

PRAIRIE DOGS AS ECOSYSTEM REGULATORS ON THE NORTHERN HIGH PLAINS

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Abstract. The increase in prairie dog populations on the northern High Plains has emphasized the need for additional information on cattle-prairie dog forage relationships. To obtain information on cattle-prairie dog forage relationships, 4 treatments were evaluated over 4 growing seasons. These treatments were: 1) no grazing (prairie dogs eliminated and cattle excluded), 2) grazing by prairie dogs, 3) grazing by cattle and 4) grazing by cattle and prairie dogs. In addition, forage utilized by cattle and prairie dogs was assessed. Standing crop values were obtained on all treatments by plant species under cages, and forage utilization was assessed by harvesting under cages and outside cages. Results indicate major differences among treatments. Peak standing crop values on the prairie dog treatment was 24% higher when compared to the cattle only grazing treatment. Cattle plus prairie dogs was 13% higher than the cattle treatment followed by no grazing, which was about equal with a 2% increase. Grasses showed an increase on both the no grazing, cattle plus prairie dog treatments (4%) followed by a decrease on the prairie dog treatment (-6%) when compared to the cattle treatment only. Forbs increased on the prairie dog treatment (+165%) followed by no grazing (+91%), and the cattle plus prairie dog treatment (+76%) when compared to the cattle treatment. Utilization by cattle and prairie dogs was 37% in June and 56% in August. After 4 years active prairie dog burrows were highest on the prairie dog plus cattle treatment with 95/acre, while on the prairie dog treatment 43/acre were present. Data on standing crop values are presented for prairie dog-cattle relationships by treatments and forage utilization.

Introduction

Much time, money and effort have been spent on attempts to reduce prairie dog populations in the western United States. In the past, justifications for these efforts centered on reducing reservoirs of contagious diseases spread by prairie dogs. More recently, control of the black-tailed prairie dog (*Cynomys ludovicianus*) has been deemed necessary to improve the forage and livestock production on rangelands.

The degree of competition between cattle and prairie dogs has not been fully assessed. Hansen and Gold (1977) showed that the proportions of different plant species consumed by prairie dogs and cattle were similar having a r_s value of 0.8 and a similarity index of 0.65. Taylor and Loftfield (1924) concluded that Zuni prairie dogs (*Cynomys gunnisoni zuniensis*) destroy 80% of the total annual production of forage and may come into direct competition for forage with cattle. Summers and Linder (1977) determined that the 5 important forage species for black-tailed prairie dog were buffalograss, scarlet globemallow, threadleaf sedge, blue grama, and western wheatgrass. Bonham and Lerwick (1976) found

that plant species diversity and livestock use of plant species was greater on than off prairie dog towns.

A study was initiated to examine prairie dog-cattle-vegetation interactions and to clarify the role of prairie dogs in rangeland ecosystems. The objective of this study was to compare differences in total plant production in response to 4 treatments. These treatments were 1) poisoning of prairie dogs followed by no grazing by either prairie dogs or cattle, 2) grazing by prairie dogs only, 3) grazing by cattle only, and 4) grazing by both cattle and prairie dogs.

Study Area

This study was conducted on prairie dog towns in the lower Sage Creek and Conanta West grazing allotments of the Buffalo Gap National Grasslands near Wall, South Dakota over a 5-year period. The dominant vegetation on this site consisted primarily of blue grama and buffalograss.

Results and Discussion

Peak plant production of above ground

over a 5 year period where only prairie dogs grazed, was higher during the last 4 years than under the other 3 treatments (Fig. 1). Production values where the cattle plus prairie dogs grazed were generally higher than those for areas only by cattle and the ungrazed area. Variation in values across years was a reflection of yearly precipitation differences. The second year (1976) was one of drought while the fourth year (1978) was considered a wet year. Only 3 years of data were presented for the cattle only grazing treatment, since the area was invaded by prairie dogs during the fourth season (1978).

One of the main points of this study was to compare the response of the vegetation under cattle grazing to responses under the other treatments. Treatment effects on the total vegetation relative to the cattle grazing treatment are shown in Fig. 2. The results clearly show that when all years are averaged, plant production where prairie dogs only grazed was approximately 24% higher than under the cattle only grazing. Plant production on sites grazed by cattle and prairie dogs together was 13% higher than under cattle grazing alone. Under no grazing the average production was about the same as the cattle treatment. During the dry year (1976), the total herbage production on sites grazed by cattle and prairie dog together was approximately 15% less than the cattle only grazing treatment. However, during wetter years production was much higher than that found on the cattle only grazing treatment.

