Reducing Prairie Dog Populations and Damage by Castration of Dominant Males

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ABSTRACT: Black-tailed prairie dogs (*Cynomys ludovicianus*) occur widely across the prairie states of North America. They compete with livestock for forage, transmit plague, and damage lawns, landscaping, and property. Interest in non-lethal methods, such as immunocontraception, is growing; however, reductions in the population due to contraception may be offset by increases in survival because adults and yearlings are not subject to the energetic demands of reproduction, and lower densities may increase the amount of resources available to growing offspring. Surgical sterilization provides a means for modeling these effects. Thus, we castrated males prior to the 1998 breeding season to simulate the potential effects of some contraceptives on body mass and survival. During the summer following treatment, the proportion of male and female adults/yearlings and juveniles captured did not differ between treatment and control coteries; however, the proportion of adults and yearlings captured decreased with later trapping periods. Hence we cannot recommend castration of dominant males to reduce colony expansion and damage by prairie dogs. Other methods of fertility control (GonaCon and diazacon) have shown more promise in prairie dogs.

KEY WORDS: *Cynomys ludovicianus*, fertility control, prairie dog, wildlife damage

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INTRODUCTION

Prairie dogs (*Cynomys ludovicianus*) are a social rodent species of the grass prairies of the United States. They pose many challenges to resource managers in highly disturbed settings, such as urban/suburban areas, where conflicting interests persist regarding the presence of prairie dogs (Witmer et al. 2003, Zinn and Andelt 1999). The history, biology, ecology, and status of prairie dogs has been reviewed by Clippinger (1989), Fagerstone and Ramey (1996), Hoogland (2003), Mulhern and Knowles (1996), and U.S. Fish and Wildlife Service (2000). There is a need to better monitor colonies and the changes that they undergo as well as a need to plan for future events. Municipalities have designed management plans to reduce conflicts by using public input, zoned management areas, and a variety of management techniques and tools. Individual populations must often be managed very differently.

Fertility control offers another potential solution to control expanding prairie dog colonies. The topic of wildlife fertility control was reviewed, including chemicals, delivery systems, advantages, disadvantages, regulatory issues, and challenges (Fagerstone et al. 2010). Previous

field studies (Nash et al. 2007) indicate that the steroid diazacholesterol and can effectively limit prairie dog reproduction if delivered in adequate amounts to the animals over a sufficiently long period of time before the breeding season. Yoder and Miller (2011) showed that GonaCon and also inhibit reproduction in prairie dogs: however, this material must be injected. Physical castration is another possible means to control prairie dog populations. Prairie dogs live in colonies and those are comprised of extended family groups called coteries. Each cotorie is comprised of one or more adult males (including a dominant male), several adult females, and their juveniles.

Our objective was to determine if physical castration of the adult males in coteries would reduce the reproduction of those coteries. We hypothesized that the castrated adult males would still prevent other males from impregnating adult females in their coteries. This study was conducted by an M.S. graduate student of ours at Colorado State University who never published the results of the study (Schwartz 2002). Hence, in this paper, I summarize the study; for more detail, see Schwartz 2002.

STUDY AREA AND METHODS

The field study was conducted on the Pine Ridge Natural Area of Fort Collins, Colorado. The 30-ha area is partially surrounded by residential housing. Prairie dogs were live-trapped, ear-tagged, and dyed with a marker so that each had a unique combination of letters and numbers. Observation blinds were built so that the prairie dogs could be observed without disturbing them. Through extensive observations, the individual coteries could be identified along with the adult (sexually active) males in each coterie. The reproductive status of captured adult females could also be determined. Fourteen coteries were used in the study. These were paired so that each pair was of similar size in terms of the number of prairie dogs. In each pair, one was randomly selected to serve as the control while the other was the treatment coterie.

Once the adult males were identified, they were live-trapped and brought to an animal room of the USDA National Wildlife Research Center in Fort Collins for processing. The males from the treatment coteries were anesthetized and physically castrated by a veterinarian; the control coterie males were subjected to a sham procedure. Each male was returned to its original coterie shortly after recovery from the anesthetic.

We observed the dominant male in each cotorie to make sure he continued to behave as the dominant male. The following spring, we observed the coteries to determine the reproductive output of each and that the original dominant male was still present. We also live-trapped the females to determine their reproductive status. We used logistic regression, ANOVA, and paired t-tests to analyze the data.

RESULTS AND DISCUSSION

There was no significant difference between the number of males per coterie in the treatment (mean = 2.9) versus the control (mean = 2.0) groups. The number of males with pigmented scrotum (i.e., sexually active) was not significantly different between treatment (14 of 20) and control (12 of 14) groups. All coteries contained at least one male with a pigmented scrota.

There was no significant difference in the portion of females that lactated prior to treating the adult males in the treatment (26%) and control (39%) coteries. All females at the start of the study had sealed vulvas, meaning they had not yet been sexually active. There was no significant difference in the number of females in treatment (mean = 4.0) and control (5.0) groups.

After the breeding season, there was no significant difference between the number of lactating females in the treatment (19 of 24)

and control (27 of 28) groups. Litters first emerged in late April. The date that juveniles first emerged did not differ significantly between treatment and control groups. There were fewer juveniles born in the treatment groups (68; 32 male and 35 females) than in the control groups (139: 71 males and 67 females). However, it should be noted that 58 of the control juveniles were born on one large control coterie containing 12 females. There was no significant difference in the number of juveniles per coterie in the treatment (mean = 9.7) and the control (19.9) groups. Nor was there a significant difference in the number of pups born per female in the treatment (mean = 2.5) and control (4.0) groups.

It is clear that castrating the adult males in coteries did not slow reproduction in those coteries. It was noted that immigrant males (and in some cases females) moved between coteries. This may have led to copulation and pregnancies of adult females in some coteries. It has also been noted that female prairie dogs will often mate with more than one male (Hoogland 1995). This helps ensure pregnancy, but may also reduce the chances of infanticide of young by non-parent males.

This study indicates that, because of extra-coterie copulations, reproductive inhibitors that target adult males will not reducing population growth in black-tailed prairie dogs unless almost all adult males are treated. To be successful at reducing colony size and expansion, dual-gender contraceptive agents such as GonaCon and diazacon will likely be needed.

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