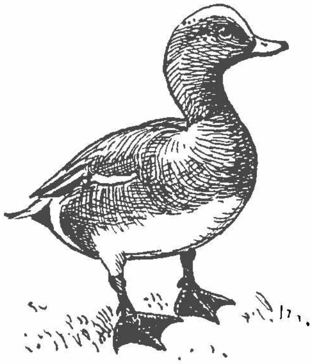
A case of polygyny in the Eurasian Wigeon *Anas penelope*



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A case of polygyny in the Eurasian Wigeon is described. The presence of a second female (F2) on the male's defended area in the lake may have been due to an especially high abundance of an important food (chironomids) prior to breeding. During prelaying, egg-laying and parts of the incubation period, the inter-mate distance between the male and the two females decreased. The male became more vigilant as the season progressed when staying with both F1 and F2. It is concluded that guarding by the male must reduce the occurrence of extra-pair copulation attempts on his females in order to increase his own lifetime reproductive success.

Keywords: Wigeon, Breeding, Vigilance, Polygyny

About 90% of bird species have a monogamous mating system (Lack 1968). van Rhijn (1991) proposed that monogamy and associated biparental care in birds evolved in response to sperm competition; consequently, a male should stay close to his partner while she is fertile in order to prevent other males from inseminating her (Birkhead & Møller 1992).

Among waterfowl, most ducks are seasonally monogamous (Owen & Black 1990). Pair bonds are formed on the wintering grounds or on spring migration, and pairs stay together until incubation when the male deserts (Owen & Black 1990).

The Eurasian Wigeon *Anas penelope* pair bonds during autumn and winter (Cramp & Simmons 1977), and most birds are in pairs in late winter (Owen & Mitchell 1988). Here, we report one case of polygyny observed during a three year (1983–1985) study of the feeding ecology and social behaviour of Wigeon. A male is considered polygynous whenever he forms a prolonged pair bond with two or more females whose nesting cycles overlap in time (Wittenberger 1981).

Study area

Observations were conducted at Lake Bjellandsvatn (59°33'N, 5°21'E), western Norway. The surrounding area has a generally flat terrain approximately 30 m above sea level, consisting of farmland with Heath *Calluna vulgaris*, Norway Spruce *Picea abies*, Pine *Pinus silvestris*, Birch *Betula pubescens* and Willow *Salix* spp. There are up to ten lakes and ponds per square kilometre in the 150 km^2 study area, which vary in size from 0.1–30 ha. Details of the study area and breeding population of Wigeon are given elsewhere (Jacobsen 1991, Jacobsen & Ugelvik 1992).

Methods

Data were gathered between the period 7 April to 16 June in 1983. The birds were observed at a distance of about 200 m using binoculars (8x40) and a telescope (25-40x). Wigeon were observed during a total of 20 h (male + F1), 25.5 h (male + F2) and 6.5 h (male + both females simultaneously) during the breeding season. The birds were considered as being in the prelaying period until the day prior

Table 1. Time spent vigilant by the polygynous Eurasian Wigeon male while staying with either the first female (F1) or second female (F2) during prelaying, egg-laying and incubation. Numbers in parenthesis refer to subsamples.

Associations	Prelaying		Vigilance (%) Egg-laying		Incubation	
	%	P*	%	P*	%	P*
Male + F1	32.1 (84)	< 0.05	37.6 (47)	NS	59.6 (18)	NS
Male + F2	16.5 (103)		28.4 (56)		61.5 (23)	

* chi-square based on frequencies. NS = not significant.

to laying of the first egg. Laying dates were estimated by using the first day of incubation when females were seen in recesses (Jacobsen 1991 for details).

The proportion of time spent in different activities was estimated by recording the frequency of occurrence of each activity of each member of the pair (male + two females) at one minute intervals (instantaneous sampling method; see Altmann 1974). Activities were categorised as feeding (including drinking), resting, vigilance, walking, swimming, flying, comfort movements (including bathing and preening) and social interactions. To evaluate possible seasonal differences in mate guarding of the two females, we recorded inter-mate distances at one minute intervals. Inter-mate distance was estimated (1 m, 2 m and so on) by using the body size of the ducks as measurements.

Since data were collected at one minute intervals, successive samples may be intercorrelated (Swihart & Slade 1985). To avoid this problem in the use of statistical analysis, independent observations for each sex were calculated and used in the subsamples (Jacobsen 1993 for details).

Results

Five Wigeon pairs were established at Lake Bjellandsvatn in 1983. The polygynous male arrived with his first female (F1) on 7 April. About 20 April, the pair settled in the southeast part of the lake and defended this area against conspecifics during prelaying, egg-laying and parts of the incubation period (Ugelvik 1986). In spring, especially, this area provided large numbers of emerging chironomids, an important food for female ducks prior to breeding (Jacobsen 1991).

On 26 April, at 0620 h, we observed a second female (F2) together with this pair. During four hours of observation, F1 performed head-forward threat-display (Cramp & Simmons 1977 for details) against F2 on five occasions when they were closer to each other than 1–1.5 m. F2 rarely retreated more than 5 m away from F1, and was soon closely associated with the pair again.

