Duck production on post-contract Conservation Reserve Program grasslands in southwestern North Dakota

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The objective of this study was to evaluate the effect of multiuse land management systems on post-Conservation Reserve Program lands and demonstrate the potential viability and sustainability of producing both agricultural and wildlife outputs. Our findings suggest that occasional grazing or moderate levels of grazing pressure of Conservation Reserve Program grasslands may decrease duck hen recruitment but improve duck nesting success.

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Summary

The objective of this study was to evaluate the effect of multiuse land management systems on post-Conservation Reserve Program lands and demonstrate the potential viability and sustainability of producing both agricultural and wildlife outputs. Six species of ducks utilized research plots as nesting cover, with the highest nest densities occurring in idled land (7.1 nests/100 acres). Overall nest success was highest in the seasonlong grazed pasture at 60 percent success. Our study provides additional evidence to support the importance of permanent cover as nesting habitat for ducks. However, our data also supports earlier findings of higher nesting success rates in seasonlong pastures versus idled lands. Our findings suggest that occasional grazing or moderate levels of grazing pressure of Conservation Reserve Program grasslands may decrease hen recruitment but improve nesting success. Moderately grazed lands may compensate for decreased nest density through increased nest success or may even improve duck production efficiency.

Introduction

The importance of the Prairie Pothole Region (PPR) in North Dakota for duck production has been well-established (Smith et al., 1964). The PPR is composed of numerous wetlands of various classifications that provide exceptional brood-rearing habitat in most years. A plethora of research has focused on duck production within the region; however, little research regarding duck production has been done outside the PPR.

The importance of permanent cover as nesting habitat has been well-documented for ducks (Kruse and Bowen, 1996; Stephens et al., 2005). The Conservation Reserve Program (CRP) has provided millions of acres of permanent cover, restored thousands of wetland acres and protected other wetland habitats throughout the United States. Reynolds et al. (2001) reported 23 percent of duck nests were successful in CRP cover and suggest that CRP has increased duck recruitment by 30 percent in the PPR. Given these findings, CRP grasslands outside the PPR may be expected to provide even more valuable nesting cover for ducks.

Livestock production, although not common on CRP lands due to regulation, is a common land use of many permanent cover types throughout much of the Dakotas. The effects of grazing on duck production have been evaluated with mixed

results (Kirsch, 1969; Barker et al., 1990; Ignatiuk and Duncan, 2001). Although duck production and its interaction with livestock have been investigated in the PPR, few studies have focused on this relationship outside the region.

The Hettinger Research Extension Center (HREC) began a research trial evaluating a multiple land use strategy on post-contract CRP lands and its effect on ring-necked pheasant (*Phasianus colchicus*) production in 2006. A total of 156 duck nests were monitored from 2006 through 2008. This report documents the effects of the multiple land use strategy on duck production.

Procedures

Study sites were located in Adams County, which is in southwestern North Dakota. Both study sites were within three miles of Hettinger, N.D. Each study site consists of approximately 640 acres. A randomized complete block design was used to test if nest success and nest density of ducks were different among several land uses. Each 640-acre study site was divided into one seasonlong (SL) pasture 320 acres in size. The other four treatments were 80 acres in size and were assigned the following treatments or control: no-till barley (NTB), no-till corn (NTC), hayed (HAY) or idle (ID) control.

The SL was grazed with 33 to 45 Angus x Hereford cows from June 1 to Jan, 1 each year, targeting a 50 percent degree of disappearance of forage. Stocking densities were adjusted each year to achieve approximately the targeted use. The HAY was harvested annually during the second week in July. The NTB was harvested for forage and NTC was grazed from Jan. 1 to April 1, at which time the cows were returned to the HREC for calving and fed harvested feeds until June 1. The ID remained intact to represent continuation of CRP, with no forage harvested, and provide habitat for ducks, pheasant and other wildlife. The NTC and NTB treatments were rotated between the two selected 80-acre parcels annually to represent traditional crop rotations.

Duck utilization of each land management type (SL, NTB, NTC, HAY and ID) was determined using a technique described by Higgins et al. (1969). Duck nests were located by dragging a 100-foot chain, 0.31 inch in diameter, between two all-terrain vehicles. The presence of a nest was determined when a hen was flushed from her nest. Each study site was searched in its entirety once every two weeks beginning in late April or early May and continuing until July 15 to determine the presence of nests and timing of the primary nesting season. Upon locating each nest, time of nest initiation was determined utilizing a candling technique (Weller 1956). Each nest was revisited every three to five days to determine nest fate.

Duck nest success was calculated using a modified Mayfield method as described by Miller and Johnson (1978). A nest was considered successful when at least one chick hatched and left the nest. Mean nest density was calculated for each treatment. A repeated measure ANOVA using PROC MIXED was used to analyze egg initiation data. The null hypothesis tested was that no difference in nest success or density would occur among treatments and years. A P-value ≤ 0.05 was considered significant. When a significant P-value was obtained regarding treatments, year and treatment X year interaction, the Tukey's Honesty Significance Test procedure was used to separate means.

Results

The degree of herbage disappearance was lower than the target of 50 percent on all ecological sites for 2006 and 2007 (Table 1). Disappearance was greatest on the loamy overflow ecological site when compared with the loamy and shallow loamy sites in 2006 and 2007. The loamy site had a greater degree of utilization than the shallow loamy site in 2006; however, the shallow loamy site was utilized at a greater level than the loamy site in 2007. The degree of disappearance could not be calculated for 2008 due to early and prolonged snowfall during the fall.

