

Study: Young Arctic muskoxen better at keeping warm than scientists thought

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A new study finds that young muskoxen conserve heat almost as well as adults, a finding that runs contrary to a longstanding assumption among scientists that young animals should be more vulnerable in extreme cold. The study, by biologist Adam Munn from the University of Sydney, Australia, will be published in the forthcoming issue of *Physiological and Biochemical Zoology*.

Surviving freezing winters is tough for any animal, but it is generally assumed to be tougher on the young. Young animals theoretically should have a harder time holding heat because they have larger ratios of surface area to body volume, meaning more of their [body mass](#) is directly exposed to the cold. That theory appeared to hold true for muskoxen—shaggy vegetarians that look a bit like buffalo, but are actually more closely related to sheep. Scientists have previously reported high death rates for muskox calves during especially cold winters in their arctic habitats.

But in measuring heat loss in adult and young muskoxen, Munn and his research team found that the cold itself might not be the culprit.

"To our surprise, we found that the smaller calves were not more thermally stressed than larger adults," said Munn said.

Munn and his team observed a population of muskoxen at the University of Alaska's R.G. White Large Animal Research Facility in Fairbanks. They used infrared sensing equipment to measure heat loss from the

body surface of animals in contact with cold air and the frozen ground. Munn tested the muskoxen during winter foraging, when the animals were the most directly exposed to the cold.

The researchers found that both calves and adults sacrificed only two to six percent of their daily [energy intake](#) to heat loss during foraging bouts, even when temperatures dipped to minus 50 Celsius (minus 58 Fahrenheit).

"This suggests that any thermoregulatory constraints associated with a small body size may not be as important for calf survival as previously thought," Munn says. "This is important because calf mortality in muskoxen and other large arctic herbivores has been variously linked with severe winters, which are expected to increase in number and severity with current climate trends.

"However, we present evidence that thermal costs per se may not be driving [calf](#) mortalities in muskoxen."

That doesn't mean climate change presents no risk to muskoxen or other large herbivores. They still face danger from food shortages and other ecological disturbances, Munn says.

Muskoxen have a variety of ways to fight heat loss. They are insulated by thick fur called qiviut, and they likely have the ability to direct blood away from their extremities in cold weather.

"Overall, our work shows that predicting a species' responses to climate change requires detailed understanding of all aspects of their physiological ecology, and particularly for how this changes throughout life," Munn says.

[More information:](#) Adam J. Munn, Perry S. Barboza and Jon Dehn,

"Sensible Heat Loss from Muskoxen (*Ovibos moschatus*) Feeding in [Winter](#): Small Calves Are Not at a Thermal Disadvantage Compared with Adult Cows." *Physiological and Biochemical Zoology*, September/October 2009.

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