The use of torpor by the Siberian hamster in the thermal gradient system.

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Introduction:
Cold and food restriction facilitate torpor use; in cold-acclimated and/or food-restricted Siberian hamsters, torpor bouts are longer and deeper than in fed animals kept under short photoperiod but relatively high ambient temperature.

Hypothesis:
Availability of high ambient temperature (TA) in the environment modifies an effect of food restriction on torpor use.

Results:
- The mean torpor bout duration in fed hamsters in the TG5 was 152 ± 80 min (vs. 12 ± 12 h with TA = 17°C in a climate chamber; Fig. 1).
- Fasted hamsters entered torpor only within the first day after food removal and later were normothermic. However, torpor episodes were shorter than in fed animals (115 ± 69 min).
- After 3-day fasting in the TG5 body mass decreased by 23.6%, to 22.3 ± 4.3 g.
- Minimum Tₐ during torpor (24.6°C) was similar in fed and fasted hamsters but Tₐ selected for torpor was higher in fasted than in fed animals. As a result, the gradient between Tₐ and Tₜ in fasted hamsters was reduced (Fig. 2).
- Hamsters not only actively selected Tₐ during rewarming phase (passive warming) but also selected gradually lower Tₐ's during the entrance phase (Fig. 3).

Methods:
Siberian hamsters were acclimated to cold (Tₐ = 10°C) and short photoperiod (L8:D16) for 7 months. Body temperature (Tₐ) was recorded continuously with mini loggers (IBat 22L, Alpha Mach Inc., Canada) implanted intraperitoneally.
After ~3 months of acclimation we started experiments in the thermal gradient system (TG5) where animals could select Tₐ's freely within the range from 5 to 45°C. During experiments, Tₐ and selected Tₐ were recorded simultaneously and continuously.
Each hamster was placed in the TG5 for seven days. After four days, food was removed but water was still freely available. The results are presented as mean ± SD.

Conclusions:
- Hamsters shorten torpor bouts when high Tₐ is available in the environment.
- Hamsters actively select Tₐ's which facilitates entrance and arousal phases of torpor.
- When body energy reserves are low, hamsters abandon torpor use because the cost of arousal would surpass the benefits of low Tₐ.
- Selection of higher Tₐ by fasted and normothermic hamsters can ensure energy savings.