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THE EFFECT OF QUAIL FEEDERS ON NORTHERN BOBWHITE DENSITY IN WESTERN OKLAHOMA

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ABSTRACT

We investigated the effect of quail feeders on northern bobwhite (*Colinus virginianus*) covey size and density from 1 October 1991 to 1 October 1996 on the Packsaddle Wildlife Management Area (WMA) in western Oklahoma. Thirty-two quail feeders filled with milo were located near the center of every 8.1 ha on a 283.3-ha treatment area. An adjacent 283.3-ha control area contained no quail feeders. Line-transect methodology was used to seasonally determine covey size and density on each area. Transects were traversed on horseback during October and March of each year. Mean fall covey size was similar ($t = 0.19$, $df = 1$, $P = 0.8525$) between the control (14.0 ± 1.2 birds/covey) and treatment (14.2 ± 1.1 birds/covey) areas, pooled over years. Mean spring covey size was similar ($t = 10.18$, $df = 1$, $P = 0.9999$) between the control (9.4 ± 1.9 birds/covey) and treatment (6.6 ± 1.5 birds/covey) areas, pooled over years. Pooled over treatments, mean covey size was similar ($F = 1.30$, $df = 4$, $P = 0.2798$) among years, but differed ($F = 40.56$, $df = 1$, $P = 0.0001$) between spring (7.6 ± 1.2 birds/covey) and fall (14.1 ± 0.8 birds/covey). Mean bobwhite density, pooled over seasons and years was similar ($t = -3.55$, $df = 1$, $P = 0.9125$) between control (1.28 ± 0.43 birds/ha) and treatment (1.38 ± 0.44 birds/ha) areas. We concluded that quail feeders had no effect on mean covey size or density of bobwhite populations on our study area in western Oklahoma.

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Key words: *Colinus virginianus*, covey size, density, line transect, northern bobwhite, Oklahoma, quail feeders

INTRODUCTION

Supplemental feeding is a common management practice used to augment populations of northern bobwhites in Oklahoma and throughout their range (Frye 1954, Guthery 1986:48, Peoples 1992). Although this practice has gained wide acceptance, there is little scientific evidence indicating feeders increase density, productivity, or survival of bobwhite populations. Several studies have examined the effect of supplemental feeding on wild bobwhite populations (Frye 1954,

Keeler 1959, Robel 1979, Doerr 1988, Kane 1988, Peoples 1992), and those that have been conducted often provide conflicting results.

Frye (1954) reported that supplemental feeding increased bobwhite numbers in south Florida. Guthery (1997) used these data from Florida (Frye 1954), as well as from Alabama (Keeler 1959), Texas Rio Grande Plains (Doerr 1988, Guthery, unpubl. data), and the Texas Coastal Prairie (Doerr 1988, Kane 1988) to determine whether increased food supplies increase bobwhite density. Guthery (1997) concluded that food supplementation was a neutral management practice because bobwhites did not respond with an increase in density to supplemental feed.

Our objective was to determine if quail feeders are

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Table 1. Number of flushing observations (n) used to estimate northern bobwhite mean covey size by season, treatment, year, and pooled over treatments and years on Packsaddle WMA, Ellis County, Oklahoma, 1991–96.

Year Season	Treatment						Pooled		
	Control			Feeder			n	$\bar{x}$	SE
	n	$\bar{x}$	SE	n	$\bar{x}$	SE			
1991									
Fall	25	15.5	1.28	22	14.0	1.76	47	14.8	1.06
1992									
Spring	7	10.0	1.31	9	9.8	1.75	16	9.9	1.11
Fall	13	17.8	0.96	16	15.6	0.75	29	16.6	0.62
1993									
Spring	4	10.8	2.25	2	5.5	0.50	6	9.0	1.81
Fall	14	9.9	1.81	16	14.3	0.52	30	12.3	0.96
1994									
Spring	4	13.0	1.22	6	5.3	1.89	10	8.4	1.72
Fall	13	14.9	0.79	10	12.3	2.00	23	13.8	0.99
1995									
Spring	2	4.0	1.00	3	4.3	2.40	5	4.2	1.36
Fall	20	12.8	1.36	19	12.7	1.31	39	12.7	0.93
1996									
Spring	3	4.7	1.86	16	5.8	1.03	19	5.6	0.90
Fall	10	12.1	1.45	15	15.9	1.44	25	14.4	1.09
1991–96									
Spring	20	9.4	0.97	36	6.6	0.77	56	7.6	0.63
Fall	95	14.0	0.60	98	14.2	0.58	198	14.1	0.42

a viable management alternative for increasing mean covey size and density of bobwhite populations in western Oklahoma.

STUDY AREA AND METHODS

Research was conducted on the Packsaddle WMA in southern Ellis County, Oklahoma. Cole et al. (1966) described the soils, ecological, and climatic conditions in this county. DeMaso et al. (1997) and Parry et al. (1997) provide details on the Packsaddle WMA study area.

