Effects of Winter Grazing on Herbage Production

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Introduction

Winter or dormant-season grazing is practiced by many western Dakota livestock producers in an effort to lower feed costs. Although adequate information exists regarding nutritional management of winter grazing cattle, little is known about the ecological effects of these practices. Furthermore, research emphasizing inferences for specific winter-grazing management is lacking. The objectives of this study are to determine impacts of winter grazing on herbage production, growth rate of dominate grass species (short-term), and changes in plant-species composition (long term) under various levels of winter and summer utilization.

Study Area and Design

Research was initiated on native rangeland in the western Dakotas in 2000. Study areas were selected in Adams County, North Dakota approximately 5 miles southwest of Hettinger and Perkins County, South Dakota approximately 15 miles south of Lodgepole. Vegetation was described as the wheatgrass-grama-needle grass association with a forage base of predominately native prairie comprised of blue grama (*Bouteloua gracilis*), western wheatgrass *(Agropyron smithii*), needle-and-thread *(Stipa comata),* and thread-leaf sedge (*Carex filifolia*) (Barker and Whitman 1989, Shiflets 1994).

Each study area was blocked into 4 pastures with the treatments 50% summer season-long use (control), 25% summer use for 2 weeks in June and 50% winter utilization (flash grazing use), 30% winter utilization, and 50% winter utilization randomly assigned. Stocking rates for season-long pastures were determined using the Soil Conservation Service Technical Guide (1984) using the Missouri slope vegetation zone. Winter pasture stocking rates were determined by collecting standing plant biomass prior to turnout from 10 randomly placed 0.25m^2 quadrats on both silty and shallow range sites (n=20) from each replicate to determine total available forage for each pasture. Final stocking rates for each treatment were computed by calculating a 25% grazing use efficiency with 50% disappearance (Laycock et al. 1972, Pearson 1975) and a dry-matter intake for a 1,200 lb dry brood cow using the Beef National Research Council (1996) guidelines. Winter grazing cattle were allowed ad libitum use of salts and minerals and were supplemented with 3 lbs/head/day of 30% crude protein all-natural cake. Cattle grazed as snow cover allowed for 53 days beginning November 15th.

Seasonal forage availability was determined by clipping 10 randomly placed 0.25m^2 frames from non-grazed shallow and silty range sites (n=20) on each study area. Samples were collected from June to November and as conditioned allowed in February and April.

Twenty 2.5 ft^2 sites within each treatment found to be indicative of the predominate forage base were randomly selected and protected from grazing in 2001, following one season of use. A 0.25 m^2 quadrat was clipped from each site in mid July to determine peak herbage production on each treatment (n=20).

Treatment effects were analyzed using a General Linear Model (GLM) and univariate analysis of variance (SPSS 2000). When differences were found, a means seperation was conducted using a Tukey's Honesty Significant Difference Test (Steel and Torrie 1980, SPSS 2000). Locations were tested for differences in herbage production potential using a GLM for block effect. When block effects were not detected, locations were combined and tested for overall treatment effect.
Data was analyzed to determine differences at the 0.05 percentile (P(0.05)). Adjusted R^2 and standard error values were calculated for herbage growth patterns and derived using a best fit curve (quadratic) estimation analysis (SPSS 2000).

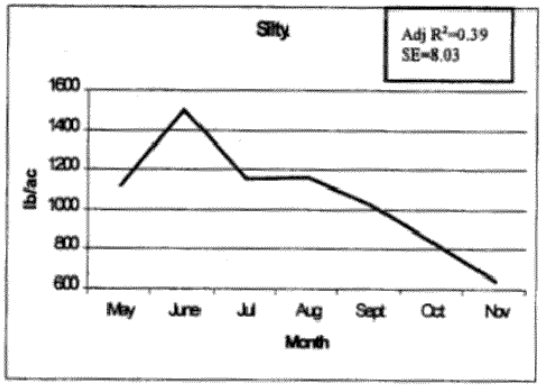
Results
No differences in herbage production were found between locations(P=0.296, F=1.097). Following one grazing season, peak primary production on the winter treatments was not lower than the season-long (control) pasture (P>0.05). Furthermore, herbage production was higher (P 0.01) on the flash gazing treatment than on the season-long and winter-only treatments (Table 1).

