Effects of Short Duration Grazing on Deer Home Ranges

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Abstract: Twenty-three white-tailed deer (*Odocoileus virginianus*) were radio-tracked from February 1984 to February 1985 on adjacent south Texas areas subjected to short duration (SDG) and continuous (CG) cattle grazing. Deer that ranged between the 2 grazing treatments were termed border deer. There were no ($P > 0.05$) differences in home range size by grazing treatment or sex, but variability was high. Home ranges were similar for deer on the SDG vs. CG area in spite of a 62% greater stocking rate under short duration for 9 of 12 study months. During the last 3 months, stocking rate in the SDG area was 16% less than in CG.

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Short duration cattle grazing is increasing in the southwestern United States (Westmoreland et al. 1981, Allison 1983, Moseley 1983). Relatively little is known about the effects of SDG on white-tailed deer, which are present on much of the rangeland involved. McMahan (1966) and Reardon et al. (1978) reported that deer preferred pastures that were being rested from cattle grazing. Adams (1978) found that deer left a pasture, heavily stocked with cattle, if there was an adjacent area of lower stocking within their home range. Our objective was to evaluate the effects of SDG vs. CG on deer home ranges on a south Texas study area.

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Methods

The study was conducted on a 1,252-ha area managed under SDG, and an adjacent CG area of 2,444 ha on the Encino Division of the King Ranch, Brooks County, Texas. Yearly precipitation in this area averaged 61 cm (Norwine et al. 1978). In 1983, preceding the study, rainfall was 73 cm. During the study, rainfall declined to an annual rate of 45 cm, with March–April and July–August particularly critical times to deer. Soils were fine sands except in low areas where a sandy loam predominated. Vegetation was a honey mesquite (*Prosopis glandulosa*)-grassland association with scattered common live oak (*Quercus virginiana*) mottes. Frequent herbaceous plants were threeawns (*Aristida* spp.), fringed signalgrass (*Brachiaria ciliatissima*), sandburs (*Cenchrus* spp.), thin paspalum (*Paspalum setaceum*), Texasgrass (*Vaseyochloa multinervosa*), crotons (*Croton* spp.), camphor telegraphplant (*Heterotheca subaxillaris*), and sarcostemma (*Sarcostemma cynanchoides*).

The SDG treatment was initiated in November 1983 after 8 paddocks (115–180 ha) were fenced with 2-strand electric fencing. Previously, the SDG and CG areas had been continuously grazed at about 7 ha/Animal Unit (AU) for many years. The SDG and CG areas were stocked with cattle at 4.5 ha/AU and 7.3 ha/AU, repectively. Stocking rate in the SDG area was reduced to 8.5 ha/AU in October 1984 as a result of drought. Stock density in paddocks, being grazed in the SDG area, ranged from 0.45 to 0.73 ha/AU, prior to October 1984, and 0.85 to 1.34 ha/AU thereafter. Grazing periods in the SDG treatment ranged from 4 to 10 days.

Twenty-three deer >1 year old were captured from November 1983 through January 1984 by drop net (Ramsey 1968) at sites scattered throughout the SDG and CG areas. Each deer was fitted with a radio collar and released at the capture site. Bearings to instrumented deer were taken from permanent null antennas arranged in a pentagonal configuration (White 1985) in the SDG area and a triangle in the CG area. Each antenna was tested for accuracy by taking 10 bearings from 6 to 10 known beacon locations (White 1985). Deviations from the actual bearings were used to estimate system accuracy (Tester and Siniff 1965, White 1985). Average bearing deviation for antennas ranged from ±0.61 to 2.03 degrees. Deer locations were established from simultaneous bearings from 3 antennas. We concentrated on location accuracy at the expense of obtaining a larger sample. Deer were generally radio-tracked 3 times/week from February 1984 to February 1985. The beginning of a tracking session involved selecting 3 antennas from which observers scanned for deer. After animals in the vicinity were located, observers moved to several different sets of 3 antennas and repeated the process until all (or most) animals were located. About 75% of locations were taken in daylight hours, and the remainder were taken at night.

Deer were divided into 3 groups for analysis: (1) SDG deer, ≥75% of locations within SDG area; (2) CG deer, ≥75% of locations in CG area; and (3) border deer, home range encompassing both treatments, but <75% of locations in either. General movement response of deer to grazing treatment was assessed by comparing the mean home range size of males and females. The bivariate normal (95% ellipse) home range model (Jennrich and Turner 1969) was used because it is relatively insensitive to sample size or distant locations. The method assumes that home range use distribution is bivariate normal which is difficult to verify (Anderson 1982).

Replication of grazing treatments was economically impossible. Two-way analysis of variance was used to test for home range differences by grazing treatment and sex. The ANOVA should be viewed as a guide to understanding the data, while keeping in mind that it was not possible to test for site effects.

Results and Discussion

Home range estimates were not different by grazing treatment or sex (Table 1). There was no grazing treatment-sex interaction. Although not significant, mean home range size of border deer was larger than for deer in a single grazing treatment. Home range size was variable, with at least a 2-fold difference separating the high and low estimate among deer within all treatment and sex groups. Inglis et al. (1979) also reported large individual differences in home range size of deer radio-tracked in south Texas.

Compared to the present study (Table 1), Inglis et al. (1979) reported smaller home ranges ($\bar{x}$ = 84 ha females; 139 ha males) for deer radio-tracked on the Welder Wildlife Refuge in south Texas. They also used the bivariate normal (95% ellipse) home range model, but had a much larger sample size and shorter radio-tracking period/deer, as compared to our study.

Cohen (1985) radio-tracked female deer ranging over a small (219 ha) SDG area and adjacent CG area on the Welder Wildlife Refuge. He found home ranges of about 500 ha, using Anderson's (1982) Fourier transform model. This was much larger than the mean home range size for females determined on the same area by

Table 1. Mean number of radio telemetry locations and home range estimates (ha) for groups of deer exposed to short duration (SDG), continuous (CG), and both SDG and CG (Border) cattle grazing in south Texas, February 1984 to February 1985.

		Locations		Home range	
Deer group	*N* deer	Mean	SD	Mean	SD
SDG					
Males	2	31	6	750A[a]	426
Females	4	51	20	654A	328
CG					
Males	2	34	13	748A	334
Females	5	34	13	553A	194
Border					
Males	6	30	10	1,340A	714
Females	4	30	13	983A	1,124

[a]Means followed by the same letter are not different ($P > 0.05$).

Inglis et al. (1979). Cohen's deer ranged between grazing treatments and had larger home ranges, similar to our border deer. However, differences in method of analysis, sample size, and length of time radio-tracked made comparisons tenuous.

Certainly, we do not claim that conditions in treatment areas were the same before the SDG treatment was imposed because treatments were not replicated. Nevertheless, home range sizes were not significantly different regardless of grazing treatment or sex, although there was much variability. Possibly the grazing treatments were not having a large effect on deer movements, despite a 62% greater stocking rate of cattle in the SDG area for 9 of the 12 study months. During the last 3 months, stocking rate was 16% less in the SDG area as compared to the CG area.

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