

Bridging environment, physiology and life history: stress hormones in the Edible Dormouse (*Glis glis*)

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Abstract

The performance of wild animals is impacted by diverse challenges imposed by the environment and distinct life history stages such as breeding and hibernation. Glucocorticoids (GCs) are hormonal mediators that reflect the response to these challenges, exerting their far-reaching effects on numerous processes such as energy allocation, immunity and behavior. Whereas short term elevations of GC levels are crucial for survival, by activation of the emergency life history stage, chronically increased GCs are capable of impairing various body functions and ultimately hamper survival and reproduction. The aim of this study was to disentangle the effects of reproductive activity, prolonged food limitation and hibernation on stress hormone levels in the Edible Dormouse (*Glis glis*) and to link them to formerly observed survival rates. We therefore measured urinary cortisol levels in wild Edible Dormice in South-western Germany during their active season (2012-2014). Results of our study revealed that reproductive activity was associated with high cortisol levels. During the mating season, particular individuals with a low body mass had high stress hormone levels. Elevated levels of cortisol were also measured during pre-hibernation fattening and were increased in females that had formerly invested in reproduction. Thus, reproduction represents a demanding, potentially stressful, event for both sexes and is linked to distinctly lowered survival rates occurring during years of high reproductive activity. Prolonged food limitation occurring during years of mast failure, did not affect stress levels and were not associated with increased mortality, demonstrating the ability of dormice to predict and cope with food restriction.

Keywords

stress hormones, reproduction, food limitation, hibernation, *Glis glis*

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NH: conceptualization, formal analysis, investigation, writing

FL: formal analysis, investigation

JF: conceptualization, formal analysis, investigation, writing, supervision, project administration, funding acquisition

Conflicts of interest

The authors declare that they have no conflict of interest.