

Selective Grazing Among Improved Varieties of Grasses by Beef Cattle, Black-tailed Jackrabbits, and Angora Goats

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INTRODUCTION

The Soil Conservation Service (SCS) and Agricultural Research Service (ARS) are constantly striving to find or breed improved varieties of forages for use in improved pastures or reclamation of deteriorated rangelands. Criteria considered in the development and release of these varieties include such attributes as seed production, ease of establishment, seasonal moisture requirements, disease resistance, stand persistence, forage production, leaf stem ratios, and nutrient and mineral content. Only within recent years has the acceptability of these forages to livestock and wildlife been an active concern.

At the local level the Soil Conservation Service cooperates with many different landowners to evaluate the success of these varieties under conditions specific to their particular area. These tasks are time consuming, as tested varieties must endure all of the temperature and moisture extremes an area can offer before potentially expensive recommendations to the public can be made with confidence.

In 1990 we established 8 selections of grasses in 9 small pastures on the Northern Great Basin Experimental Range. Our objectives were to evaluate the persistence of these grasses, their seasonal forage production and quality attributes, and their seasonal acceptability to livestock. Selections (and recommended precipitation ranges for planting) were: 2 cultivars of basin wildrye (*Elymus cinereus* (Scribner & Merr.), Magnar (8-25 in) and Trailhead (8-16 in); 1 cultivar of bluebunch wheatgrass (*Agropyron spicatum* (Pursh) Scribn. & Smith), Goldar (8-18 in); 2 cultivars of thick-spiked wheatgrass (*Agropyron dasystachyum* (Hooker) Scribner & J.G. Smith), selection #9021076 (6-16 in) and Secar (8-18 in); the Bozoisky (12-14 in) cultivar of Russian wildrye (*Elymus junceus* Fischer); Nordan crested wheatgrass (*Agropyron desertorum* (Fischer ex Link) Schultes) (8-12 in); and a crested wheatgrass cross called Hycrest II (9+ in), a product of *Agropyron desertorum* and *Agropyron cristatum* (L.) Gaertner). With the exception of Hycrest II, secured from USDA-ARS Logan, UT, seed was acquired from the SCS Pullman Plant Materials Center, WA.

EXPERIMENTAL DESIGN

Pastures and plantings were arranged similar to those in the previous discussion of cattle and native grasses. Seedlings were started in the green house during the 1989-90 winter and transplanted to the field in April 1990. Ninety-eight individual plants of each of the 8 selections were established in each of the 9 pastures for a total of 784 plants per

pasture. Again each plant was randomly positioned so animals could not focus on a specific row or area to graze from a single selection. Because plants were kept free of competing weeds they grew to roughly baseball diameter during April, May, and June. In June 1990, black-tailed jackrabbits appeared in abundance and began foraging heavily on the plots. On 10 July, 1990 the pasture were fenced with chicken wire to exclude rabbits, and each plant was checked for presence and severity of grazing.

In 1991 Angora goats were on the station to evaluate their potential for sagebrush control. These animals were used in 2 sets of trials during the late-boot (seed stalks nearly emerged) and dormant (cured forage) stages of growth to evaluate their preferences for these forages. Three pastures were grazed in early June and 3 pastures in late August. During each session 6 mature goats were released progressively into a pasture and followed by a researcher with a portable computer to keep track of bites and time spent grazing on each plant. Because some of these varieties could not be identified from casual observations two other observers noted the positions of plants as the goats grazed for later determination of variety. Each goat was observed until it had foraged on 50 separate plants with a total of 250 observations gathered in each pasture.

Similar trials were conducted in 1992 with cattle at the same stages of plant growth. In these instances 3 steers were used with each animal being observed until it had consumed 84 plants for a total of 252 plants grazed in each pasture. While a vast amount of data are available from these trials, the following discussions will focus on the numbers of plants of each variety that were grazed as an expression of forage selection.

