Effects of Short-duration and Continuous Grazing on Bobwhite and Wild Turkey Nesting

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Abstract

We compared effects of short-duration and continuous grazing on nesting cover and success of bobwhites and wild turkeys in south Texas during 1984. Coverage, density, and dispersion of suitable nest sites and loss rates of artificial nests were not affected by grazing treatment.

The effects of cell-type, short-duration grazing (SDG) on ground-nesting gamebirds are largely undetermined. Concern that the system may impact these birds has arisen because a single herd of livestock is concentrated in small pastures for short periods. Stocking densities in paddocks may be 5 to 10 times higher with SDG than with continuous grazing (CG). Likewise, the overall stocking rate may be increased under SDG.

Livestock concentrations associated with SDG could increase trampling of ground nests and reduce nesting cover. Bryant et al. (1982) modeled loss rates and concluded that the relative probability of trampling was similar under SDG and CG. Koerth et al. (1983) found that the trampling of clay pigeon targets, placed to simulate ground nests, was similar under the 2 grazing programs.

We compared the effects of SDG and CG on loss rates of ground nests and examined their impact on availability of nesting cover for bobwhites *(Colinus virginianus)* and wild turkeys *(Meleagris gallopavo).*

Study Area and Methods

The study was conducted during 1984 on the Encino Division of the King Ranch, Brooks County, and on the Welder Wildlife Foundation Refuge, San Patricio County, Texas. Soils at the Encino area were deep, level to undulating sands of the Sarita-Nueces-Falfurrias Association. Honey mesquite *(Prosopis glandulosa)* dominated the woody vegetation, which included occasional mottes of live oak *(Quercus virginiana).* Dominant grasses included threeawns (*Aristida* spp.) while crotons (*Croton* spp.), sunflowers (*Helianthus* spp.), and camphorweed (*Heterotheca* sp.) dominated the forbs. The 8-paddock, 1,142-ha SDG cell, established in 1983, was stocked at 4.5 ha/AU with the herd rotated every 4-9 days. The CG pasture (1,242 ha) was stocked at 7.3 ha/AU.

Soils on th Welder area were primarily level Victoria clays that supported mixed brush, mainly mesquite (Drawe et al. 1978). Dominant grasses were Texas wintergrass *(Stipa leucotricha)* and meadow dropseed *(Sporobolus asper).* Prairie coneflower *(Ratibida columnaris),* western ragweed *(Ambrosia psilostachya),* and *Ruellia* sp. were dominant forbs. The 10-paddock, 219-ha SDG cell, established in 1982, was stocked at 2.8 ha/AU with the herd rotated every 3–6 days. The CG pasture (253 ha) also was stocked at 2.8 ha/AU.

We estimated availability of nesting cover (clumps of residual grasses) during March 1984 with 50, 30-m line transects/grazing treatment per study area. Lines were established at right angles to bobwhite counting transects with random starting points and subsequent measurements at 30-m intervals. Clumps of residual grasses were considered suitable for bobwhite nesting if they exceeded 20 cm height and 30 cm diameter (Lehmann 1976) and suitable for turkey nesting if at least 45 cm height (Cook 1972) and 60 cm diameter (D. Ransom, Welder Wildlife Fellow, pers. comm.). Percentage of suitable nesting cover intercepted by each line, number of clumps/line, and frequency of lines with one or more clumps were calculated to evaluate effects of grazing treatments on coverage, density, and dispersion of nesting cover.

We used artificial bobwhite and turkey nests to determine the effects of SDG and CG on loss rates of ground nests during April–June on the Encino Division and May–July on the Welder Refuge. Cattle completed 1.2 rotations in the Welder SDG cell and 0.88 rotations in the Encino SDG cell during the study. Transects with random starting points were used to systematically place 50 turkey "nests" and 100 bobwhite "nests" at least 50-m apart and at sites of suitable cover (Lehmann 1976, Cook 1972) under each grazing treatment and study area (N = 600 nests). No attempt was made to construct a nest bowl. Turkey nests contained 10 domestic turkey eggs and quail nests contained 8 bobwhite eggs. Nest locations were marked with flagging on a nearby shrub or stake. Nests were checked weekly for 6 weeks, which corresponded with the normal laying and incubation period (Bailey and Rinell 1967). Cause of loss was determined by sign at the nest site (Baker 1979). Eggs in undisturbed nests were replaced after 2 weeks so that rotting would not affect results.