The study area was divided into 2 areas, each 283.3 ha. Beginning 1 October 1991, 1 area was supplemented with milo *ad libitum* in gravity-flow feeders, distributed at about 1 feeder/8.1 ha (35 feeders total). The second area served as a control, and was separated from the feeder area by a 1.2-km wide buffer zone.

Bobwhite density was estimated using line-transect methodology (Burnham et al. 1980, Buckland et al. 1993). Four 800-m long transects were permanently established on each study area, 300 m apart, and oriented north-south. Transects were traversed on horseback repeatedly during the first and last 3 hours of daylight (Guthery 1988) until cumulative length ridden was 32 km/site per season. Each time a covey flushed, the number of birds and right-angle distance from the transect to the point where the covey flushed were recorded. Covey centers were determined at the point of first sighting for coveys that did not flush.

Line-transect data were used to estimate density using the computer program DISTANCE (Buckland et

al. 1993). We used the half-normal detection model because it best satisfied the model selection criteria while yielding reasonable density estimates (Buckland et al. 1993). However, within each site, the number of right-angle distance measurements fell below the recommended 40 observations (Burnham et al. 1980) and were considerably below the 100 observations recommended by Buckland et al. (1993). To increase sample size, the seasonal and annual estimates of $\hat{f}(0)$ based on pooled data were assumed applicable on all sites within a season and year; treatment densities were estimated using $\hat{f}(0)$ values, pooled over season and year.

We used the Student's t -test to test for differences in covey size and density between treatment and control populations. Analysis of variance tests were used to test for differences between seasons and among years for these demographic attributes. Because our study was not replicated in different areas, we will stress descriptive statistics. All estimates are reported as $\bar{x} \pm 1.96(\text{SE})$. All statistical tests were considered significant at $P < 0.05$.

RESULTS

Covey size

Mean fall covey size was similar ($t = 0.19$, $df = 1$, $P = 0.8525$) between the control (14.0 ± 0.60 birds/covey) and treatment (14.2 ± 0.58 birds/covey) areas (Table 1). Mean spring covey size was similar ($t = 10.18$, $df = 1$, $P = 0.9999$) between the control (9.4 ± 0.97 birds/covey) and treatment (6.6 ± 0.77 birds/

covey) areas (Table 1). Mean covey size was similar ($F = 1.30$, $df = 4$, $P = 0.2798$) among years, but differed ($F = 40.56$, $df = 1$, $P = 0.0001$) between spring (7.6 ± 0.63 birds/covey) and fall (14.1 ± 0.42 birds/covey) seasons (Table 1).

Bobwhite Density

Mean bobwhite density, pooled over seasons and years was similar ($t = -3.55$, $df = 1$, $P = 0.9125$) between the control (1.28 ± 0.43 birds/ha) and treatment (1.38 ± 0.44 birds/ha) areas.

DISCUSSION

Mean covey size did not differ between the control and treatment area among years. Our results were similar to the results from a quail feeder study in Alabama (Keeler 1959). To our knowledge, no other studies reported the effect of quail feeders on mean covey size.

Frye (1954) reported an increase in bobwhite numbers on an area with automatic quail feeders in south Florida. We found no difference in bobwhite density between the control and treatment study areas. Our results are consistent with studies in south Texas (Doerr 1988, Kane 1988, Guthery 1997) and in Alabama (Keeler 1959). Our results agree with the above results that food supplementation is a neutral management practice.

Four assumptions must be met in order for a supplemental feeding program for bobwhites to be successful (Doerr 1988). These assumptions include: 1) the native food supply is limiting bird numbers, 2) no other habitat parameter (i.e., nesting cover, brood-rearing cover, woody cover, etc.) restricts the population from increasing when supplemental food is provided, 3) birds will utilize supplemental feed, and 4) the birds will be healthier (have higher survival, be more productive, avoid predators better, etc.) when the food supply is improved (i.e., food supply is a component of fitness) (Doerr 1988). Also, a successful feeding program needs to benefit the entire population (e.g., adult birds, chicks, females, and males), not just one segment of that population (i.e., over winter survival of adult birds). On an annual basis, some of the above assumptions must not have been met on our native rangeland study sites in western Oklahoma.

Our results, and the results of other researchers, show that increasing food does not increase bobwhite covey size or density. However, supplemental feeding may be useful as a shooting preserve management tool. Feeders may concentrate birds into specific areas and change the distribution of cause-specific mortality of bobwhites on that area (DeMaso et al. 1998). Doerr (1988) found that of the birds collected in south Texas, there was a tendency to find birds close to feeders more often than at points without feeders. Data from Packsaddle WMA controlled hunts showed similar results early during the hunting season. However, good shooting preserve management techniques may not be good population management techniques. The majority of the quail hunting public has been confused for many

years on the differences between wildlife management and shooting preserve management.

MANAGEMENT IMPLICATIONS

On our study area in western Oklahoma, quail feeders did not increase bobwhite density. Therefore, we recommend managers should focus bobwhite management activities on habitat manipulation. Management activities such as prescribed burning, strip discing, and cattle grazing can be used to augment the late fall and winter supply of bobwhite food. Also, these techniques can increase insect availability (food) for bobwhites during the spring and summer.

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