During prelaying, the male spent more time vigilant when associated with F1 than with F2 (x^2=4.95, df=1, P=0.026), but not during egg-laying (x^2=0.70, df=1, NS) and incubation (x^2=0.002, df=1, NS) (**Table 1**). He was vigilant in 39.7% (391 one minute obs.) of the total time both females were present simultaneously, i.e. during 26 April to 12 May. As the season progressed, the male spent more time vigilant when associated with F1 or F2 (**Table 1**).

The inter-mate distance between the male and F1 was closer than between the male and F2 during prelaying and egg-laying, but not during incubation (**Figure 1**). The inter-mate distance between the male and the females decreased as the season progressed (**Figure 1**).

During prelaying and egg-laying, male conspecifics were observed trying to engage in copulation with F1 and F2 on four and three occasions, respectively. Each attempt resulted in pursuit flights where the polygynous male chased the

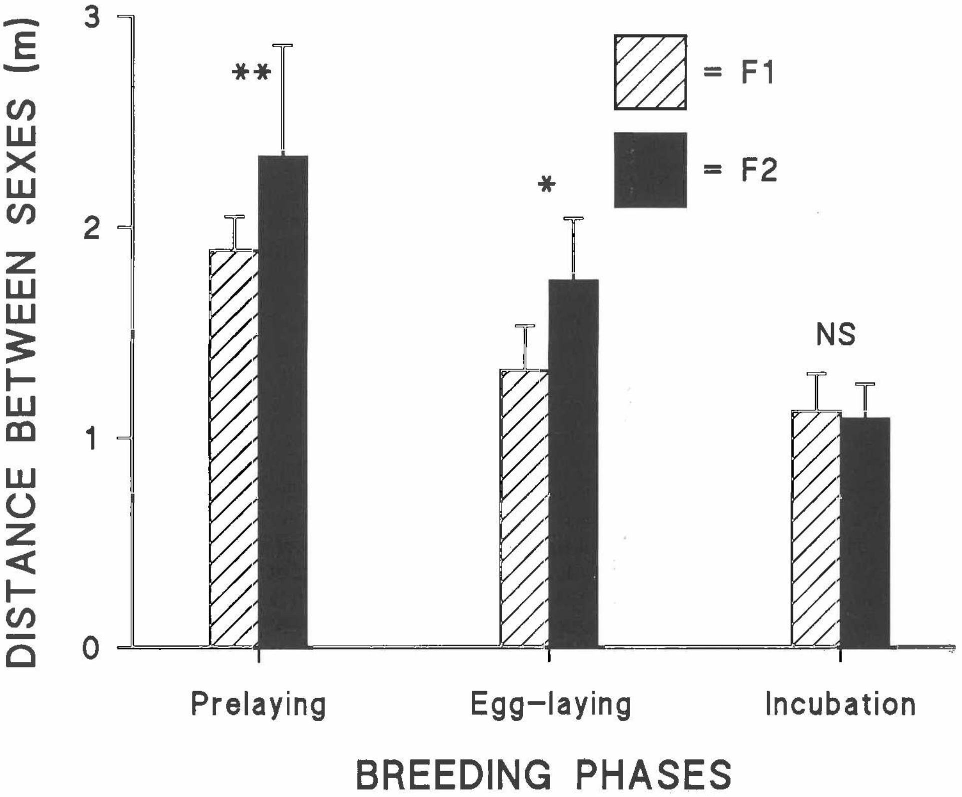

Figure 1. Mean distance (m ± SD) between the male and the first female Eurasian Wigeon (F1) and between the male and the second female (F2) measured during prelaying, egg-laying and incubation. Number of observations as in Table 1. ** = $P < 0.01$, * = $P < 0.05$, and NS = not significant.

intruder away. No "attack" upon the two females was successful.

Copulations were observed six (F1) and four times (F2). F1 started egg-laying and incubation about 5 and 12 May, respectively, and F2 about 20 and 25 May. Recesses were normally performed at dusk and dawn, and averaged (mean ± SD) 21.6 ± 7.89 min for F1 (n=5) and 30.5 ± 14.84 min (n=6) for F2. The nests of F1 and F2 were probably preyed upon about 1 and 5 June, respectively. The females did not try to renest after losing their clutches.

Discussion

The low degree of polygyny observed (1.1%, n=92) in the Wigeon population during 1983–85, suggests that polygyny in this species is rather an unusual occurrence. Polygyny is assumed to arise because spatially clumped resources allow some males to monopolize sites providing sufficient resources for reproduction for several females (Orians 1969). The fact that the south-eastern part of Lake Bjellandsvatn was very productive (Jacobsen 1991) probably allowed F2 access to this area without being excluded by F1.

Trivers (1972) suggested that monogamous males, committed to parental duties, should capitalize on any opportunity to obtain additional matings. Although not participating in the raising of the brood, insemination of additional females, while maintaining a stable pair bond and preventing other males from obtaining forced extra-pair copulations (FEPC) with his mate, would be advantageous in terms of increased number of offspring (Wittenberger 1981, Birkhead & Møller 1992).

The present study showed that the

male spent more time vigilant and stayed closer to F1 than F2 during parts of the breeding season, probably because he had already invested more in F1 than F2. Inter-mate distance between the Wigeon male and his two females decreased during the breeding season probably because of an apparent increase in the risk of extra-pair copulations by single males having their females on nests (Ugelvik 1986). That the distance between sexes was shortest during incubation also meant that females could feed with less disturbance and thereby reduce the time spent away from the nest.

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