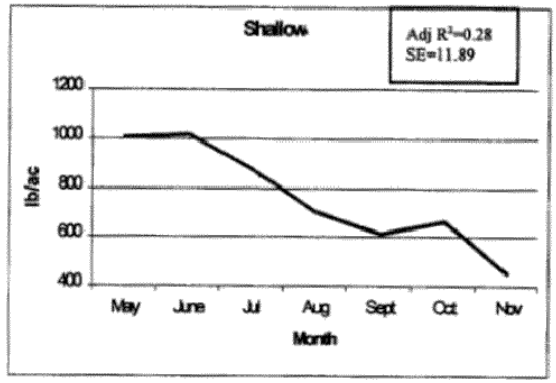
Table 1. Comparison of herbage production between grazing treatments in western North and South Dakota in 2001.

Treatment	lb/ac	% Difference
Season-long (Summer use)	1252[a]	0
Flash (25% use in June and 50% use in winter)	1579[b]	+26
30% Winter use	1162[a]	-7
50% Winter use	1326[a]	+6

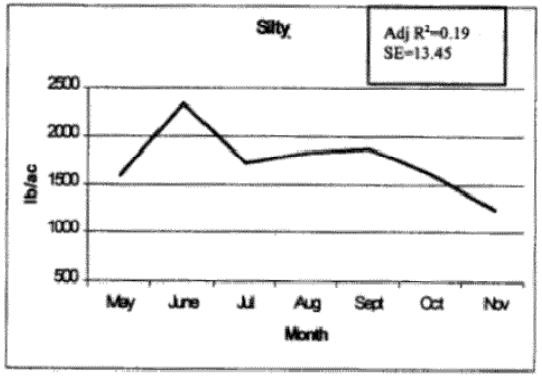
Treatments with same letter are not significantly different (p> 0.05).

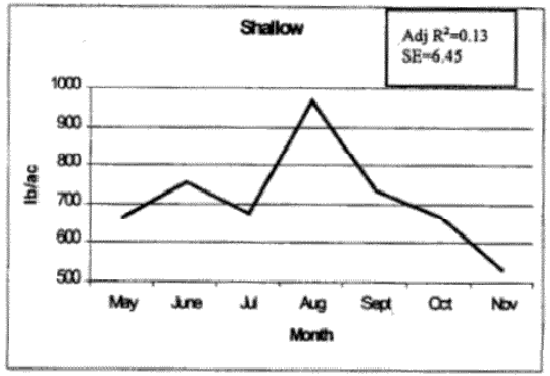
Figures 1a through 2b display mean lb/ac and corresponding regression analysis of available forage from late May through mid November on silty and shallow range sites for both study areas. Available forage began declining on the North Dakota sites in June and August, ranging from 1,500 lb/ac in June to 645 in November on the silty range site and from 1,010 lb/ac in June to 451 in November on the shallow range site. The South Dakota sites were reduced from 2,340 lb/ac in June to 1,234 in November on the silty range site and from 970 lb/ac in August to 532 in November on the shallow range site.





Figures 1a and b. Standing biomass (potential forage) on silty and shallow range sites in North Dakota.





Figures 2a and b. Standing biomass (potential forage) on silty and shallow range sites in South Dakota.

Summary

Peak herbage production as measured by above-ground standing biomass was not negatively affected by winter grazing at both 30 and 50% utilization after one grazing season. Brief early-summer grazing (June) in conjunction with 50% winter grazing appeared to have a beneficial effect on herbage production versus winter grazing only, thus providing a beneficial alternative to conventional forage stockpiling by deferring pastures until the beginning of the winter grazing season. Furthermore, this method minimizes forage lost from senescence from early summer to the beginning of the winter grazing season.

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