

SEASONAL AND DIURNAL VARIATION IN METABOLISM AND VENTILATION IN HOUSE SPARROWS

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Abstract. Passerines that are year-round residents in temperate climates undergo seasonal acclimatization that facilitates maintenance of thermoregulatory homeostasis. These changes in thermoregulatory metabolism must be supported by equivalent changes in oxygen transport. We measured the effects of ambient temperature and time of day on metabolism and ventilation in House Sparrows (*Passer domesticus*) in summer and winter. House Sparrows were exposed to ambient temperatures (T_a) ranging from -12°C to 15.5°C in summer and 17.5°C in winter. Open-circuit respirometry was used to measure oxygen consumption (VO_2) and ventilation was recorded using whole-body plethysmography. In both summer and winter, VO_2 increased with decreasing T_a . VO_2 was significantly higher during the active phase compared to the resting phase of the daily cycle in both summer and winter. Thermal conductance was significantly lower in nighttime birds compared to daytime birds. With increased oxygen demands, minute volume (V_I) increased in both summer and winter. In summer, only respiratory frequency (f) was significantly affected by time of day. In winter, active-phase birds had significantly higher respiratory frequency and minute volume (V_I) than rest-phase birds. Winter birds in their rest phase had significantly higher oxygen extraction efficiency (EO_2) than active-phase birds. Winter birds at rest phase also had significantly higher EO_2 than summer birds.

Key words: *House Sparrow, metabolism, oxygen consumption, Passer domesticus, seasonal acclimatization, ventilation.*