

**The Relationship Between Cattle Grazing and
Prairie Dog (*Cynomys ludovicianus*) Communities**

by

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ABSTRACT:

Prairie dogs (*Cynomys ludovicianus*) are considered to be an important species supporting a variety of other species in the grasslands environment, several of which are on the endangered species list. Prairie dogs are currently being poisoned in order to control populations in cattle grazing areas, thus destroying an important trophic level in the ecosystem. Poisoning of this species has not shown to be cost efficient since they do not significantly affect grazing cattle. It may be possible to maintain healthy prairie dog communities in grazing areas by banning the use of poisons against them, thus preserving a valuable food source for other species. In order to determine the effects of grazing cattle upon prairie dog communities this project examines the difference between prairie dog communities in grazed and ungrazed areas. No significant difference is found between prairie dog communities in grazed and ungrazed areas, thus supporting the idea that healthy prairie dog communities can be maintained in cattle grazed areas.

INTRODUCTION:

All of the five species of prairie dogs in North America are considered to be keystone species (Sharps 1990). Many animals depend upon the prairie dog for their food source and are seriously threatened with a decline in prairie dog numbers. Some of these threatened species include the black-footed ferret (*Mustela nigripes*), Mountain Plovers (*Charadrius montanus*), and Swift Foxes (*Vulpes velox*) which have all been proposed for the endangered species act with reductions in prairie dog numbers as the primary cause. 170 other species are said to be dependent upon prairie dogs at some trophic level (Reading, 1993). Thus, the protection and preservation of this keystone species, which has been repeatedly denied by the federal government, is imperative.

Over the past century, massive efforts have been placed upon the eradication of prairie dogs (*Cynomys* spp.). These efforts are mainly due to the belief that prairie dogs are a pest species because of competition for vegetation with beef cattle. However, studies have shown that prairie dogs do not significantly compete with cattle and may actually benefit the cattle by improving the soil quality (O'melia 1982, Miller 1994). Yet, millions of dollars are spent annually by government and private sources to conduct poisoning campaigns against the prairie dog. The past century has witnessed a reduction of 98% of prairie dog populations in North America mainly due to poisoning (Miller, 1994). The poisoning campaign has not proven to be cost effective and large net losses have been calculated over the past several decades.

Can prairie dogs and cattle live together harmoniously? Since prairie dogs do not significantly compete with cattle for vegetation, poisoning of these keystone species seems unwarranted. Prairie dogs enrich the soil which produces higher quality grasses which benefits cattle (Detling, 1988). Thus, it seems that cattle can graze with prairie dogs with no significant consequences. Are prairie dogs however, significantly affected by the presence to grazing cattle?

In order to determine the affects of cattle grazing upon prairie dog (*Cynomys ludovicianus*) communities, I have observed and compared several prairie dog towns. Two types of sites were selected. The first set were prairie dog towns in which the grasses are ungrazed by cattle. The second were prairie dog towns located in currently cattle grazed areas. Spatial distribution patterns, number of holes, number of coteries (family groups), and the number of holes per coterie were observed. From the data I hope to establish a lack of significance between the towns of grazed and ungrazed sites, thus concluding that cattle ranching is not detrimental to prairie dog towns.

METHODS:

This study was conducted at Bonvue Ranch in Golden, Colorado (5399 HWY. 93) on April 14 & 15. Six sites were studied, three ungrazed (no grazing cattle), one lightly grazed (cattle grazed <25% of the year), one heavily grazed (cattle grazed 25-75% of the year) and one moderately grazed (cattle grazed 75-100% of the year). These sites are comprised of three large prairie dog towns which are separated by a wire fence. The three grazed sites are individual towns, separated by the fence with the ungrazed sites on the opposite side. Each site's spatial distribution pattern was determined by the Nearest Neighbor Distance method (NND). A plot of 100 x 100 meters was randomly selected for each site and the nearest neighbor distances were determined by a measuring tape. Type of dispersion (R) and statistical significance were determined by formulas given in Field Study by Eric Stone, pp. 111-112. A rough plot of the prairie dog towns were also made. From the plot of the towns, number of holes per site, number of coteries, and number holes per coterie were counted. Coteries were determined by close grouping of holes.

RESULTS:

Refer to "Plots of Prairie Dog Towns" diagram for an overview of each community. Please note that the plots of the prairie dog communities were roughly estimated in order to give an basic overview of distribution patterns. Each plot contains an area of 100 x 100 meters.

Refer to "Average NND per site" for nearest neighbor distances.