Grass production was the lowest when grazed only by prairie dogs during the first 4 years, when compared to the other 3 treatments. Production of grasses on the ungrazed and cattle plus prairie dog treatments was about equal until the fourth yr., when the ungrazed treatment produced approximately 1200 lbs. of grass per acre (1365 kg/ha) compared to about 800 lbs./acre (906 kg/ha) under the other 2 treatments. During the fifth year (1979) grass production was 1349, 1188, and 987 lbs./acre on the prairie dog, cattle plus prairie dog, and ungrazed treatments, respectively. This increase in grass production may be the result of decreased population densities of prairie dogs on the areas grazed by prairie dogs only.

Forbs production was higher when grazed only by prairie dogs during the last 4 years of the study, and lowest for the ungrazed treatment. Forb production was higher throughout the 3 years under the prairie dog grazing, when compared to the cattle only grazing. All treatments were higher in forb production during the first year of harvest, but steadily decreased when compared to the cattle only grazing. Forbs were generally produced more on the cattle plus prairie dog treatment, except during a dry year when the forb production was approximately equal to the cattle grazing treatment.

When averaging the percentage values by treatment over the first 3 year period, forb production

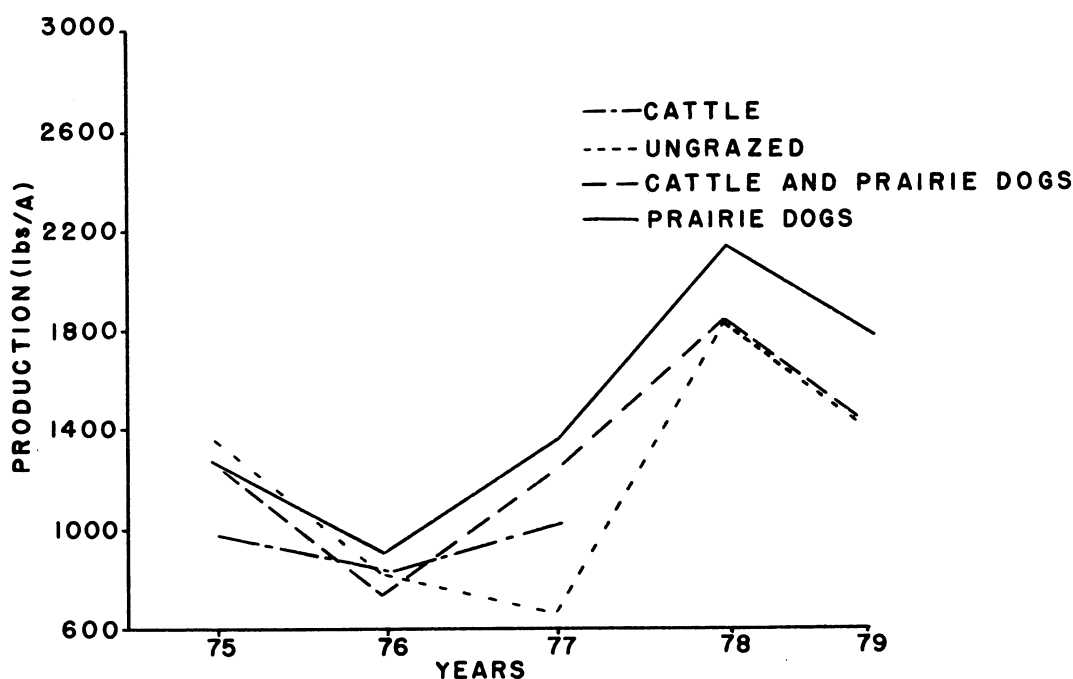


Fig. 1. Peak plant production under 4 treatments, cattle, ungrazed, cattle plus prairie dogs, and prairie dogs, and prairie dogs over a 5-year period, with peak plant production equal to the sum of the peaks for the forb and grass categories.

