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SAME-NEST POLYGYNY IN THE BARN OWL[1]

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Polygyny occurs most frequently among altricial bird species in which females provide most or all of the parental care (Emlen and Oring 1977). Owls are considered to be monogamous and both sexes play vital roles in parental care. Polygyny, though, is known to occur in 10 owl species demonstrating that it may be a more common mating system among owls than once believed (Watson 1957, Scherzinger 1968, Koenig 1973, Schönfeld and Girbig 1975, Korpimäki 1983, Mikkola 1983, Norgall 1985, Sonerud et al. 1987, Marks et al. 1989).

Polygyny, with females nesting in separate sites, has been reported for the Barn Owl (*Tyto alba*) in Europe and North America (Schönfeld and Girbig 1975; Epple 1985; B. A. Colvin and P. T. Hegdal, unpubl. progress reports). I report here the first observations of polygyny in wild Barn Owls where two females used the same nest site concurrently.

METHODS

I collected reproductive data as one part of an ongoing study of Barn Owls in a northern Utah agricultural valley. See Marti et al. (1979), Marti and Wagner (1985), and Marti (1988a) for descriptions of the study area. I visited nesting/roosting sites (mostly nest boxes) monthly to determine occupancy and reproductive status, and to band nestlings and adults. Additional visits were made as needed to monitor egg-laying dates, clutch size, brood size, and fledging success.

RESULTS AND DISCUSSION

In 1987, the 11th year of this study, polygyny was first documented. I found three trios (one male and two females) occupying nest boxes in February of that year and another trio in February 1988. All 12 of these birds were known, either through banding records or from

[1] Received 31 July 1989. Final acceptance 13 November 1989.

TABLE 1. Reproductive parameters of polygynous Barn Owls in Utah, 1987–1988.

Date Trio	No. eggs laid	No. eggs hatched	No. young fledged
1987			
A	13 (6, 7)[a]	10[b]	10
B	2	0	0
C	9[c]	6	6
1988			
A	13[b]	8	4

[a] Clutches of individual females in parentheses.
[b] Not possible to differentiate eggs or young of individual females.
[c] One female departed early and it is not known whether she laid any eggs.

TABLE 2. Comparison of reproductive performance between polygynous and monogamous Barn Owls in Utah, 1987–1988.

	Polygynous owls ($n = 4$)	Monogamous owls ($n = 27$)
Clutch[a]		
Mean	4.6	7.0
Range	2–?[b]	5–9
Brood[a]		
Mean	3.0	5.1
Range	0–?[b]	0–8
Fledglings[a]		
Mean	2.5	4.6
Range	0–?[a]	0–8
Successful breeders[c]		
Male	75.0%	85.2%
Female	62.5%	85.2%

[a] Based on numbers of females initiating breeding.
[b] Not possible to separate eggs or young of polygynously breeding females.
[c] Those initiating breeding that produced at least one fledgling.

the pattern of wing molt (P. Bloom, pers. comm.), to be 1 year old. It is not likely, however, that breeding age was a factor contributing to polygyny. Most Barn Owls in this population bred in their first year.

Trio A in 1987 and the 1988 trio raised young to fledging age. In 1987, trio B disappeared after laying two eggs and one female of trio C disappeared during egg laying or early incubation. The male and the other female of trio C produced two broods in 1987. Reproductive performance of the polygynous owls is summarized in Table 1. On average, monogamous Barn Owls of both sexes were more successful in producing fledglings than polygynous individuals (Table 2). Polygynous breeding, though, may lead to high reproductive success for some males compared to monogamous mating; the polygynous male from trio A produced 10 fledglings in a single brood.

Emlen and Oring (1977) predicted that polygyny would occur when males can monopolize females clumped by environmental conditions. All four of the polygynous nestings that I observed were within 6.4 km of each other suggesting that a local effect did indeed favor this mating type. Possible contributing factors include: (1) number of available nest sites, (2) density of prey, and (3) number of available males.

