

Mother bats expert at saving energy

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In order to regulate their body temperature as efficiently as possible, wild female bats switch between two strategies depending on both the ambient temperature and their reproductive status. During pregnancy and lactation, they profit energetically from clustering when temperatures drop. Once they have finished lactating, they use torpor - temporary hibernation - to a greater extent, to slow their metabolic rate and drop their body temperature right down so that they expend as little energy as possible.

These findings by Iris Pretzlaff, from the University of Hamburg in Germany, and colleagues, were just published online in Springer's journal *Naturwissenschaften - The Science of Nature*.

When energy demands are high, such as during pregnancy and lactation, female bats need to efficiently regulate their body temperature to

minimize [energy expenditure](#). In bats, energy expenditure is influenced by environmental conditions, such as ambient temperature, as well as by social thermoregulation - clustering to minimize heat and [energy loss](#). Torpor, another common temperature regulation strategy, has disadvantages for reproductive females, such as delayed offspring development and compromised milk production.

Pretzlaff and team investigated, for the first time in the wild, the thermoregulation strategies used by communally roosting Bechstein's bats during different periods of their [reproductive cycle](#) - pre-lactation, lactation, and post-lactation. They collected data from two maternity colonies roosting in deciduous forests near Würzburg in Germany, predominantly in bat boxes. The authors measured ambient temperature over those three periods as well as the bats' [metabolic rate](#) by using respirometry (measuring the rate of [oxygen consumption](#)).

They found that the bats' metabolic rate was strongly influenced by the ambient temperature. However, by roosting in groups (social thermoregulation), the bats were able to regulate their body temperature more effectively, despite changes in daily ambient temperature.

The bats also used torpor to minimize energy expenditure, particularly post-lactation - more than twice as often than during the other two periods. This suggests that they predominantly use torpor once they can afford to do so without compromising offspring development and milk production. They also formed much smaller groups post-lactation when temperatures were lower because roosting in smaller groups reduces the risk of disturbances by conspecifics. This resulted in longer torpor bouts and therefore longer periods of energy saving.

The authors conclude: "We were able to demonstrate on wild Bechstein's [bats](#), during different reproductive periods, the significance of behavioral and physiological flexibility for optimal thermoregulatory

behavior. Our study also highlights the importance of field studies, where the animals can use their behavioural and physiological repertoire, which is often not possible under the generally more controlled regimes in laboratory studies."

More information: Pretzlaff I et al (2010). Communally breeding bats use physiological and behavioural adjustments to optimize daily energy expenditure. *Naturwissenschaften*. [DOI:10.1007/s00114-010-0647-1](https://doi.org/10.1007/s00114-010-0647-1)

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