Cattle Grazing and Sharp-Tailed Grouse Nesting Success

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Plains sharp-tailed grouse originally ranged from northcentral Alberta, into the northwest and central United States, and as far south as northern New Mexico. The decline in sharp-tailed grouse abundance and distribution has been attributed to habitat loss by rangeland being converted to cropland and overgrazing by domestic livestock (Miller and Graul 1980).

Livestock grazing reduces residual vegetation required for nesting, and has been the most commonly cited factor in the reduction of sharp-tailed grouse abundance and distribution (Hillman and Jackson 1973). Kirsch et al. (1973) did not recommend livestock grazing for lands principally managed for prairie grouse habitat. However, Evans (1968) suggested that light to moderate livestock grazing left adequate residual cover for nesting sharp-tailed grouse.

Typical mixed-grass prairie on the Central Grasslands Research Center.

Methods

The 5,300 acre Central Grasslands Research Center in southcentral North Dakota served as the study area. The region is characterized by potholes, sloughs, and hummocky, irregular and rocky plains, without an integrated drainage system. Herbaceous vegetation is typical of the mixed-grass prairie. Shrub-dominated communities comprise 30% of the rangeland. Western snowberry dominates the overstory and Kentucky bluegrass the understory. Wetlands occur on 8% of the land area.

A short duration grazing system was established in 1982 on 320 acres of rangeland as eight-40 acre pastures. Between 1984 and 1986, 65 cow/calf pairs were annually allocated to this grazing treatment. Cattle were rotated every 5 days so that each pasture received 35 days rest between occupancies. Each pasture was grazed 4 times between late May and early November each year (160 days).

A twice-over rotation grazing system was established in 1983 and located adjoining the previous treatment. In 1984, two replicates of three-80 acre pastures were grazed by cow/calf pairs. Cattle grazed each pasture 28 days with 56 days rest between occupancies. In 1985 and 1986, this system was modified to two replicates of four-80 acre pastures, grazed by 60 and 65 cow/calf pairs, respectively. Each pasture was grazed twice annually, on a 20 day graze, 60 day rest cycle. Cattle were allocated to and removed from this treatment on the same dates as the short duration grazing system. Stocking rates of both grazing systems were based on a 50 to 60% use of annual herbage production as estimated by clipping.

A total of 520 acres of nongrazed rangeland adjacent to the short duration grazing treatment served as a control area. This land had not been grazed or hayed since 1977. Terrain, sites and vegetation composition was similar to the grazed treatments.

Sharp-tailed grouse dancing grounds on or within 1 mile of the Center were found between late March and early April each spring. Nests were located in 1984 using the cable-chain drag method (Higgins et al. 1977). In 1985 and 1986, nests were located by monitoring radiotagged hens trapped on dancing grounds. Sharp-tailed grouse hens were trapped on the 4 dancing grounds closest to the grazing treatments and nongrazed rangeland.

Solar or battery powered transmitters were placed on captured hens. Nesting hens were located daily until they failed to return to the nest site. Nest fates were determined by nest checks, and by locating and flushing hens and broods ten days after nest abandonment.

Visual obstruction readings (Robel et al. 1970) were taken at the nest, at 1 yard intervals to 10 yards from the nest in cardinal directions, and along permanent transects established in grazed and ungrazed areas. Permanent transect visual obstruction readings were recorded at vegetation greenup in early May. Species and frequency of vegetation occurring within a 1 yard radius of nests and permanent stations were recorded.

Because of the small numbers of nesting birds, we only made statistical comparison between grazed and nongrazed areas. Nest success was adjusted by the Mayfield method

