

WEIGHTS OF KNOT IN CAPTIVITY

by J.D. Goss-Custard, R.E. Jones and L. Harrison

Introduction

One of the hot issues at the time the Wash Feasibility Study was in progress was the cause of the winter decline in weight in many wader species (e.g. Minton, 1973, 1975; see also Pienkowski, Lloyd & Minton 1979). The question was whether this was a preprogrammed and adaptive shedding of reserves or the result of a chronic difficulty for the birds in obtaining enough food at this time of year? The food shortage hypothesis was supported by the finding that many birds, especially the smaller-sized species, fed for a very high proportion of the time available in winter (Goss-Custard et al. 1977). However, this was hardly conclusive, especially as night observations were so difficult. The observations certainly suggested food was more difficult to collect in winter than in autumn, but it does not necessarily follow that most birds then had to use fat reserves to survive. Therefore, we decided to do an experiment on captive birds fed on unlimited food. The food shortage hypothesis predicts that the birds would maintain high weights in winter, whereas the adaptive weight loss hypothesis predicts that weights would decline. We expected weights to decrease but they did not. However, this is difficult to interpret because captivity may simply have interfered with the weight control mechanism and caused artificial obesity.

Materials and Methods

Under licence from the Nature Conservancy Council, samples of adult Knot *Calidris canutus* were caught by wader nets on the east and west shores of the Wash. The first sample (5 birds) was obtained in December 1975. Two birds subsequently escaped but were replaced by two more caught at the beginning of January 1976. A further sample of four birds was obtained in late January. Birds were selected from those caught so that the mean weight of each sample was as close as possible to the mean weight of the wild population at that time.

The birds were housed at Norwich, in a wooden hut measuring 4 x 3m and 3m high. They were confined by wire netting to one-third of the hut. The concrete floor was covered with newspapers and 10cm of peat to provide the birds with a soft substrate which protected their feet from damage. They were fed almost entirely on blowfly larvae (*Calliphore* spp) killed in hot water to stop them eating the birds. The birds were also given some cockles, *Cerastoderma edule*, and mussels, *Mytilus edulis*, to provide variety and grit. They were fed daily and always had excess food. The maggots were given in six bowls scattered all over the floor to minimise the chances that certain birds would dominate the food supply. Fresh water was provided in a large tray (1m x 0.5m x 10cm deep) for drinking and bathing and was changed daily.

The hut had a clear perspex roof and was not illuminated artificially. Thus the period of daylight was similar to that outside, although somewhat shorter. However the birds were protected from the chilling effects of wind, rain and snow. Also temperatures sometimes rose rather high on sunny days in spring, although they were kept to a minimum by ventilation. Therefore, it was inevitable that, in addition to being provided with unlimited food, the birds experienced rather different weather conditions to those in the Wash.

Birds were weighed by spring balance each Monday between 0900 and 0930.

Results

Although individual weights were variable, it appears that several birds lost weight immediately after capture, presumably as they adjusted to captivity. However four of the five birds caught in December and early January subsequently increased in weight during January and February and then lost some weight during March. The weight of the fifth bird was variable and showed no clear trend throughout. Two of the birds caught in late January increased in weight during February and March while the other two birds lost weight slightly. All but one of the birds from both groups put on weight rapidly during April and May. Throughout the experiment, there were large individual differences in weight.

Fig. 1 shows the mean of all the weights obtained during each month. Data from the first and second groups of birds are shown separately. They are compared with the weights obtained from all the birds caught each month on the Wash between 1959 and 1975. Although the mean weight of the first group of captive birds was similar to the mean weight of the wild birds both in December and May, it did not decrease during the intervening months and may even have increased slightly in January and February. The mean weight of the second group was higher than that of the wild birds in February, March and April but was also similar in May.

Discussion

Had the weights declined in captivity as we had expected, the experiment would have strongly confirmed the adaptive weight loss hypothesis. In fact, this did not happen so we were left with an uninterpretable result. Weights may have stayed high either because the food shortage hypothesis was true or because captivity interfered with normal weight control mechanism and produced obesity. Our results do not allow us to distinguish between these possibilities.

We decided to publish this note after such a long time because several people have showed an interest recently in this kind of experiment. Our experience may therefore be useful and interesting. We think our main difficulty was that we were forced to conduct the experiment in a high-sided cage which probably changed the environment too much. If the experiment is to be repeated, we recommend that the birds are kept in less artificial conditions. But even this may not be enough because birds kept relatively inactive in cages may tend to become obese anyway.

Keeping the birds was remarkably easy. They adapted well to captivity, perhaps because they were introduced to the cage in a group. They quickly settled down and none died until May when heat stress became a problem. We think it was important to have the correct flooring material. This should be soft - birds on hard floors get bad foot problems - and be able to absorb the droppings to minimise health hazards. Variety in the diet is probably important too so as to ensure the birds get all the nutrients they need.

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References

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Fig. 1. The mean monthly weights (+ SE) of all the birds in captivity compared with the monthly weights of birds caught on the Wash. Filled circles - birds caught in December and early January. Open circles - birds caught in late January. Diamonds - birds on the Wash. Arrows show the mean weight of the samples of captive birds at the time of capture.

