

Polar bear energy storage

How do polar bears acquire energy?

This highlights the disparity in the energetic windfall polar bears acquire through energy-dense marine mammals relative to terrestrial-based resources 19,37. Bears in a long-term fast such as hibernation primarily metabolize body fat and experience minimal changes in lean body mass 42,43.

Do polar bears save energy?

J. P. Whiteman, H. J. Harlow, G. M. Durner, R. Anderson-Sprecher, S. E. Albeke, E. V. Regehr, S. C. Amstrup, M. Ben-David, Summer declines in activity and body temperature offer polar bears limited energy savings. 349,295-298 (2015).

How does food availability affect polar bear body condition?

The combined effects of decreasing food availability and increasing energetic demands are predicted to result in decreasing polar bear body condition and a consequent cascade of demographic effects (Stirling and Derocher, 1993, Derocher et al., 2004, Wiig et al., 2008).

Do polar bears have more energy demands in the spring?

We found that polar bears in the spring exhibit greater energetic demands than those of previous predictions (13,14) both for maintenance functions and locomotion.

Do polar bears lose energy?

Reduced insulation from thinning of fur and subcutaneous fat could also cause temperature declines, although warm summer conditions could counteract insulation loss. Hence, gradual declines in the summer core temperature of polar bears suggest reductions in energy expenditure typical of food-deprived mammals (24).

Are polar bears active on sea ice?

These activity rates are similar to those observed for adult and subadult polar bears on the summer sea ice (34.6% of the time active) (8) but are greater than observations from a breeding adult female polar bear on the spring sea ice (26.7% active) (32).

Because the Arctic marine ecosystem is highly dependent on fat for insulation, buoyancy and energy storage, these pollutants are accumulated in higher and higher levels up the food chain. ... Given that no polar bear in the world is free from pollution, there is cause for concern. New pollutants are also being found in polar bears such as ...

Contour lines showing model predictions (18A, 18B, 18C, 18D, 18E) for polar bear storage energy, E (units: MJ), from straight-line body length and total body mass for (A) cubs-of-the-year, (B) yearlings, (C) adult females and (D) adult males. Thick solid lines correspond to starved bears, dotted lines to bears whose total body mass is four times ...

Polar bear energy storage

Our model builds on and expands an earlier polar bear body composition model (with a single storage compartment) (Molnár et al., 2009), allowing metabolizable lipid and protein energy stores in storage muscle and storage adipose tissue to be quantified, and providing greater flexibility for modelling bioenergetic processes.

To understand polar bear responses to these challenges of summer ice melt, we investigated activity on shore (2008 and 2009) and on ice (2009) in the Beaufort Sea by affixing telemetry transmitters and activity loggers to 25 females (mean age = 10 years ± 1 SE, age range = 4 to 20 years) and one male (age 3). We recorded temperatures of the body core (an index ...

Polar bears are perfectly equipped for life in the Arctic. During times in which prey is in abundance, they develop a layer of fat reaching ten centimetres. This and the thick fur keeps the polar bears warm in icy temperatures of up to minus 50 degrees centigrade and is used as an energy storage.

Regarding renewable energies, many promising bionic concepts, based on nanostructures from biomass for rechargeable batteries ([21]), on the cellular metabolism for bio-energy production ([9]) or on the well-known fur of the polar bear ([3, 7, 15]), have recently been developed. The advantage of renewable energies, especially solar energy, is the fact that their ...

To explore how energy estimates were influenced by accounting for storage composition, we calculated total storage energy for hypothetical adult polar bears across a range of straight-line body lengths and total body masses using both the multi-storage model (using average values for the proportions of storage muscle that are lipid and protein ...

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Spring is a particularly important time for polar bears. Polar bear mothers emerge hungry from their snow dens with their young cubs after fasting for four months. They need to hunt and replenish their energy quickly so they can continue to nurse their cubs. But as climate change continues to warm the Arctic, sea ice melts earlier in the summer and forms ...

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Polar bear energy storage

Conversion Behavior of Polar Bear Hair and Wool of Sheep @article{Jia2017ComparisonOT, title={Comparison of the Photo-thermal Energy Conversion Behavior of Polar Bear Hair and Wool of Sheep}, author={Hao Jia and Jiansheng Guo and ...}}

Therefore, energy storage technology plays a vital role in bridging the discrepancy between energy consumption and supply. Generally, latent heat storage (LHS) possesses a lot of advantages, ... Polar bear optimization algorithm: meta-heuristic with fast population movement and dynamic birth and death mechanism. *Symmetry-Basel*, 9 (2017) ...

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Many animals have evolved special furs to survive in the extremely cold environments (28-30). As a prime example, polar bear hair exhibits a distinct core-shell structure (31-33). The hollow core with high porosity effectively traps air and provides excellent thermal insulation performance (), and the dense shell provides efficient mechanical protection (about ...

Polar Bear Adaptations: Low surface area to volume ratio (anatomical) - Compared to other species of bears, polar bears have small extremities, proportionally shorter legs and a stockier build. This reduces the surface area to lose heat from. This is a common characteristic amongst animals that live in cold environments that enables them to retain their heat and conversely ...

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Additionally, human development encroaching into bear habitats can increase the likelihood of human-bear conflicts, further stressing bear populations. Awareness of the human impacts on bear hibernation behavior is crucial for implementing effective conservation strategies to minimize disturbances and protect these vulnerable animals.

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Polar bear cubs interact with their mother and littermates, and this is an important period for learning critical life skills (e.g., hunting, navigation) during the extended mother-offspring association (typically 2.5 but up to



Polar bear energy storage

3.5 years) (Macdonald 1983; Ramsay and Stirling 1988; Derocher et al. 1993). Once young cubs achieve a degree of coordination, play behavior (i.e., ...

During a follow-up research project, a certain amount of the generated energy is to be stored locally, close to the collector. Beneath the black skin of the polar bear, a fat layer is present, which serves as a natural storage unit. This optimised combination of fur, skin and fat layer helps the polar bear to survive in the Antarctic environment.

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