That was not the end of the story though. British Airways treated us to an extra 36 hours in Ghana when a technical problem necessitated parts and an engineer being flown in from the UK. This time was well spent, with several new non-wader species being added to our list for the trip.

Our memories of the trip include the friendliness shown to us by the Ghanaian people, being greeted every few paces whilst in Accra. A novel experience was the sight of goods being carried atop heads, which included our ringing equipment. We were not allowed to carry any heavy equipment ourselves, trainee ringers please note!

So as we finally departed for the UK, getting a bird's eye view of the Sahara, we could reflect that the first national Bird Ringing Scheme based in West Africa had been started, one that should add to our knowledge of waders using the East Atlantic flyway.

THANK YOU

To set up the scheme, the Ghanaians have been helped financially by the Dutch Ministry of Nature Conservation, Agriculture and Fisheries, the French Embassy (Cultural Section) in Accra and the Ghana Volta River Authority. The BTO provided technical assistance and *British Airways Assisting Nature Conservation* generously provided sponsorship and facilities to allow the authors to assist in the inception of the scheme. Our thanks go to them all.

The dynamics of body composition of overwintering Dunlin *Calidris alpina sakhalina*

Shi Ming & Lu Jianjian

Shi, M. & Lu, J. 1992. The dynamics of body composition of overwintering Dunlin *Calidris alpina sakhalina*. *Wader Study Group Bull.* 64: 35 - 36.

Shi Ming & Lu Jianjian, Dept. of Environmental Science, East China Normal University, Shanghai 200062, China.

Reprinted, by permission of the Editors, from *The Stilt* 16: 59

.Samples of the north-east Siberia and north Alaskan population of Dunlin *Calidris alpina sakhalina* were collected monthly in mist-nets on the coast of Shanghai in winter (September 1986 - April 1987), and were analysed for body composition. Measurements included total weight, water content, lean weight, fat content and mineral content. Changes in these values reflect changes in the energetic metabolism of this species whilst overwintering (Blem 1976). These data are also fundamental to further research into the energy utilization and storage strategy of what is the numerically dominant shorebird overwintering at Shanghai. Results indicate that:

A. There were two peaks in the value of both weight and fat content during the overwintering period (Figure 1). Energy consumption during reproduction and migration showed in the low values of both total weight and fat content at the beginning of the period (September - October).

The values of these two indices then increased until mid-November. Maxima of total weight and fat content, relative to the earliest (September) values, were 1.66 and 2.35 respectively for females, 1.20 and 3.00 for males.

Both weight and fat content then dropped over the next two or three months, with the minima in January, because severe weather conditions and the availability of food affected activity and foraging success.

The second peak in the values of the two indices appeared at the end of March, when increasing temperatures and more favourable weather allowed an increase in foraging intensity and a consequent build-up of fat reserves, or hyperlipogenesis (King 1965), as preparation for migration and

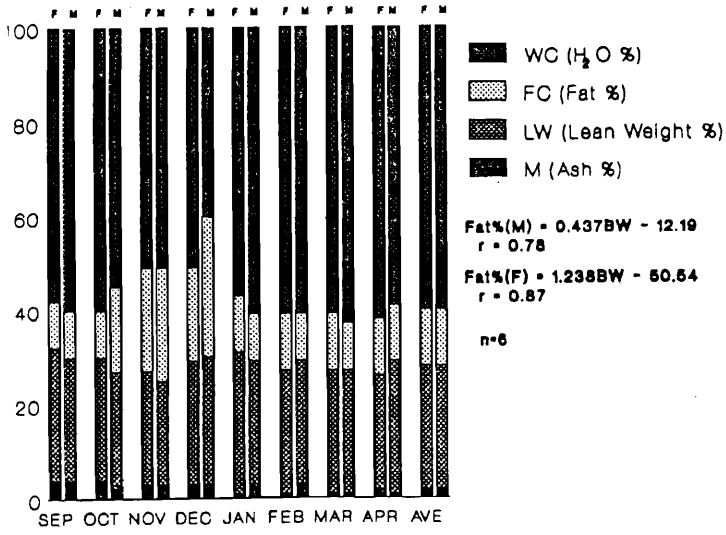

Figure 1. The dynamics of the body composition of overwintering Dunlin.

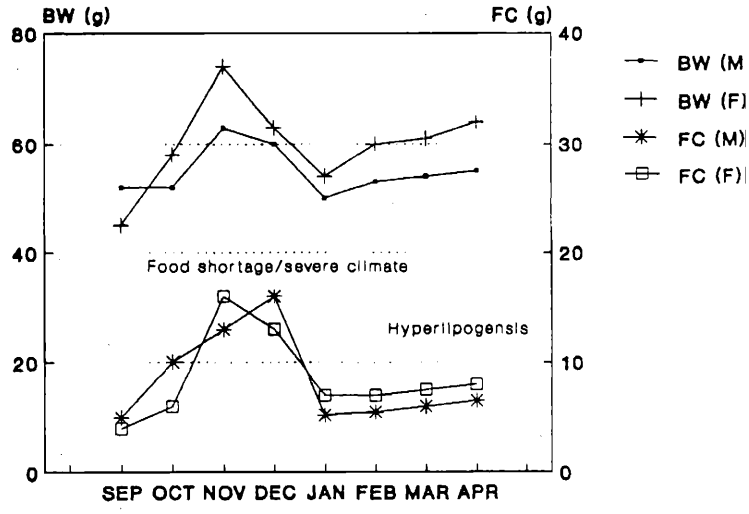

Figure 2. The change of weight and fat content of overwintering Dunlin.

reproduction (Morton *et al.* 1973).

From the regression analysis, the regression equations of total body weight (TBW), and fat as a percentage of total body weight (Fat %), were:

Fat %

Fa t% (male) d = 0.437 TBW - 12.9. r = 0.78.

Fat % (female) = 1.238 TBW - 50.54. r= 0.869.

The same trend of changing weights and fat content were evident in both sexes, although the females had a relatively high lipid content, after the initial post-migratory low, throughout the period.

B. Average values of body composition of both male and female Dunlin were similar during the period. However, the rate of change in the values differed between the sexes (Figure 2). The most significant factor, apart from total body weight, was lipid percentage, with the coefficients of variance (CV): 34.0% (female), and 48.6% (male). The variation in water content (CV) was 6.4% for females, and 11.0% for males. Other factors were not significantly correlated.

This indicates that:

a) The change of fat content is related mainly to total weight and to water content.

b) The energy reserve corresponds directly with fat (triglyceride) levels, as no significance was found in the change in lean dry weight (P>0.05), (Connell *et al.* 1960).

This study was supported by the National Scientific Foundation (China): 3860890.

REFERENCES

Blem, C.R. 1976. Patterns of lipid storage and utilization in birds. *Amer. Zool.* 16: 671-684.

Connell, C.E. Odum, E.P. & Carey, C. 1960. Fat-free weights of birds. *Auk* 77: 1-9.

King, J.R. *et al.* 1965. The lipid reserves of White-crowned Sparrows on the breeding ground in central Alaska. *Auk* 82: 236-252.

Morton, M.L. *et al.* 1973. Body weights and lipids of summering Mountain White-crowned Sparrows in California. *Auk* 90: 83-93.