The experimental design for analysis of nesting cover data was a 2×2 factorial (2 study areas, 2 grazing treatments). Numerical ranks were assigned to dependent variables because of non-normality. Analysis was applied to the ranks, resulting in nonparametric tests (Conover and Iman 1981). Variance among subsamples within each pasture was used as the error term. Consequently, statistical inference is limited to these specific pastures and does not extend to the vegetation types they represent.

Results and Discussion

Coverage and density of nesting cover for bobwhites and wild turkeys were higher ($P<0.002$) on the Welder area than on the Encino area (Table 1). Likewise, nesting cover for both species was more broadly distributed on the Welder area. This occurred in spite of the fact that the stocking rate was 2 to 3 times higher on the Welder area than on the Encino area. The Welder area has a history of light grazing pressure and receives an average annual precipitation 15 cm greater than the Encino area.

Grazing treatment had no effect ($P>0.2$) on coverage, density, or dispersion of nesting cover for either bird (Table 1). These variables appeared higher for turkeys under SDG than CG on the Encino area because sampling lines intersected stands of gulf cordgrass *(Spartina spartinae)* on the SDG treatment, whereas none was intersected on the CG treatment. Both areas had low, thorny brush which protected residual cover from grazing (Stoddard 1931, Moore 1972), thus neutralizing the effects of different stocking intensities.

Effects of the grazing treatments on coverage and density of bobwhite nesting cover depended on study location (interaction $P<0.03$). This occurred because nesting coverage and density were higher on the Welder area than the Encino area in the SDG treatment. A possible explanation for this was that the SDG treatment was stocked nearly 2 times higher than the CG treatment on the Encino area, whereas the grazing treatments on the Welder area were stocked at the same rate.

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Support for this study was provided by the Rob and Bessie Welder Foundation (Contribution No. 281) and the Caesar Kleberg Foundation for Wildlife Conservation.
Manuscript accepted 9 July 1985.

Table 1. Availability of nesting coverts for bobwhites and wild turkeys in rangeland under continuous grazing (CG) and short-duration grazing (SDG) on 2 study areas in south Texas, March 1984.

		Percent coverage				Coverts/30 m				Frequency (%)	
		CG		SDG		CG		SDG			
Species	Area	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	CG	SDG
Bobwhite	Welder	7.2	0.7	8.0	0.7	3.9	0.3	5.2	0.3	92	96
	Encino	3.3	0.7	2.6	0.7	2.0	0.3	1.5	0.3	74	66
Turkey	Welder	0.9	0.4	0.9	0.4	0.2	0.1	0.3	0.1	24	26
	Encino	0.1	0.4	0.3	0.4	0.1	0.1	0.3	0.1	4	12

[1]Frequency of 30-m lines ($N = 50$) with one or more nesting coverts.

Losses of artificial nests were not affected by study area or grazing treatment. Total losses exceeded 84% for a given area and treatment (Table 2). More than 90% of the losses were attributed to predation by mammals, snakes, or unknown agents. One wild turkey nest was trampled in the SDG treatment at the Welder area.

Table 2. Percentage losses of artificial bobwhite ($N = 100$/treatment/area) and wild turkey nests ($N = 50$/treatment/area) in rangeland under continuous grazing (CG) and short-duration grazing (SDG) on 2 study areas in south Texas, April-July 1984.

	Bobwhite		Wild turkey	
Area	CG	SDG	CG	SDG
Welder	84	96	92	100
Encino	96	94	92	88
Average	90	95	92	94

In south Texas, Baker (1979) found that loss of artificial turkey nests to predation exceeded 90% in a 6-week study. He determined survival of simulated nests was higher in pastures under 4-pasture deferred rotation and high-intensity low-frequency grazing than CG.

The present data add to evidence (Bryant et al. 1982, Koerth et al. 1983) that SDG is not associated with increased trampling losses of ground nests in comparison with CG. This finding, however, must be tempered by conditions obtaining in this and other studies. Obviously, at extremely high stocking rates, heavy losses to trampling are possible. We saw no trampling losses at a maximum paddock density of 0.6 ha/AU on the Encino area. At a maximum of 0.4 ha/AU, one nest was trampled on the Welder area. This latter value might serve as a research and management hypothesis, i.e., trampling losses may not be a management concern unless paddock density exceeds 0.4 ha/AU.

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