

Activity budgets of Common Eiders in different housing environments

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Introduction

Spatial restriction of an animal may lead to considerable changes of its behaviour (Levy 1944; Hediger 1950, 1955; Black & Hughes 1974). It appears (Draper & Bernstein 1963) that "changes in the physical dimensions of the spatial environments can be accompanied by a marked change in the form of behaviour as well as the frequency of occurrence of various activities that are generally common in cages".

In temperate countries, many aviculturists keeping wildfowl are faced yearly with the necessity of wintering their birds in confined quarters. The object of this study is to describe the effects of such a restriction on the activity budget of a flock of Common Eiders *Somateria mollissima*.

Animals and methods

In the fall of 1978, a group of 19 Common Eiders *Somateria m. mollissima* composed of 2 adult males, 7 adult females and 10 juveniles was studied at the Jardin zoologique de Québec, 11 km north of Quebec City, Canada. The birds were pinioned and kept all summer in an outdoor enclosure.

The birds were first observed outdoors for four days (22, 23 and 28 September, and 5 October). They were transferred to an indoor pen on 9 October and then observed another four days (19 October and 2, 9 and 23 November). Each day, the Eiders were observed continuously from 0800h to 0920h, 1000h to 1120h, 1300h to 1420h and 1500h to 1620h. Every 20 minutes, the activity and localization of each bird was recorded. Four different activities were considered: locomotion (swimming or walking), resting, preening and feeding.

Housing conditions

Outdoor enclosure

The 90 × 30 m outdoor enclosure has in its centre a 30 × 18 m artificial pond. Each

side of the pond is bordered by natural grass, shrubs and trees. The public has access to the birds from a terrace built on one side of the pond. The Eiders were kept along with 70 other aquatic birds from 22 different species. The birds were fed daily around 1100h with an 18% protein grower pellet supplemented with minerals.

Indoor pen

The indoor pen is an 18 × 4 × 5 m aviary with a concrete floor covered with wood chips except for a 6.75 × 5 m section that is kept bare. This section includes a 3 m² artificial pond filled with running water.

Large windows let natural light enter from one side and a series of white fluorescent tubes is lit every day between 0800h and 1600h. Eiders share this pen with other birds as in the outdoor enclosure. The birds are fed once daily between 0900h and 1000h.

Results

1. Activity in the outdoor pen

(a) Activity pattern (Table 1)

Outdoors, locomotion was the main activity with 48.6% of the time spent swimming or walking; while resting represented only 30.5% of total diurnal activity. Locomotion was a little less frequent in the morning than in the afternoon ($P < 0.05$), while the opposite was noted for resting ($P < 0.001$).

Feeding and preening were evenly distributed throughout the day ($P > 0.05$, $df = 1$) taking about 9% of the time each.

(b) Space utilization (Table 2)

The Eiders spent 46.7% of their time in the water, where they swam, bathed or rested. Aquatic activity was more frequent in the afternoon (51.3%) than in the morning (42.1%) ($P < 0.001$). This difference may partly be explained by the presence of afternoon visitors on the terrace. In fact, the pond section mostly utilized by the

Table 1. Activity pattern of Common Eiders in the pens

	Resting		Locomotion		Preening		Feeding		Undetermined	
	N	%	N	%	N	%	N	%	N	%
Outdoors										
AM	270	35.5	340	44.7	66	8.7	64	8.4	20	2.6
PM	193	25.4	399	52.5	64	8.4	87	11.4	17	2.2
Total	463	30.5	739	48.6	130	8.6	151	9.9	37	2.4
Indoors										
AM	464	61.0	186	24.5	82	10.8	9	1.2	19	2.5
PM	503	66.2	149	19.6	71	9.3	21	2.8	16	2.1
Total	967	63.6	335	22.0	153	10.1	30	2.0	35	2.3

Table 2. Spatial utilization of the pens

	Pond		Ground		Out of sight	
	N	%	N	%	N	%
Outdoors						
AM	320	42.1	420	55.3	20	2.6
PM	390	51.3	363	50.4	7	0.9
Total	710	46.7	783	51.5	27	1.8
Indoors						
AM	11	1.5	740	97.4	9	1.2
PM	18	2.4	739	97.2	3	0.0
Total	29	1.9	1,479	97.3	12	0.1

birds was the one directly facing the terrace. Ground use was greater in the morning ($P < 0.001$) as most of the birds rested on the grass. When on the ground, three-quarters of the birds used the side of the pond nearest to the feeding grounds.