<u>Site</u>	<u>Type</u>	<u>Number of Holes</u>	<u>R</u>	<u>Dispersion pattern</u>	<u>Number of coteries**</u>
I	lightly grazed	80	0.02	Clumped	13
II	ungrazed	78	0.03	Clumped	13
III	moderately grazed	93	0.03	Clumped	14
IV	ungrazed	79	0.02	Clumped	15
V	heavily grazed	85	0.03	Clumped	15
VI	ungrazed	96	0.03	Clumped	17

**the number of coteries was determined by grouping closely positioned holes into a coterie

DISCUSSION:

The data suggests that there is no significant difference between grazed and ungrazed sites for prairie dog communities. The spatial distribution pattern remains clumped between all six sites with an R value between 0.02 and 0.03. An $R < 1$ is spatially clumped (Stone, 1993). The NND between all six sites is not significantly different. The graph "Average number of coteries per site" indicate an overlap of error bars between all sites, thus indicating no significant difference. The number of holes on each side of the fence does not appear to be significantly different. For two of the communities, the grazed sides of the fence had more holes than the ungrazed. The average number of holes for grazed sites is 86, while the average number of holes for ungrazed sites is 84.3. With errors accounted for, there is no significant difference between these two areas for the number of holes. The number of coteries between the two areas is also not significant. The average number of coteries for the grazed sites is 14, and 15 for the ungrazed. With errors accounted for, there is no significant difference of coterie numbers between the two areas. "Plots of Prairie Dog Towns" shows rough plots of each surveyed site. Though they are but rough plots, they indicate that there is very little difference between the six sites. Thus, there appears to be no difference in prairie dog community structures between grazed and ungrazed areas.

Since prairie dogs are considered an important keystone species in open grasslands, their preservation is a fundamental part of protecting any other species which are dependent upon them. Since prairie dogs are not detrimentally affected by cattle grazing, preservation of this important species could be easily achieved. Prairie dog communities could flourish in not only protected lands but also in private ranching lands by banning the use of poisons. No additional lands would need to be set aside for prairie dogs in order to secure their habitats since they seem to do just as well in cattle grazed areas. Historically, most of the prairie dogs have been eliminated by the use of poisons by ranchers. If poisoning of prairie dogs is banned, the species would most likely flourish thus supporting an important trophic level in the ecology of the grasslands.

Because of time and equipment constraints, this project was limited to a very small area. Further studies in larger more ecologically diverse areas would produce more concrete data. Also, more thorough plotting of communities and coteries would give more accurate results. Additional studies of trophic interactions of prairie dogs in grazed and ungrazed areas would help in our understanding whether or not they are an important species in both areas.

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Permission to use Bonvue Ranch property & advice:
Jennifer Ramstetter, Ph.D. (Biology), (Owner)
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Permission and assistance on Bonvue Ranch:
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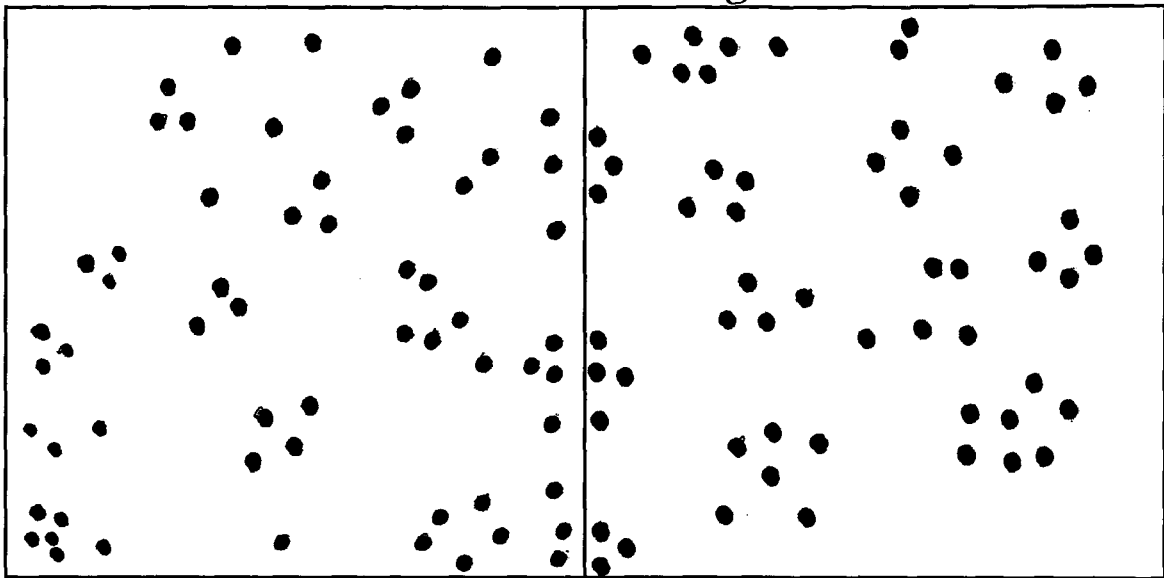
Use of Equipment:
Eric Stone, Ph.D. (Biology)
U.C. Boulder