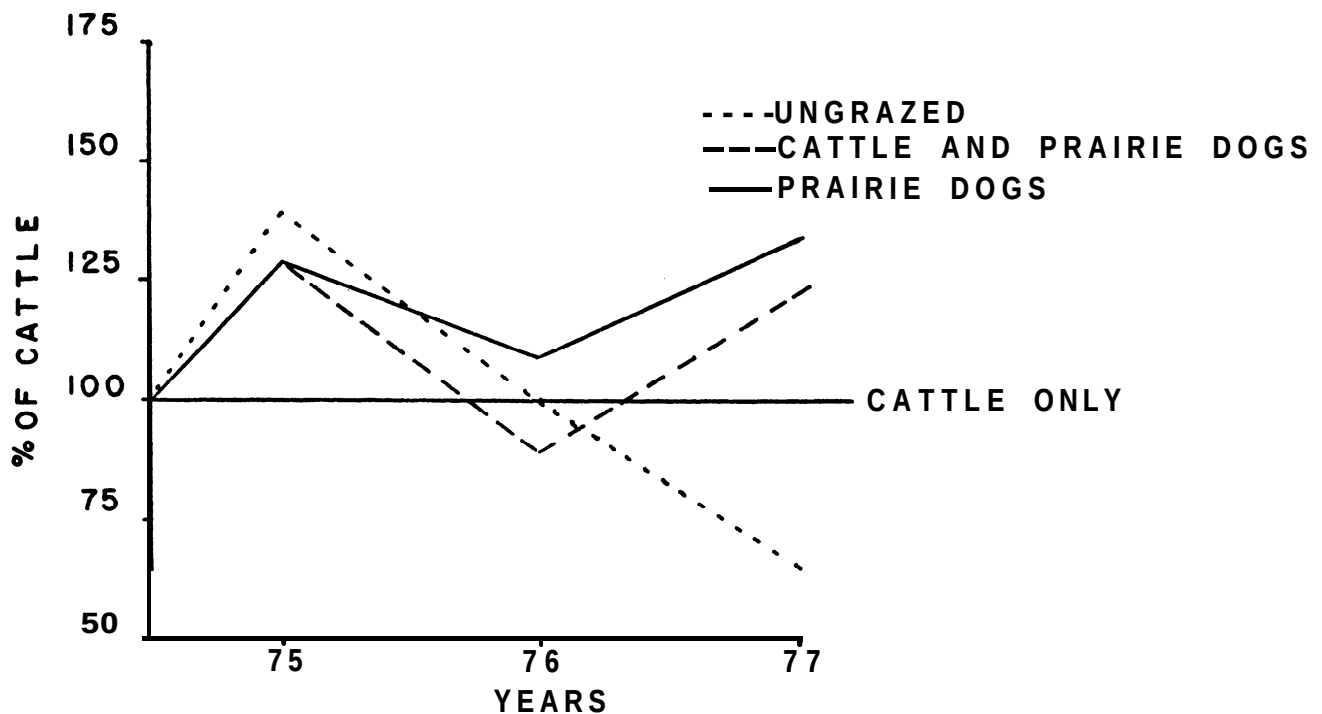


Fig. 2. Production response of total vegetation under different treatments adjusted as a percent of cattle-only treatment over 3 years.

was higher under the prairie dog only grazing (+165%) followed by no grazing (+91%) and the cattle and prairie dog together grazing treatment (+76%) when compared to the cattle only grazing treatment. It appears that dry years may be the most critical in evaluating the various treatments for interactions among animals and forage.

Four years after initiation of the study, the area where only prairie dogs grazed had 43 active burrows per acre, while the area where cattle and prairie dogs grazed together had 95 active burrows per acre. This reduction in active burrow densities on the prairie dog treatment was attributed to taller vegetation occurring on the study areas. It appears that tall vegetation is not conducive to maintaining stable populations. Higher prairie dog densities are more closely related to livestock grazing, especially when rangelands are heavily grazed.

Several studies have examined weight gains of livestock on and off prairie dog towns. Hansen and Gold (1977) reported in Colorado that during the winter months cattle averaged no gains or losses on native and old field dog towns over 2 winters. O'Melia (1980) evaluated the effects that prairie dogs have on forage availability, utilization and steer gains. He found that prairie dogs decreased forage availability; however, this reduction did not influence steer weight gains when compared to steers not on prairie dog towns.

The black-tailed prairie dog is an ecosystem regulator as they manipulate the soil, increase plant diversity (Gold 1976, Bonham and Lerwick 1976) and increase animal density (Hansen and Gold 1977). Prairie dogs will enhance the habitat for desert cottontails, burrowing owls, rattlesnakes and some species of plants. O'Melia (1980) reported that 63% more small animals (other than prairie dogs) were live trapped on pastures having steers plus prairie dogs than on pastures with steers only. In addition, arthropod biomass on the steer-only pastures was significantly greater than on the steer-plus-prairie dog pastures. O'Melia stated that the number of arthropods in the steer-plus-prairie dog pastures were reduced by high populations of grasshopper mice, ground squirrels and burrowing owls.

Our study does show that increased plant production occurs on areas grazed by prairie dogs only and cattle plus prairie dogs. However, this increase may or may not account for the forage consumed by prairie dogs.

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