Several species of ducks, including mallard (*Anas platyrhyncos*), gadwall (*A. strepera*), northern pintail (*A. acuta*) and blue-winged teal (*A. discors*), were observed nesting on trial plots, with gadwall being the most abundant. In general, the number of duck nests declined from 2006 to 2008. A year effect occurred between 2006 and 2007, with overall nest density lower in 2006 than 2007 ($P \leq 0.05$; Table 2). The SL grazing treatment (5.1 nests/100 acres) and ID control (7.1 nests/100 acres) had greater duck nest density ($P<0.05$) than NTC and NTB (0.6 and 0.4 nests/100 acre, respectively).

Predation by skunks (*Mephitis mephitis*) and other mammalian predators accounted for the majority of nest failures. Nest failures resulted in the destruction of the nest and eggs but generally showed no signs of hen predation. Duck nest success was greater ($P \leq 0.05$) on the SL (61 percent) compared with NTC (2 percent) and NTB (1 percent) (Table 3). Duck nest success on ID (41 percent) was trending toward being different from NTB and NTC ($P=0.09$).

Discussion

Ducks predominantly chose habitats that consisted of permanent grassland cover for nest sites during the study and avoided cropped land entirely following 2006. Duck nest density was highest in ID CRP lands throughout the study period. Kirsch (1969) reported similar findings of 0.28 nest/acre in idle lands versus 0.17 nest/acre in grazed lands. Barker et al. (1990) reported greater nest densities in idle lands than grazed treatments in six of seven years in a study in south-central North Dakota.

The nest success rates recorded in this trial were high compared with most studies found in the literature. Nests initiated in the SL treatment were more successful than all other treatments, including ID. Barker et al. (1990) reported an average Mayfield nest success rate of 26.6 percent in seasonlong pastures versus 11.3 percent in idle lands from 1983 to1989. Ignatiuk and Duncan (2001) found duck nests initiated in seasonlong pastures averaged 25 percent success in Saskatchewan. Conversely, Kirsch (1969) reported higher apparent success rates in idled lands (28 percent) versus grazed (14 percent). Stocking rates in our study, as well as those in Barker et al. (1990) and Ignatiuk and Duncan (2001), were designed to achieve a 50 percent degree of disappearance, while those in Kirsch (1969) varied, often exceeding 50 percent disappearance.

As with earlier research, nest success did not appear to be impacted negatively by the presence of cattle. Many opinions have been offered as to why this phenomenon may occur, but the likely answer is cattle presence discourages predators, either directly or indirectly. Although the ability to graze CRP is limited by federal CRP requirements, future agriculture and land management considerations may want to be given to the occasional grazing of CRP. When proper stocking rates are applied, which allows for residual vegetation to remain following the completion of grazing, ducks may initiate fewer nests. However, nests initiated in properly stocked seasonlong pastures are more likely to have greater nesting success and potentially more ducklings produced than idled lands.

Table 1. Degree of herbage disappearance (percent) for the loamy, loamy overflow and shallow loamy ecological sites near Hettinger, N.D., in 2006 and 2007.

	2006		2007	
Ecological Site	Grass	Forbs	Grass	Forbs
Loamy	45.2 ± 10.4	32.4 ± 7.6	28.0 ± 6.8	70.0 ± 10.0
Loamy Overflow	53.7 ± 1.6	21.2 ± 0.0	44.2 ± 8.8	50.0 ± 0.0
Shallow Loamy	27.5 ± 15.0	39.8 ± 10.6	31.3 ± 8.5	80.0 ± 10.0

Table 2. Mean values of duck nest density (nests/100 acre) on NTC, NTB, HAY, SL, treatments and ID control on post-Conservation Reserve Program lands near Hettinger, N.D., 2006-2008.

	Treatment[1]				
Year(s)	SL	ID	HAY	NTC	NTB
2006-2008	5.1[a]	7.1[a]	2.9[ab]	0.6[b]	0.4[b]
2006[2]	5.8	8.7	5.6	1.9	1.3
2007	4.4	5.7	1.7	0	0
2008	5.2	7.0	1.3	0	0

[1]Treatment abbreviations: SL = seasonlong grazing, ID = idle, HAY = hay lands, NTC = no-till corn,
NTB = no-till barley.
[2] The HAY treatment was idle prior to study initiation and not hayed until mid-July, thus reacting like an idle treatment during the primary nesting season in 2006.
[a,b]Means within rows having differing superscripts differ $P \leq 0.05$.

Table 3. Mean nest success (percent) on NTC, NTB, HAY, SL and ID treatments on post-Conservation Reserve Program lands near Hettinger, N.D., in 2006 and 2007.

	Treatment[1]				
Year(s)	SL	ID	HAY	NTC	NTB
2006-2008	61[a]	41[ab]	29[ab]	2[b]	1[b]
2006	56	29	57	0	0
2007	62	70	32	0	0
2008	66	25	0	0	0

[1]Treatment abbreviations: SL = seasonlong grazing, ID = idle, HAY = hay lands, NTC = no-till corn, NTB = no-till barley.
[a,b]Means within rows having differing superscripts differ P ≤ 0.05.

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