

Energy requirements make Antarctic fur seal pups vulnerable to climate change

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A study published in the journal *Physiological and Biochemical Zoology* found that changing weather conditions can impact the metabolic rates of fur seal pups. Climate models predict windier and wetter conditions in Antarctica in the coming years, and that could cause young seals to assign more energy to thermoregulation, leaving less available for growth and development. Credit: Photo courtesy of *Physiological and Biochemical Zoology*/University of Chicago Press

A new study suggests that climate change could pose a risk for Antarctic fur seals in their first few months of life.

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young seals to assign more energy to thermoregulation, leaving less available for growth and development.

For their study, a team of scientists led by Dr. Birgitte McDonald (University of California, Santa Cruz) gathered data from 48 young seals on Livingston Island, just off the Antarctic Peninsula, to find out how much energy pups get from their mothers and how they use it.

"Energy budgets are important if we are to understand how individuals interact with their environment," McDonald said. "In juvenile animals we need to know how they allocate energy towards growth, [energy storage](#), maintenance including thermoregulation, and development of foraging skills to facilitate a successful transition to independence."

The team measured milk [energy intake](#), field metabolic rate, and growth rate over three developmental periods during in the seals' first four months of life, when they are completely dependent on mother's milk. The research found that in newborn pups, around 60 percent of the milk energy they receive from their mothers goes to growth. But as the pups get older and their mothers begin leaving them behind periodically to go on foraging trips, that percentage begins to fall. By the age of one month, pups only have about 25 percent of their energy available for growth.

As expected, the researchers found that the biggest predictor of a pup's growth rate was the amount of milk they ingested, showing just how important maternal investment is when growing up in such harsh conditions. But other factors were also important in determining a pup's energy throughput, including the pup's size and condition at birth and environmental factors like weather.

"If climate change models are correct and the [Antarctic Peninsula](#) gets windier and wetter weather, this may influence how much energy is

available for growth," McDonald said. "Changes in prey availability and climate may lead pups to conserve energy by sacrificing the development of foraging skill or to wean at a lower mass or body condition, resulting in negative impacts on the ability to transition successfully to nutritional independence."

McDonald hopes the research will lead to better predictions about how a changing environment may ultimately affect young seals and seal populations.

More information: Birgitte I. McDonald, Michael E. Goebel, Daniel E. Crocker, Daniel P. Costa, "Biological and Environmental Drivers of Energy Allocation in a Dependent Mammal, the Antarctic Fur Seal Pup." *Physiological and Biochemical Zoology* 85:2 (March/April 2012).

Provided by University of Chicago

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