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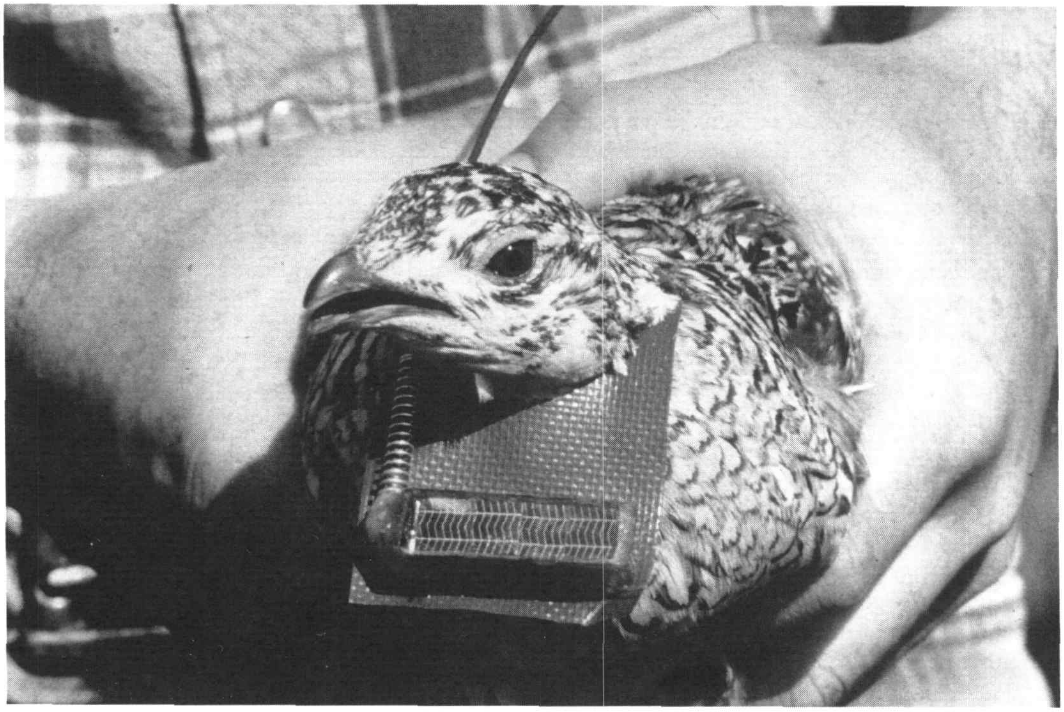

Solar powered transmitter fitted on a captured sharp-tailed grouse hen.

(Mayfield 1961) with 36 exposure days for the nest. Apparent (actual) and Mayfield adjusted numbers of nests, nest success (percent of hens with broods), and nest visual obstruction readings were compared between grazed and nongrazed areas with Chi-square analysis (Sokal and Rohlf 1981). A two-way analysis of variance tested visual obstruction readings between successful and unsuccessful nests. A paired *t*-test ($P<0.05$) compared average clutch size for nests between grazed and nongrazed areas.

Results

Fifteen dancing grounds were located on or within 1 mile of the Center. Nine grounds occurred on grazed areas and six grounds on nongrazed lands. Thirty-two nests, 16 in grazed pastures and 16 in nongrazed areas were located from 1984 to 1986. All 16 nests in the rotation grazed treatments were initiated either before cattle were allocated to pastures or in pastures where grazing was deferred in spring. First nests were initiated during late April. The latest nest initiations were in late June and early July. Median date of nest initiation was May 14. Initiation dates were similar between grazed and nongrazed lands.

Eighty-eight percent of nest site visual obstruction readings exceeded 4 inches (Fig. 1). Less than 20% of grazed pasture visual obstruction readings exceeded 4 inches, while 60% of the visual obstruction readings in nongrazed areas exceeded 4 inches. Nest sites had the highest visual obstruction readings (7.2 inches) with visual obstruction readings significantly decreasing to 10 yards away. Average nest site visual obstruction readings for grazed (7.6 inches) and nongrazed areas (7.2 inches) did not differ. Visual obstruction readings at successful or unsuccessful nests in grazed (8.0 vs 6.8 inches) and nongrazed (6.0 vs 7.2 inches) areas did not differ.

Nineteen plant species were identified within 1 yard of

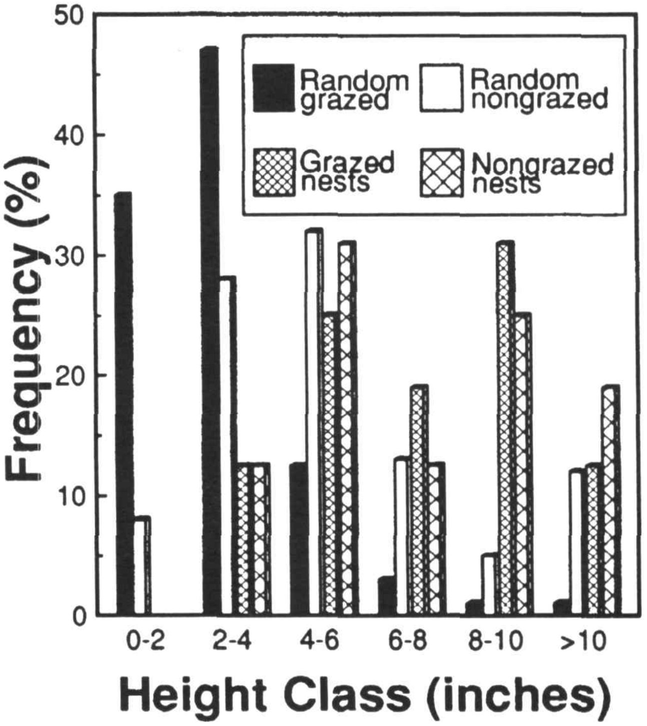

Fig. 1. *Frequency distribution of early May visual obstruction readings for random transects on grazed and nongrazed rangeland and for sharp-tailed grouse nest sites, 1984–1986.*