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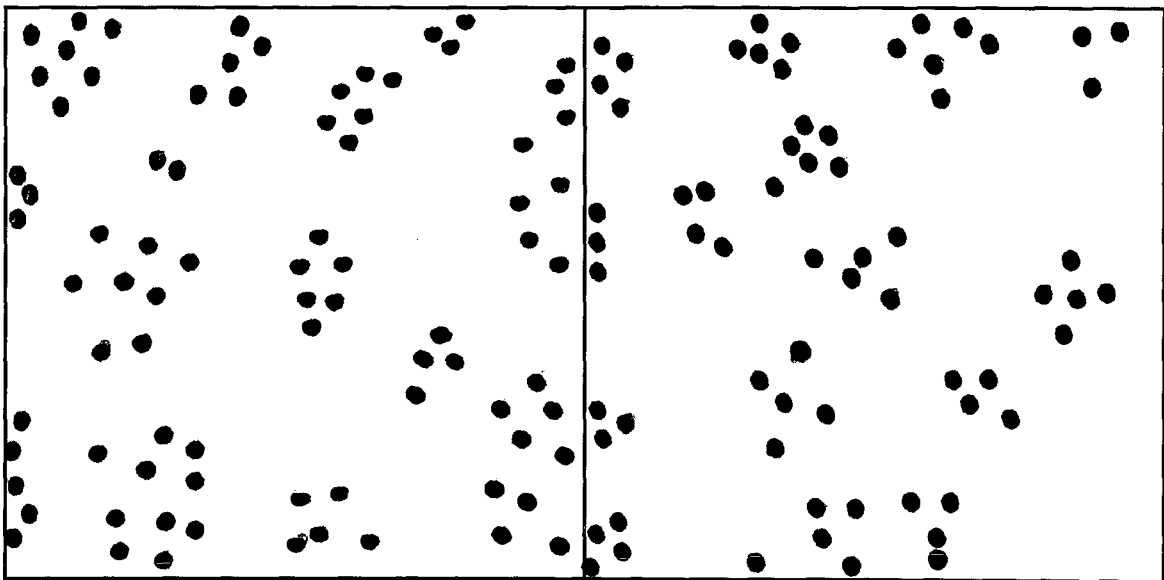
Plots of Prairie Dog Towns