The segment of my study area containing the polygynous nestings measured 13 × 16 km. The other segment, located 50 km away, measured 6.5 × 19 km. Good-quality nest sites in these areas are limited to nest boxes (density = 1 box/9.5 km^2). In 1987, eight unoccupied nest boxes were present within a 15-km diameter circle encompassing the polygynous sites. Each polygynous site was within 4 km of at least one vacant nest box. Eight vacant sites also were present in the 15-km circle containing the polygynous nest in 1988. The nearest vacant nest box was 6.4 km distant. The remaining six nest boxes closest to the polygynous site were occupied by monogamous pairs. Thus, lack of nest sites does not appear to have been a factor in the observed polygyny.

Circumstantial evidence and evidence from other studies suggest that prey densities were stable on my study area (Marti 1988a). However, I have no data to compare prey densities from site to site or from year to year. Diets of the three trios in 1987 were not significantly different in prey composition from those of four pairs of monogamous owls in the same area ($\chi^2 = 1.49$, df = 3, $P = 0.68$; prey $n = 440$ for polygynous owls and 789 for monogamous owls). Combined diets of the polygynous trios did differ significantly from the collective diets of seven pairs of monogamous owls nesting about 50 km away ($\chi^2 = 46.2$, df = 6, $P < 0.001$; $n = 440$ for polygynous owls and 1,922 for monogamous owls). These comparisons were made on numeric frequency at the generic level of prey. Differences observed between diets of polygynous and monogamous owls were smaller than many between-pair differences found in a more comprehensive dietary analysis on the same population (Marti 1988a). This suggests that diet composition was not a factor contributing to polygyny but leaves open the possibility that prey density may have been.

No evidence exists that an uneven sex ratio occurred in this population. The sex ratio of a sample of necropsied owls from the same population was not significantly different from 1:1 (Marti and Wagner 1985) and unpaired owls have rarely been detected during the breeding season.

None of the potential reasons for the observed polygyny is strongly supported. However, only the limitation of nest sites is eliminated based on available evidence. The scenario most in accordance with the Emlen-Oring model is that a local abundance of food and local shortage of males enabled some males to attract two mates.

Polygyny is difficult to detect if two females mated to the same male occupy different nest sites. Earlier in my study, a banded and color-marked male was observed roosting alternately with two females nesting 0.4 km apart. No other male was seen at either site. Other circumstantial evidence of polygyny also exists. In about 10% of 250 nesting attempts (1977–1988) in my study population, no male was ever found roosting at the nest site. In the remainder, a male was observed roosting with the female at some time during the breed-

ing period. These observations suggest that polygyny may occur regularly but at a low level in Utah as it does in New Jersey (B. A. Colvin and P. T. Hegdal, unpubl. progress reports).

Only one of the polygynous breeders, the male of trio A, was found nesting in more than one year. This male bred polygynously in 1987, moved to another nest site 1.7 km distant in 1988, and fledged five young with a first-year female. In 1989 he nested at the same site as in 1988 but with another first-year female and fledged four young. One female breeder (trio A) was found dead of starvation in the winter following her first breeding attempt. None of the other polygynous breeders was encountered again. Presumably all died or moved out of the study area before a second breeding season.

The apparent lack of aggression between females was surprising. Nest-box floor dimensions of 55 × 60 cm would permit separation of the females during incubation and brooding. Nevertheless, in the two cases in which both females produced clutches, the two females incubated side-by-side with only a few centimeters separating the clutches. Both females helped provision the young even after fledging in the two successful trios. Same-nest polygyny certainly does not support the "deception strategy" under which polygynous males are thought to deceive females about their mating status by attracting each female to a separate nest site (Alatalo et al. 1981).

Barn Owls are known to possess a highly flexible reproductive regimen and a potential for high productivity (Colvin 1984, Marti 1988b). The faculty for polygamous mating in Barn Owls has been known from captive birds. In separate instances, two females of trios caged together nested simultaneously in the same nest box (Betsy Hancock and Steve Chindgren, pers. comm.). Cooperative biandry has also been reported in captive Barn Owls (Epple 1985). My observation of polygyny and especially same-nest polygyny is an additional example substantiating the opportunistic nature of Barn Owl reproduction.

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