sharp-tailed grouse nests. Kentucky bluegrass and western snowberry were the most frequently recorded species at nests. Needle-and-thread occurred at over 25% of nest sites. Smooth brome was identified at 38% of nongrazed nest sites.

Sharp-tailed grouse hens preferred western snowberry-dominated plant communities for nest sites in both treatments. Approximately 30% of the grazed and nongrazed areas were dominated by western snowberry whereas, 75% of sharp-tailed grouse nests were located in these plant communities. These communities provided the majority of tall, dense canopy cover, especially in spring.

Of the 32 nests found, 50% were successful (Table 1). Actual nests per 100 acres of nongrazed area were double that of grazed pastures. However, apparent nest success was 25 percentage points higher on the grazed pastures compared to nongrazed areas. Clutch size, averaging 11.4 and 11.0 for nests in grazed and nongrazed areas, did not differ. Mayfield adjusted nesting success was higher in grazed pastures than in nongrazed areas. However, nongrazed areas had a great density of nests per 100 acres. The number of successful nests per 100 acres was 1.0 and 1.3 for grazed and nongrazed areas, respectively.

Recently introduced rotation grazing systems attempt to improve or maintain the productivity and diversity of habitats through temporal and spatial control of grazing. In our study, livestock were not allocated to rotation grazed pastures until late-May which allowed over 60% of sharp-tailed grouse hens to initiate nests prior to grazing. Additionally, 50% or more of the pasture units in the short duration and twice-over rotation grazing treatments were deferred from grazing until mid-June by which time nearly all nests had been initiated. Our results agree with those of Barker et al. (1990) and Sedivec et al. (1990), who reported that deferred spring grazing of livestock was mutually beneficial to livestock, waterfowl and sharp-tailed grouse production in North Dakota. Once nested, no radio-collared sharp-tailed grouse hens were observed to abandon nests when cattle were rotated into pastures where nests were located.

The number of successful nests per unit area was similar between grazed and nongrazed areas. A greater density of nests were found in nongrazed areas, but nest success was higher in grazed areas. Greater nest density in nongrazed areas is a function of the greater choice of suitable nest sites in these areas. Sharp-tailed grouse hens seek tall, dense cover for nesting as evidenced by 88% of all nest site visual obstruction readings exceeding 4 inches.

The high nest success in grazed areas can not be explained by this study. We can only suggest a hypothesis, based on field observations, for this occurrence. Grazed areas are centers of human and livestock activity, and have reduced levels of cover for mammalian predators. These factors may make grazed areas unattractive to predators as foraging sites. In contrast, the seclusion and cover provided by nongrazed areas may actually attract greater numbers of predators. Radio-tracking of mammalian predators is needed to understand the role they play in upland game bird nest site selection and success in this region.

Table 1. Number of nests, nests/100 acres, and nesting success of sharp-tailed grouse from rotation grazed and nongrazed rangeland, North Dakota.

	Nests		Nests/100 acres		Nesting success (%)	
Year	Grazed	Nongrazed	Grazed	Nongrazed	Grazed	Nongrazed
1984	5	9	0.5	1.8	40	33
1985	8	7	0.8	1.4	75	43
1986	3	—[4]	0.3	—	67	—
Apparent total[1]	16	16	1.6	3.2	63	38
Adjusted total[2,3]	22	27	2.4[a]	5.2[b]	44[c]	26[d]

[1]Adjusted grazed vs nongrazed totals were not different (Chi-square, $P>0.05$).
[2]Calculated with the Mayfield method and 36 exposure days.
[3]Grazed vs. nongrazed treatments followed by a different letter differ (Chi-square, $P<0.05$).
[4]No nests.

Conclusion

Rotation grazing systems at the Center have increased livestock production over traditional methods of livestock grazing, while maintaining or improving forage resources. In addition, these rotation grazed areas had a similar density of successful sharp-tailed grouse nests when compared to nongrazed areas. Based on these findings, we support the use of rotation grazing systems on private lands in the northern Great Plains for livestock and sharp-tailed grouse production.

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