RESULTS

Cattle

Cattle exhibited slightly different patterns of selection between the 2 two stages of plant growth, so results from each period are presented separately. When forages were green and growing (late-boot stage) cattle appeared to place the forages into two categories. These were basically acceptable and avoided. Hycrest II, Goldar, Nordan, Thick-spiked, and Secar were all acceptable with between 40 and 31 percent of the plants of each variety being grazed (Figure 1-A). Indeed, had the steers not been selective grazers and simply foraged at random, roughly 31 to 32 percent of each of the cultivars would be grazed. This was almost the case with the acceptable forages, and observations are close enough that we can not really isolate a clear favorite from among the top five. Avoided selections included the 2 basin wildrye selections, Magnar and Trailhead, and the Bozoisky cultivar of Russian wildrye.

When forages were dormant, roughly three levels of selection occurred. Preferred forages were the Hycrest II and Nordan crested wheatgrasses (Figure 1-B). The cattle grazed four selections at roughly expected rates, which we will classify under the indifferent heading. These were thick-spiked wheatgrass, Secar Snake River wheatgrass, Bozoisky Russian

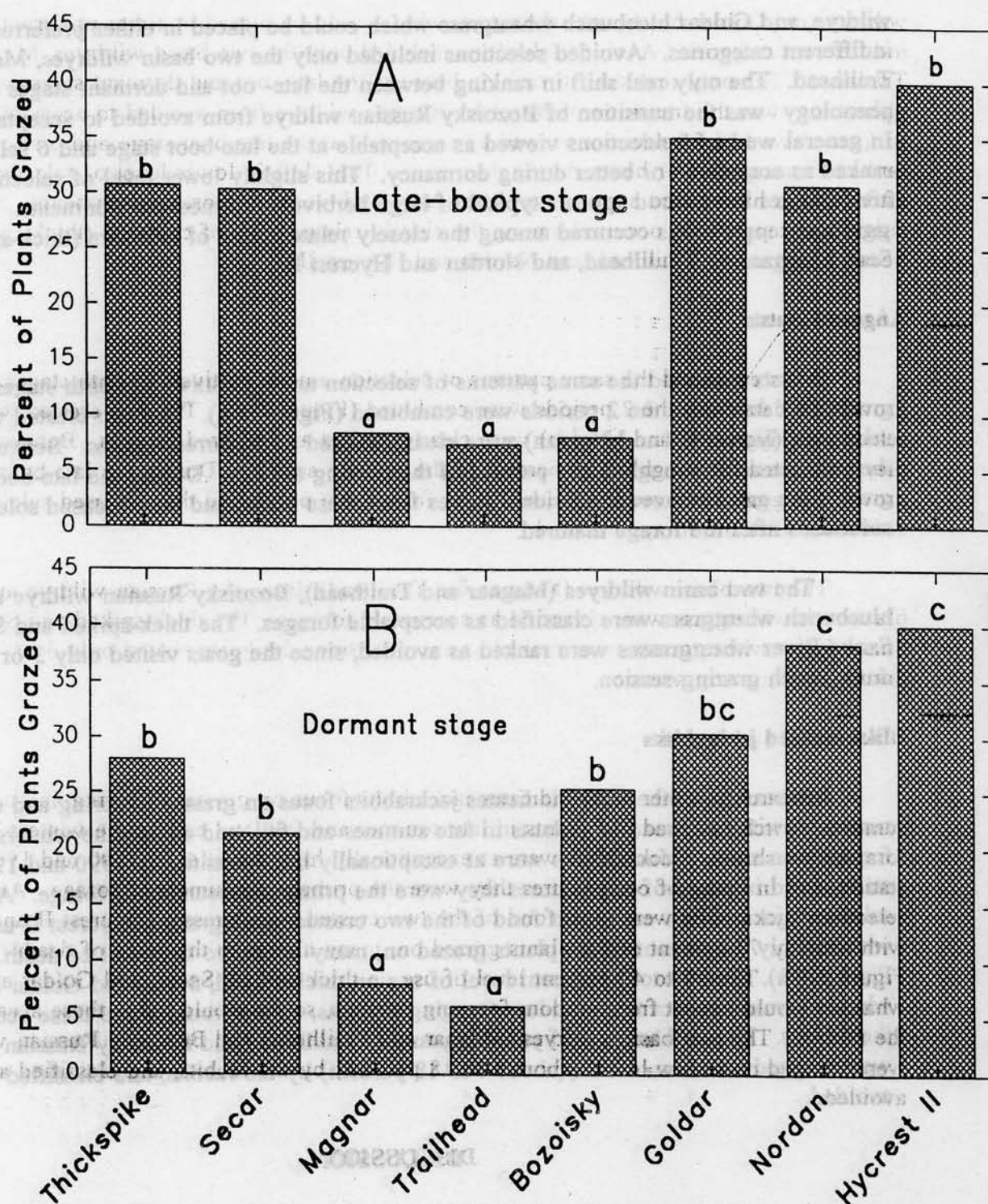


Figure 1. Selective patterns of steers grazing 8 cultivars of grasses during the late-boot (graph A) and dormant (Graph B) stages of growth. Columns sharing a common letter do not differ significantly ($P > 0.05$). 1992. Northern Great Basin Experimental Range.

wildrye, and Goldar bluebunch wheatgrass which could be placed in either preferred or indifferent categories. Avoided selections included only the two basin wildryes, Magnar and Trailhead. The only real shift in ranking between the late-boot and dormant stages of phenology was the transition of Bozoisky Russian wildrye from avoided to acceptable. In general we had 5 selections viewed as acceptable at the late-boot stage and 6 selections ranked as acceptable or better during dormancy. This slightly lower level of selective grazing after forages have cured appears typical of large herbivores in most environments. No significant separations occurred among the closely related pairs of cultivars (thick-spiked and Secar, Magnar and Trailhead, and Nordan and Hycrest II).

