

On the feeding behaviour of Common Eiders in two coastal areas of Central Italy.

P. CAVALLINI *Dipartimento di Biologia Evolutiva,
Via Mattioli 4, 53100 Siena, Italia.*

RIASSUNTO

Comportamento alimentare dell'Edredone comune in due aree costiere dell'Italia centrale

La popolazione mondiale di edredoni (Somateria mollissima L.) sta aumentando. Nonostante, l'uso del Mediterraneo come area di svernamento rimane sporadico. Per gettare luce sui possibili fattori ecologici influenzanti la scelta del Mediterraneo, è stato analizzato il comportamento alimentare di 15 edredoni intorno alla foce del fiume Ombrone (GR) nell'autunno 1988, comparandolo con quello di due edredoni intorno al porto di Castiglione della Pescaia (GR) nell'inverno 1987.

Nella prima delle due aree, gli edredoni si tuffavano più frequentemente, e la durata dei tuffi è risultata negativamente correlata con la loro frequenza. Questo può indicare che in quest'area gli edredoni non erano in grado di ridurre il tempo di recupero fra un tuffo e il successivo, sia perché lo sforzo totale era molto alto, sia perché gli uccelli erano in cattive condizioni fisiche. È possibile che queste differenze siano causate dalla distribuzione delle risorse alimentari. Anche una bassa salinità potrebbe essere importante per gli edredoni.

The world population of Common Eiders (*Somateria mollissima* L.) is increasing in numbers in recent years (e.g. Cramp, 1977). Despite this, the Eiders use only sporadically the Mediterranean sea as a wintering area. The reasons for this phenomenon are unclear, but might be related to the relative inaccessibility of this area to Eiders from areas of higher latitude and/or to food; in fact, predation (except that of man) is unlikely to be an important factor for a diving duck, and competition by other ducks is virtually non-existent in Italy. On the other hand, Mediterranean is an oligotrophic sea (but for the Adriatic and some other spot), when compared to the Baltic and the North Atlantic ones (Margalef, 1985), where Eiders winter in large numbers. In addition to this, the higher salinity and temperature in the Mediterranean might limit Eider populations. Both food and salinity may contribute to explain why Eiders in Italy tend to concentrate around estuaries

or big coastal towns (pers. obs., G. Anselmi pers. comm., F. Perco pers. comm.), while this phenomenon does not appear to happen in South Sweden (Nilsson, 1972). In fact, both these habitats are characterized by an higher productivity (unless pollution is very high) and a lower salinity (Margalef, 1985). Unfortunately, only one paper (Cavallini, 1988) on the feeding ecology of the Eider in the Mediterranean is currently available. Furthermore, the study of Cavallini (1988) is based on a very small sample (2 individuals) and is conducted in a man-manipulated environment. Aims of this paper are then to: (a) give some more data on feeding behaviour and ecology of the Eider in the Mediterranean, to increase the data base for comparisons; (b) verify the findings of a previous paper (Cavallini, 1988) on a larger sample of birds and in a more natural situation, so to shed some more light on the ecological factors related to Eider use of Mediterranean as a wintering area.

STUDY AREA AND METHODS

The study area is the Ombrone estuary, near Grosseto (Central Italy), in the Maremma Natural Park (hereafter MNP). The bottom is in prevalence muddy, but many dead trees and some rock host populations of mussels (*Mytilus galloprovincialis*). The present paper is based on a sample of Eiders (N=15) observed between 24 September and 2 October 1988 for a total of 16 observation hours. The following data were recorded for each feeding bout (i.e. the interval elapsing between the time an Eider was seen to start and stop feeding, excluding interruptions lasting more than 10 min): (a) dive duration (only when birds were not in tight flocks, to avoid confusion between the emersion times of different individuals); (b) frequency of dives (number of dives on bout length); (c) percentage of time underwater (on total feeding time).

Parameters of feeding effort in MNP were compared with those recorded in winter 1986/87 in Castiglione della Pescaia (hereafter CP), about 35 km away from MNP. Comparison were made only with the "shore" habitat (Cavallini, 1988) because this was the most similar to MNP and the differences in mean dive length, dive frequency and percentage of feeding time underwater were the smallest. The behaviour and movements of Eiders between feeding bouts were also recorded. Data are given as mean \pm standard deviation. Spearman rank (hereafter S) and Mann-Whitney (hereafter M) tests were used for correlations and differences, respectively (Siegel, 1956).

RESULTS

The Eiders in MNP alternated feeding bouts at the estuary with rests on the shore or in the river (the only place where they were seen drinking). The dive frequency was lower (although difference only approached significance; M: $p=0.089$; N1=10; N2=6) in groups of three or more animals (1.55 ± 0.35 dives/min) than in groups of one or two (1.40 ± 0.37 dives/min). Dive duration was shorter (M: $p=0.001$; N1=284; N2=571) in MNP (17.2 ± 6.9 sec) than in CP (19.0 ± 8.1 sec). Dive frequency was higher (M: $p=0.035$; N1=16; N2=13) in MNP (1.29 ± 0.38 dives/

min) than in CP (1.08 ± 0.65 dives/min). The percentage of feeding time underwater was higher (but the difference only approached significance; M: $p=0.084$; N1=16; N2=13) in MNP ($0.42 \pm 0.11\%$) than in CP ($0.31 \pm 0.16\%$). Mean dive length was negatively correlated (S: $r_s = -0.585$, $p=0.017$; N=16) with dive frequency among feeding bouts in MNP, while not significantly (S: $r_s = -0.214$, $p=0.488$; N=13) in CP. Mean dive length was not correlated with percentage of feeding time underwater, neither in MNP nor in CP (S: $0.17 > r_s > -0.10$, $p > 0.5$; N1=16; N2=13). Dive frequency was strictly correlated with percentage of feeding time underwater both in MNP and in CP (S: $r_s > 0.79$, $p < 0.001$; N1=16; N2=13). Kleptoparasitism was never observed in MNP.

DISCUSSION

Eiders in MNP dived more frequently than those in CP. The intensity of feeding effort was related in both areas to pause length and dive frequency, but not to dive length (in fact, dive length is strictly related to depth; Nilsson, 1972; Cavallini, 1988). The negative correlation between dive length and dive frequency in MNP (but not in CP) might mean that Eiders in MNP could not reduce recovery times, either because the total feeding effort was very high or because birds were in bad conditions, so that when dives are longer, Eiders must dive less frequently. Differences in resource availability and quality might underlie this pattern, but unfortunately no data available on this topic. It might also be possible that these differences between the two areas simply reflect a behavioural response (e.g. through social facilitation or competition) to changes in feeding group size (always 2 in CP, 1-12 in MNP). However the slightly lower dive frequency of Eiders when in group seems to exclude this possibility, indicating rather the opposite trend. No active competition was observed at the surface, but there is still the possibility of an underwater food competition.

Finally, the fact that the drinking behaviour was recorded only in the river and not in the estuary or the open sea suggests that low-salinity water might be important for Eiders.

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