

The effect of fasting on rate of oxygen consumption in air versus water in king penguins, *Aptenodytes patagonicus* A. Fahlman, A. Schmidt, C-A Bost, P.J. Butler, A.J. Woakes and Y. Handrich Centre d'Ecologie et Physiologie Energétiques, C.N.R.S. Strasbourg, France; The University of Birmingham, UK.

Previous data showed that resting rate of oxygen consumption (\dot{V}_{O_2} , l O₂ • min⁻¹) of king penguins during fasting in air decreases with an allometric mass exponent of 2.02 (Fahlman et al., Am J Physiol, in press). We hypothesized that fasting would elicit a similar change in resting \dot{V}_{O_2} of penguins in water. Therefore resting \dot{V}_{O_2} was measured in air and water in ten male king penguins before (Pre, 0-2 days after returning from the sea) and after (Post) an average fasting duration of 14.2 ± 2.3 days (mean ± 1 SD, range 10-19 days) in air and water. The Pre- and Post-fasting body masses were 13.8 ± 1.2 kg and 11.0 ± 0.6 kg (n = 10), respectively. There was no difference in air temperature (P > 0.1, 1-way ANOVA) or in water temperature (P > 0.2, t-test) between experiments and the mean temperatures in air and water were 14.2 ± 2.3° C and 8.5 ± 0.6° C, respectively. After fasting, the resting \dot{V}_{O_2} was 74% higher in water than in air (air: 86.0 ± 8.6 l O₂ • min⁻¹; water: 149.5 ± 40.7 l O₂ • min⁻¹, P < 0.01, Mann-Whitney), which is similar to other studies (Culik et al., 1996, J. Exp. Biol. 199: 973-983). However, after returning from the sea, there was no difference in resting \dot{V}_{O_2} between air and water (air: 117.7 ± 19.3 ml O₂ • min⁻¹ water: 122.2 ± 27.3 ml O₂ • min⁻¹, P > 0.6, t-test). Thus it is important that calibration and validation studies of the \dot{V}_{O_2} and heart rate relationship with king penguins in water are performed on fully-fed birds and also, that recovery from fasting during re-feeding is taken into account. (Support: NERC NER/A/S/200001074; IPEV Programme 394).