

Accepted Manuscript

Food consumption in ground beetles is limited under hypoxic conditions in response to *ad libitum* feeding, but not restricted feeding

Agnieszka Gudowska, Ulf Bauchinger

PII: S0022-1910(17)30390-6

DOI: <https://doi.org/10.1016/j.jinsphys.2018.02.004>

Reference: IP 3752

To appear in: *Journal of Insect Physiology*

Received Date: 2 October 2017

Revised Date: 23 January 2018

Accepted Date: 8 February 2018

Please cite this article as: Gudowska, A., Bauchinger, U., Food consumption in ground beetles is limited under hypoxic conditions in response to *ad libitum* feeding, but not restricted feeding, *Journal of Insect Physiology* (2018), doi: <https://doi.org/10.1016/j.jinsphys.2018.02.004>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



Food consumption in ground beetles is limited under hypoxic conditions in response to *ad libitum* feeding, but not restricted feeding

Agnieszka Gudowska and Ulf Bauchinger

Institute of Environmental Sciences, Jagiellonian University, Gronostajowa 7, 30-387 Kraków, Poland

Corresponding author: agnieszka.gudowska@uj.edu.pl

Abstract

Habitats on land with low oxygen availability provide unique niches inhabited by numerous species. The occupation of such hypoxic niches by animals is hypothesized to come at a cost linked to the limitations of aerobic metabolism and thus energy budget but may also provide benefits through physical protection from predators and parasitoids or reduced competition for food. We investigated the effects of hypoxic conditions on standard metabolic rate (SMR) and specific dynamic action (SDA) in male *Carabus nemoralis*. SMR and SDA were determined under three manipulated oxygen availabilities: 7, 14 and 21% O₂ and two feeding regimes: limited or *ad libitum* food consumption. In both hypoxic conditions, *C. nemoralis* was able to maintain SMR at levels similar to those in normoxia. When the meal size was limited, SDA duration did not differ among the oxygen availability conditions, but SDA was smaller under hypoxic conditions than at normoxic levels. The relative cost of digestion was significantly higher in normoxia than in hypoxia, but it did not affect net energy intake. In contrast, when offered a large meal to simulate *ad libitum* food conditions, beetles reduced their food consumption and net energy gain by 30% under hypoxia. Oxygen availability may influence the consumed prey size: the hypoxic condition did not limit net energy gain when the beetles fed on a small meal but did when they fed on a large meal. The results indicate that meal size is an important variable in determining differences in physiological costs and whole animal energy budgets at different concentrations of environmental oxygen levels.

Key words: metabolic rate, hypoxia, insects, specific dynamic action, SDA coefficient

Download English Version:

<https://daneshyari.com/en/article/8649735>

Download Persian Version:

<https://daneshyari.com/article/8649735>

[Daneshyari.com](https://daneshyari.com)