Cattle, Prairie Dogs, and Vegetation in the Marathon Basin of Texas

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The black-tailed prairie dog (Cynomys ludovicianus) plays a vital role in preserving biological stability in western grasslands. Considered a keystone species responsible for grassland maintenance, prairie dogs provide ecosystem services such as brush control and nutrient cycling. Black-tailed prairie dogs were once widespread and numerous throughout West Texas, but populations have been on the decline since the early 1900s. Recent surveys in Texas revealed that black-tailed prairie dogs occupy less than 5 percent of their historic range within the Trans-Pecos region.

Reasons for their decline include poisoning, bubonic plague (Yersinia pestis), habitat destruction and land fragmentation. Public perception of prairie dogs is often polarized and controversial and often influences management decisions on public and privately owned land.

The consumption of plants by prairie dogs creates distinct vegetation communities within a grassland system. Long-term continuous grazing alters vegetation species composition from climax plants to early successional plants. Long-term changes to vegetation that have been observed include declines in biomass, plant production and plant cover.

The continuous grazing by prairie dogs on vegetation creates a positive feedback loop in which removal of plant biomass is offset by the improved forage quality. Removal of mature plant tissue promotes vegetative regrowth that has greater nitrogen content and is highly digestible.

Constant grazing by prairie dogs and the subsequent increase in vegetative nutritional quality is attractive to a variety of herbivores. Historically, bison (Bison bison) would have benefitted from this feedback loop, and today cattle (Bos taurus) and pronghorns (Antilocapra americana) will selectively utilize prairie dog colonies.

Cattle and prairie dogs often occupy the same rangelands and consume the same vegetation. Use overlap often leads to concern among ranchers about competition between cattle and prairie dogs that could result in a decline in cattle productivity.
Previous research has shown the dietary overlap between cattle and prairie dogs varies seasonally from 50-80 percent. However, research has not shown a change in cattle weight on prairie dog colonies compared to non-prairie dog colonies.

To better understand how prairie dogs influence vegetation and cattle, we examined spatial and temporal variation and trade-offs between forage quantity and quality across landscapes with and without prairie dog colonies. We also evaluated cattle movements and grazing patterns across landscapes with and without prairie dog colonies.

The study area was in Brewster County on The Nature Conservancy’s 2,701-acre Marathon Grassland Preserve, north of Marathon, Texas. This property includes part of one of the largest black-tailed prairie dog colonies in the Trans-Pecos region of Texas. Two prairie dog colonies exist on the Marathon Grassland Preserve; the main colony was approximately 700 acres and the smaller colony was approximately 50 acres, located 1 mile east.

We divided the property into three pastures that varied in size (pasture 1—518 acres; pasture 2—1,047 acres; pasture 3—1,183 acres). Ten to 32 percent of the acreage of each pasture consisted of prairie dog colonies.

Vegetation sampling occurred during three seasons: cool (November–March), warm-dry (April–June), and warm-wet (July–October) from June 2017 to May 2018. Vegetation samples were dried to measure biomass and ground to estimate nutritional content.

Hereford and Red Angus heifers (n = 25) were rotated, using a three-pasture, one-herd system, on the Marathon Grassland Preserve. Ten cows were fitted with GPS collars that recorded fixes every 30 minutes for 24 hours per day. Cattle were rotated monthly in pastures 1 and 2, and every two weeks in pasture 3, to provide for consistent grazing intensity among pastures.

Study results indicated that plant species composition and biomass were similar on and off prairie dog colonies. However, we detected differences in protein content of forbs on the prairie dog colonies during the warm-dry and warm-wet seasons; similar to previous studies, we documented 10 percent higher crude protein levels on the colonies compared to off the colonies.

We found that cattle minimized use of the prairie dog colonies during the cool season and increased use during the warm-dry and warm-wet seasons. Increases in vegetation biomass and protein during the warm-dry and warm-wet seasons aligned with the monsoonal rainfall patterns that occur in the Trans-Pecos region.

Movement data indicate that cattle graze within the prairie dog colonies during the growing seasons because of the highly nutritious and palatable forage regrowth promoted by prairie dogs during monsoonal rains. The increased crude protein observed within grasses and forbs in the prairie dog colonies suggests that vegetation responded positively to the continual grazing by prairie dogs during this study.

We also documented a 16 percent higher occurrence of Havard threeawn (Aristida havardii), a grazing adapted species, on prairie dog colonies compared to off the prairie dog colonies. This provides additional evidence that prairie dog grazing may alter species composition, and ultimately, vegetation species available to other grazing herbivores.

This study indicates that while dietary overlap exists between black-tailed prairie dogs and cattle, landowners who seek to graze cattle on prairie dog colonies may see a mutually beneficial relationship in the form of positive vegetative feedback. Appropriate stocking rates and rotational grazing can be used so that cattle take advantage of the shifts in vegetation nutrition caused by prairie dogs.

Specifically, landowners and managers can design rotation schedules where cattle graze in non-prairie dog colonies during the cool and warm-dry seasons when protein is lowest and where cattle are on the prairie dog colonies during the late warm-dry and warm-wet seasons when protein is at its highest. Such rotation schedules allow cattle to have access to the prairie dog colonies when vegetation is at its highest nutritional value, while removing grazing pressure and competition between prairie dogs and cattle when nutritional value is lower.