Angora Goats

Goats exhibited the same patterns of selection among cultivars at both stages of growth, so data from the 2 periods were combined (Figure 2-A). The two crested wheatgrass selections (Hycrest II and Nordan) were clearly ranked as preferred forages. Between the two they accounted for roughly 80+ percent of the grazing activity. During the late-boot stage of growth the goats removed individual leaves from these plants and they focused solely on the seedheads after the forage matured.

The two basin wildryes (Magnar and Trailhead), Bozoisky Russian wildrye and Goldar bluebunch wheatgrass were classified as acceptable forages. The thick-spiked and Secar Snake River wheatgrasses were ranked as avoided, since the goats visited only 3 or 4 plants during each grazing session.

Black-tailed jackrabbits

Research in other areas indicates jackrabbits focus on grasses in spring and early summer, switch to broad leaf plants in late summer and fall, and endure the winters by foraging on shrubs. Jackrabbits were at exceptionally high densities in 1990 and 1991 on the station, and in many of our pastures they were the primary consumers of forage. Among selections jackrabbits were most fond of the two crested wheatgrasses (Hycrest II and Nordan) with roughly 70 percent of the plants grazed on, many almost to the point of death (See Figure 2-B). The 30 to 40 percent level of use on thick-spiked, Secar, and Goldar are about what we would expect from random foraging patterns, so we would judge these acceptable to the rabbits. The two basin wildryes (Magnar and Trailhead) and Bozoisky Russian wildrye were foraged on at low levels (about 4 to 18 percent) by the rabbits, and classified as avoided.

DISCUSSION

For cattle it appears that thick-spiked wheatgrass, Secar Snake River wheatgrass, Bozoisky Russian wildrye, Goldar bluebunch wheatgrass, and Nordan and Hycrest II crested wheatgrasses were all at least acceptable or preferred forages. The Bozoisky Russian wildrye, however, appeared more palatable when cured than when it was green. The avoided rankings