2. Activity in the indoor pen

(a) Activity pattern (Table 1)

Transferring the Eiders indoors induced a dramatic change in their activity pattern. Resting became the major 'activity' of the birds representing 63.6% of total observation checks. It was evenly observed in the morning and in the afternoon.

Locomotion was observed only 22.0% of the time and was more frequent in the morning ($P < 0.01$). This difference may partly be explained by the fact that the birds were often disturbed in the morning by the keepers who had to work nearby.

Preening accounted for 10.0% of total activity and was evenly distributed throughout the day.

Time spent feeding was very low, accounting for only 2.0% of total activity. Feeding was a little more frequent in the afternoon ($P < 0.01$).

(b) Space utilization (Table 2)

Indoors, the Eiders spent only 1.9% of their time in the water. This quite surprising situation may be due to the fact that the artificial pond occupied only 3% of total floor indoor surface compared to 20% of the outdoor surface. Strong competition also existed with Black Ducks *Anas rubripes* which, when they were in the water, always prevented the Eiders from getting in the water by threatening or pecking at them.

There was no difference between morning and afternoon use of either pond or ground.

Discussion

We found striking differences in the activity pattern of Common Eiders between indoor and outdoor pens (Figs. 1-2). The birds were significantly less active indoors than outdoors. Locomotion accordingly decreased ($P < 0.001$). These findings are in accordance with Black & Hughes (1974) who found that domestic fowl housed in cages were generally less active than those housed in pens. These authors also stressed that birds spent more time feeding in cages than in pens but failed to

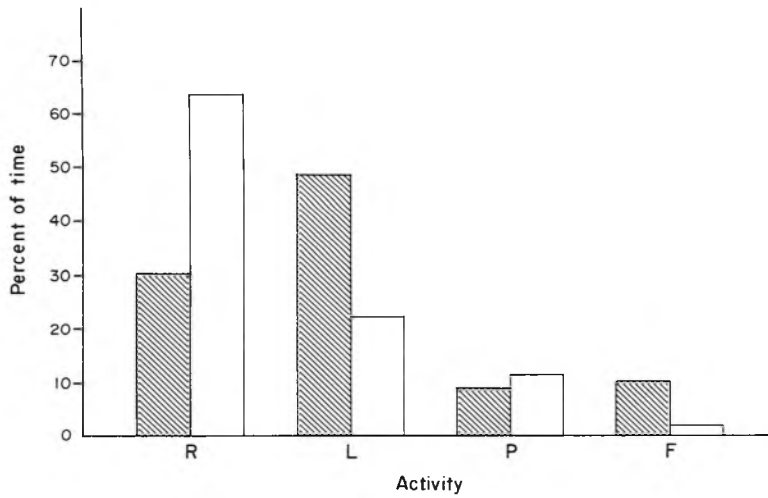


Figure 1. Percentage of time devoted to each activity during the day, comparison between indoor \square and outdoor \boxtimes pens. R, resting; L, locomotion; P, preening; F, feeding.

