utah State University which will provide information on: (1) how to renovate decadent crested wheatgrass stands, (2) the extent to which sagebrush in the plant mix is desirable, (3) how to manage grazing to minimize sagebrush reinvasion, and (4) which grazing techniques will most efficiently maximize profits from crested wheatgrass range. The studies being conducted are cooperative and multidisciplinary, involving 15 scientists. The overall effort recognizes the value of crested wheatgrass for grazing and is directed toward improved management and productivity of crested wheatgrass range. This research is being pursued on lands administered by the Bureau of Land Management near Eureka, Utah, which are believed to be representative of foothill rangelands throughout the Intermountain area.

*Patterns of Grazing*

To realize maximum grazing potentials on crested wheatgrass stands, livestock feeding behavior and nutrition (including day-to-day and year-to-year patterns of grazing) must be understood. Research thus far conducted has yielded important information regarding these 2 parameters. For example, cattle grazing is found to be neither random nor uniform (Norton and Johnson 1981). A preference for plants of intermediate size classes (about 4 inches in diameter) is apparent, with relatively light grazing occurring on the smallest plants. Likewise, large wolf plants and plants with an abundance of standing dead (over-winter material) remain practically untouched (Norton et al. 1983).

Standing dead material appears to be especially important in determining the probability of a plant being grazed as well as how much will be taken by the animal. Under normal early-summer grazing pressures, about 70% of the plants are



*Cattle in the Intermountain West depend heavily on crested wheatgrass range especially in May and June.*

grazed with only 17% of these being grazed more than once. In addition, plants used heavily one year are likely to be preferred again the following year (Norton and Johnson 1981). The net effect is a patchy distribution of livetock use due to the avoidance of plants having an abundance of standing dead materials.

Early spring grazing studies on crested wheatgrass begun in 1982 indicate that heavy grazing while inflorescences are still in the boot stage may successfully reduce reproduction of this grass. The resultant fewer seedheads reduce the amount of standing dead material that overwinters. Thus utilization should be more evenly distributed during the subsequent grazing season, providing more efficient use of available forage without reducing the vigor of the stand (Norton et al. 1983).

*Cattle Nutrition*

Other studies seek to determine how much available forage is necessary to sustain high levels of animal performance. The amount available and nutritional quality of forage affect the level of dry matter intake by livestock, which in turn affects animal response. Intake estimates for Angus heifers grazing matured, crested wheatgrass stands were obtained during the 1978 and 1979 grazing seasons. As the amount of forage declined, animals compensated by increasing both eating rate and daily time spent grazing (Havstad et al. 1983). When crested wheatgrass availability declined to about 110 lb of dry matter per acre, body weight losses were recorded. These losses, however, could not be attributed to restricted intakes of forage nor to declining forage quality. The only other possible explanation appears to reside in an elevated maintenance energy cost under conditions of scarce forage (Havstad and Malechek 1982).

Most grazing management decisions hinge on available forage. The decision about when to initiate grazing has been based on the amount of forage leaf area necessary to sustain the animals and perpetuate healthy, vigorous plants. Likewise, the decision to remove animals from a pasture has been based on remaining forage. For grazing-resistant species such as crested wheatgrass, however, perhaps greater attention should be given to the needs of the animal.

*Shrub Reinvasion*

Well-managed stands of crested wheatgrass may remain productive for over 20 years following seeding; however, reinvasion by sagebrush and other shrubs is almost a certainty where seed is plentiful. The encroachment of shrubs into crested wheatgrass stands appears to be affected by the kind of animal species allowed to graze. On the seeded pastures under study, sheep grazing represented the only livestock use until 1965 when cattle grazing began. Most of the sagebrush plants now in the pastures are less than 18 years old, which means that sagebrush establishment occurred after the transition in livestock use. The cattle do not utilize the sagebrush. Even near water troughs where the vegetation is heavily overgrazed, small sagebrush plants remain untouched.

Vigorous stands of sagebrush are also found within exclosures that were set up after the pastures were seeded in 1952. Thus, it appears that sheep grazing, as opposed to cattle grazing or no livestock use, can be a successful means of controlling sagebrush encroachment into seeded ranges. This has been demonstrated in previous research (Frischknecht and Harris 1973). Our research now focuses on determining the relationship between biomass and density of invading sagebrush with depression of grass production. It has been demonstrated that sagebrush invasion of seeded ranges can be slowed or halted by periodic grazing with sheep rather than cattle.

Foothill ranges represent a critical land resource type in the Intermountain West. They are the major source of spring forage for the livestock industry, as well as wintering grounds for big game herds, habitat for several small mammal and avian forms, and important watersheds.

Hundreds of thousands of acres of foothill rangelands have been seeded, principally to crested wheatgrass, since the 1930's when seed became readily available. Many of the stands in Utah and other Intermountain areas are presently producing less grass than in prior years due to reinvasion by native shrubs.

There is little reason to doubt that future demands for red meat products will impose additional resource demands on rangelands. This will be prompted partly by increases in animal numbers, but mostly by the shift from use of cereal grains for animal feeding to forage-based feed supplies.

Seeded ranges in the Intermountain region offer much greater forage potential and grazing tolerance than do native ranges. Improved ranges, however, require a higher intensity of management than may be justified on native ranges. To fully optimize the higher productive potential of seeded ranges, the manager and livestock producer need grazing management systems based on extensive information about plant-animal interactions.

Research conducted by Utah State University on crested wheatgrass seedings near Eureka, Utah, is attempting to develop optimum grazing strategies for improved production from seeded ranges. In addition to investigating utilization and nutritional quality of grass forage, cattle response and influence on the vegetation, ongoing projects are looking at opportunities to improve the crested wheatgrass forage resource by introducing palatable shrubs and legumes into the seedings and by planting new hybrids and strains of wheatgrass and wildrye where crested wheatgrass stands have become decadent and in need of rejuvenation.

## Literature Cited

**Cook, C.W. 1966.** Development and use of foothill ranges in Utah. Utah Agr. Exp. Sta. Bull. 461.

**Frischknecht, N.C., and L.E. Harris. 1968.** Grazing intensities and systems on crested wheatgrass in central Utah: response of vegetation and cattle. USDA Forest Serv. Tech. Bull. 1388.

**Frischknecht, N.C., and L.E. Harris. 1973.** Sheep can control sagebrush on seeded range if . . . . Utah Sci. 34:27-30.

**Havstad, K.M., and J.C. Malechek. 1982.** Energy expenditure by heifers grazing crested wheatgrass of diminishing availability. J. Range Manage. 35:447-450.

**Havstad, K.M., A.S. Nastis, and J.C. Malechek. 1983.** The voluntary forage intake of heifers grazing a diminishing supply of crested wheatgrass. J. Anim. Sci. 56:259-263.

**Kearl, W.G., and R.V. Cordingly. 1975.** Cost and returns from reseeding plains ranges in Wyoming. J. Range Manage. 28:437-441.

**Norton, B.E., and P.S. Johnson. 1981.** Pattern of defoliation by cattle grazing crested wheatgrass pastures. p. 462-464.*In:* Proc. XIVth International Grassland Cong., Lexington, Ky. June 14-24.

**Norton, B.E., P.S. Johnson, and M.K. Owens. 1983.** Increasing grazing efficiency on crested wheatgrass. Utah Sci. 43:110-113.