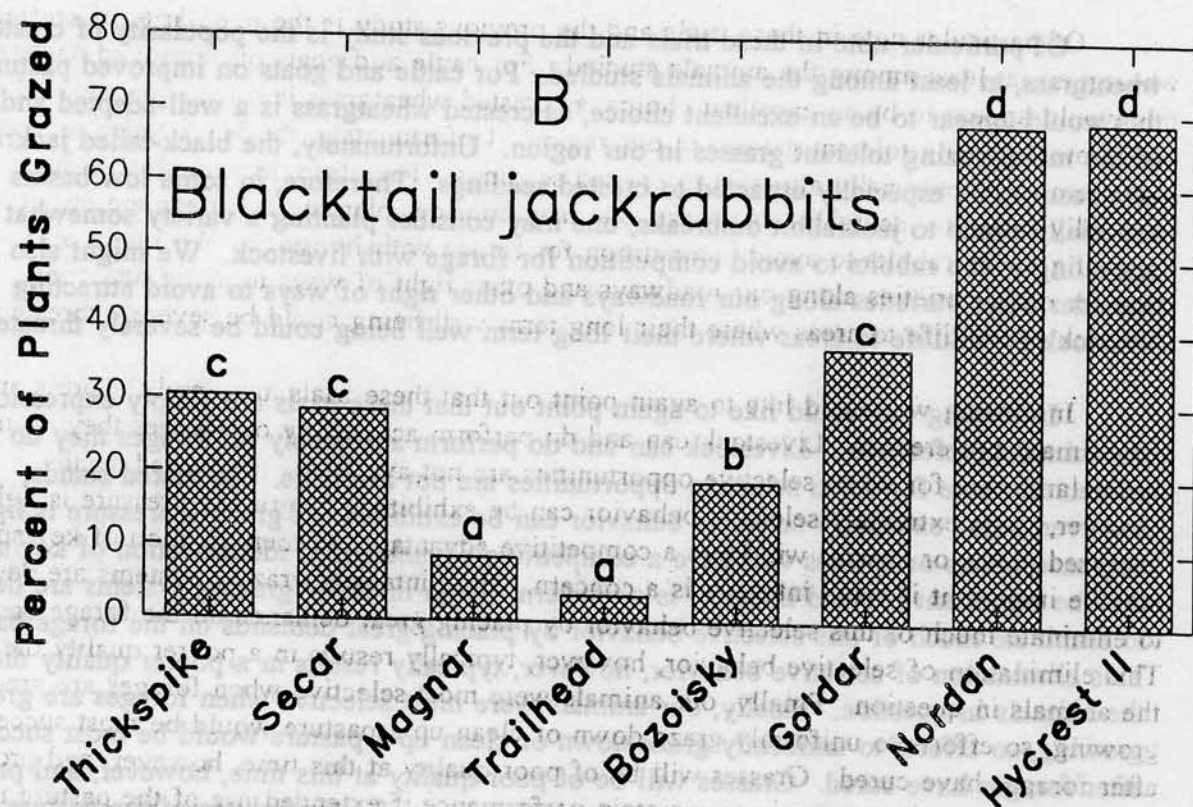
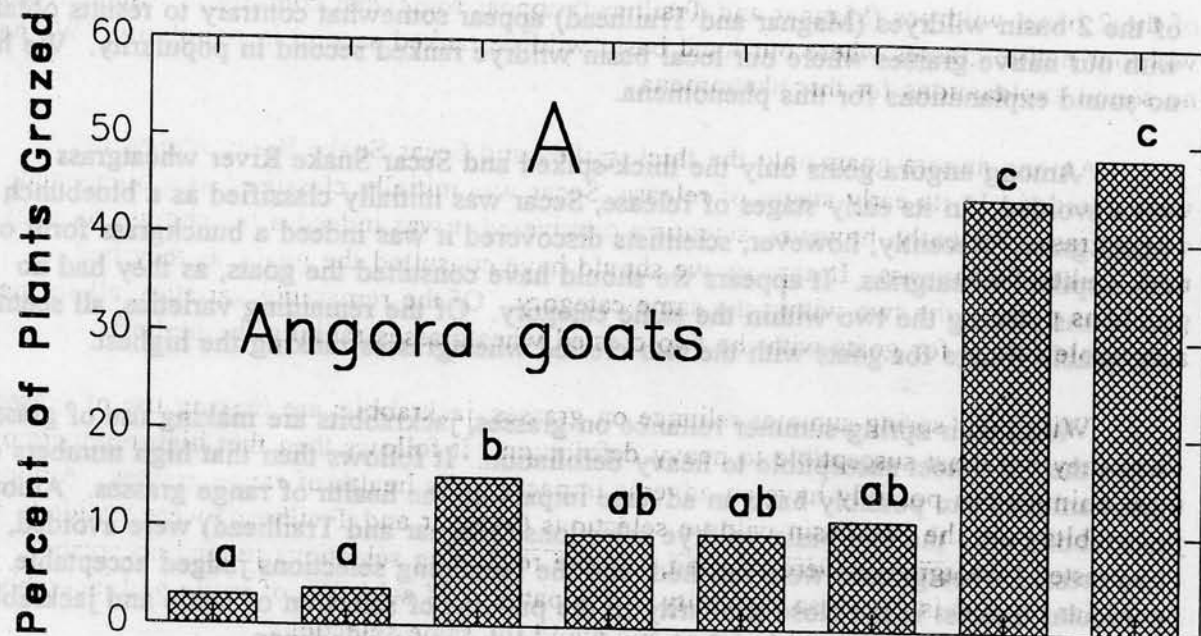