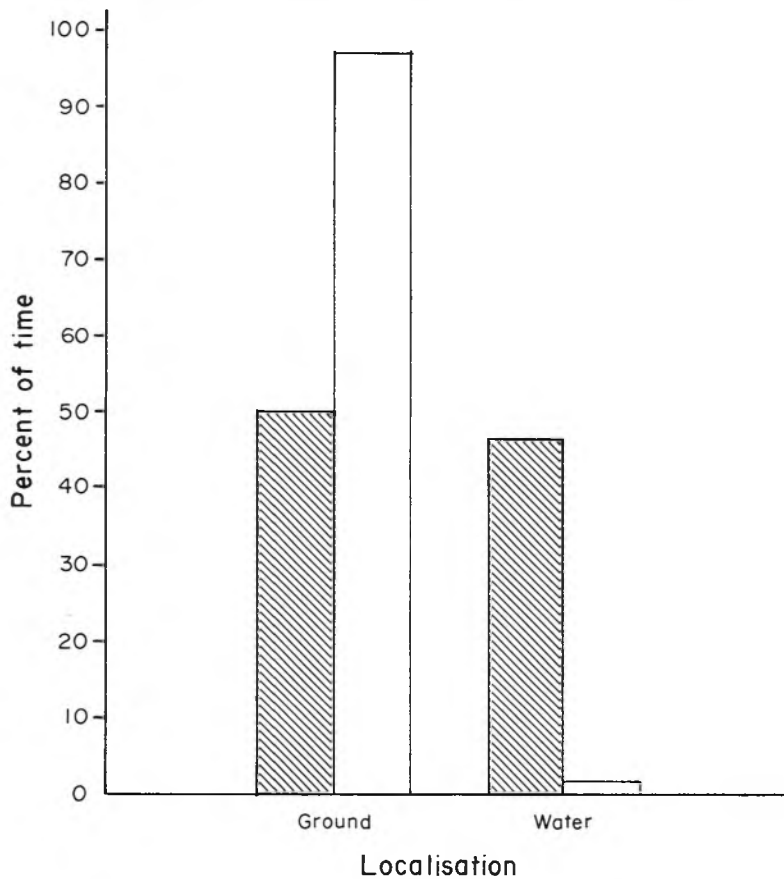


Figure 2. Percentage of time spent on the ground and in the water, comparison between indoor \square and outdoor \boxtimes pens. G, ground; W, water.

give any explanation of this change. This decrease of feeding activity in our Eiders ($P < 0.001$) could tentatively be explained by a decrease of the birds' energetic needs. Indoors, the birds were both less active and less exposed to temperature variations thus spending less energy. Apathy and refusal of food sometimes caused in zoo animals by environmental changes (Meyer-Holzapfel 1968) could also partly explain this decrease of appetite.

Despite marked differences in the substrate structure, the general pattern of activity and the time spent in the water between both enclosures, preening time was not influenced by a change of housing conditions.

Far less time was spent in the water indoors than outdoors ($P < 0.001$). This difference may simply be due to pond size differences and also to the overt aggression of the Black Ducks.

The results thus indicate that environmental restrictions do affect the activity budget of Common Eiders. These activity changes obviously may not be simply

caused by spatial restriction. Other variables such as temperature, lighting conditions, quality of substrate, general arrangement of the pen and social variables such as crowding probably influenced the behaviour of the birds.

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Summary

When kept in two different captive environments, 19 Common Eiders *Somateria m. mollissima* showed striking differences in their activity budgets. In a large outdoor enclosure, locomotion and feeding were significantly more frequent than in a smaller indoor pen, and the birds spent more time in the water. Time spent preening did not differ.

References

- Black, A. J. & Hughes, B. O. 1974. Patterns of comfort behaviour and activity in domestic fowls: a comparison between cages and pens. *Br. Vet. J.* **130**: 23–33.
- Draper, W. A. & Bernstein, I. S. 1963. Stereotyped behavior and cage size. *Perceptual and Motor Skills* **16**: 231–4.
- Hediger, H. 1950. *Wild animals in captivity*. London: Butterworth Scientific Publ.
- Hediger, H. 1955. *Studies of the psychology and behavior of captive animals in zoos and circuses*. New York: Criterion.
- Levy, D. M. 1944. On the problem of movement restraint. *Amer. J. Orthopsychiat.* **14**: 644–71.
- Meyer-Holzapfel, M. 1968. Abnormal behaviour in zoo animals. pp. 476–503 in: Fox, N. W. (ed.) *Abnormal behavior in animals*. W. B. Saunders.
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