Site I
Lightly
grazed



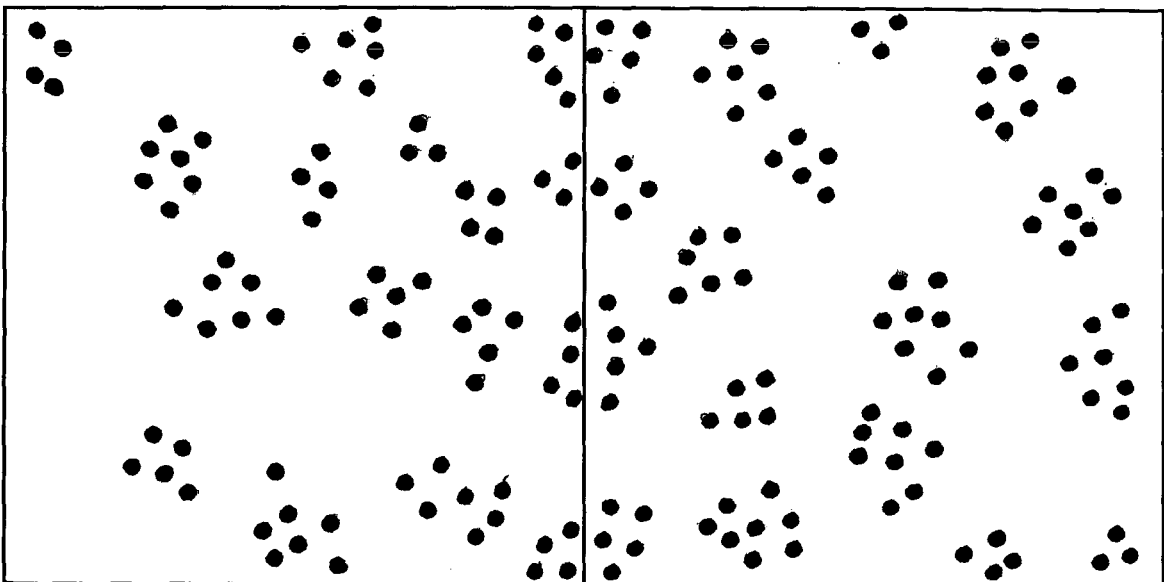
Site II
ungrazed

Site III
Moderately
grazed

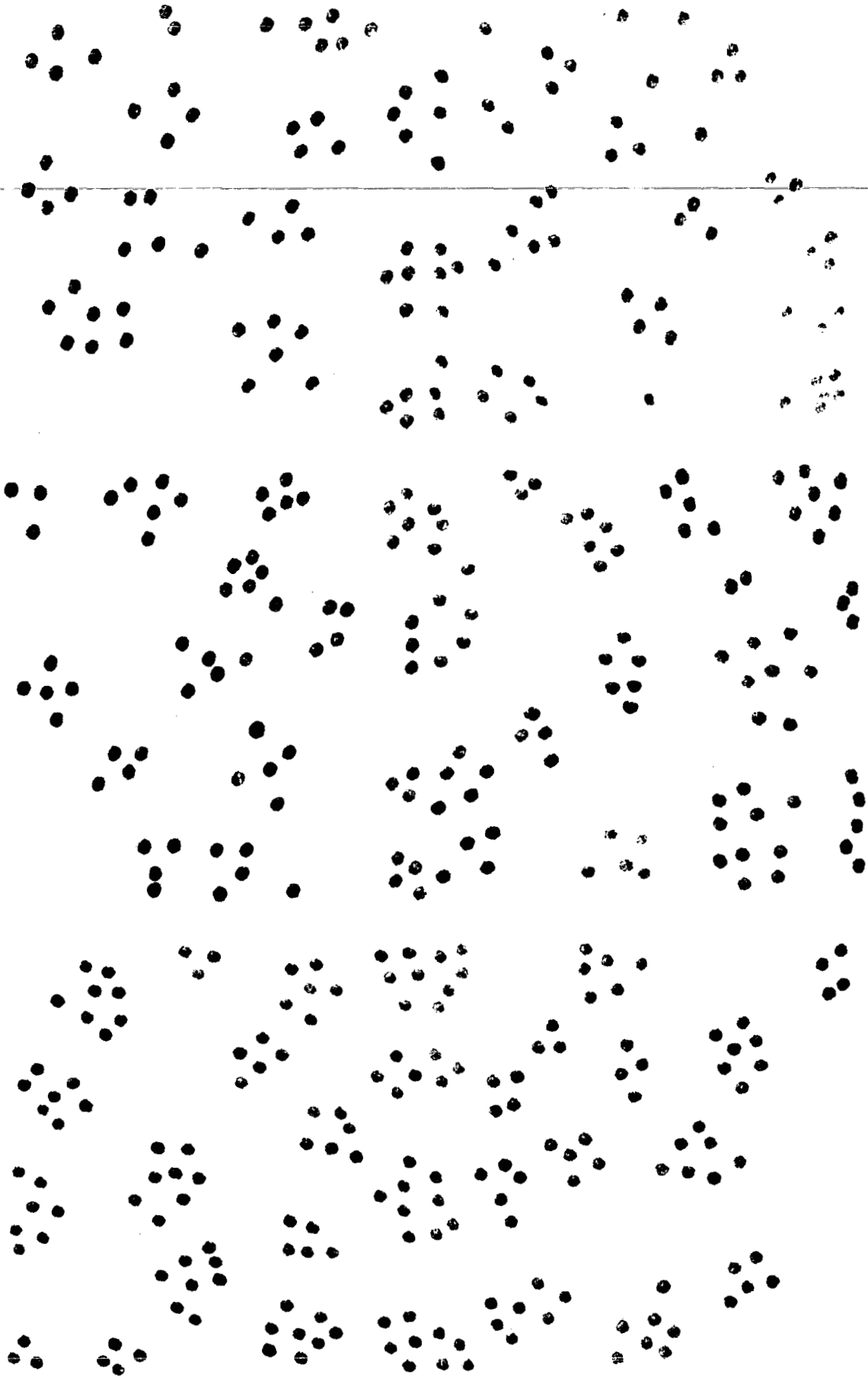


Site IV
ungrazed

Site V
Heavily
grazed



Site VI
ungrazed



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Average NND (nearest neighbor distance) per Site