Figure 2. Forage preferences of angora goats (1991) and blacktailed jackrabbits (1990) foraging among 8 selections of grasses available for reclamation of Northern Great Basin Rangelands on the Northern Great Basin Experimental Range. Columns sharing a common letter do not differ significantly ($P \leq 0.05$).

of the 2 basin wildryes (Magnar and Trailhead) appear somewhat contrary to results obtained with our native grasses where our local basin wildrye ranked second in popularity. We have no sound explanations for this phenomena.

Among angora goats only the thick-spiked and Secar Snake River wheatgrass were avoided. In its early stages of release, Secar was initially classified as a bluebunch wheat grass. Recently, however, scientists discovered it was indeed a bunchgrass form of thick-spiked wheatgrass. It appears we should have consulted the goats, as they had no problems placing the two within the same category. Of the remaining varieties, all seemed acceptable forage for goats with the two crested wheatgrasses ranking the highest.

With their spring-summer reliance on grasses, jackrabbits are making use of grasses when they are most susceptible to heavy defoliation. It follows then that high numbers of these animals can possibly have an adverse impact on the health of range grasses. Among the jackrabbits only the two basin wildrye selections (Magnar and Trailhead) were avoided, the two crested wheatgrasses were relished, and the remaining selections judged acceptable. Of particular interest is the close similarity in the patterns of selection of cattle and jackrabbits. Indeed, both species appeared to favor and avoid the same selections.

Of particular note in these trials and the previous study is the popularity of crested wheatgrass, at least among the animals studied. For cattle and goats on improved pastures this would appear to be an excellent choice, as crested wheatgrass is a well-adapted and one of the most grazing tolerant grasses in our region. Unfortunately, the black-tailed jackrabbits also seem to be especially attracted to crested seedings. Therefore, in some low basins especially prone to jackrabbit outbreaks, one may consider planting a variety somewhat less appealing to the rabbits to avoid competition for forage with livestock. We might also consider other varieties along our roadways and other right of ways to avoid attracting livestock or wildlife to areas where their long term well being could be severely threatened.

In closing we would like to again point out that these trials are simply expressions of the animals' preferences. Livestock can and do perform acceptably on forages they do not particularly care for when selective opportunities are not available. In mixed stands, however, some extremely selective behavior can be exhibited. If grazing pressure is light, ungrazed plants or species will have a competitive advantage, so identification of key species may be important if stand integrity is a concern. High intensity grazing systems are designed to eliminate much of this selective behavior by placing great demands on the forage base. This elimination of selective behavior, however, typically results in a poorer quality diet for the animals in question. Finally, our animals were most selective when forages are green and growing, so efforts to uniformly graze down or clean up a pasture would be most successful after forages have cured. Grasses will be of poor quality at this time, however, and protein supplements may be necessary to maintain performance if extended use of the pasture is contemplated.