

Physiological and energetic measurements of bearded seals (*Erignathus barbatus*) during early development



Madilyn Pardini ^{1,2}, Madeline Meranda ^{1,2}, Nicole Thometz ^{2,3}, David Rosen ⁴, Colleen Reichmuth ^{1,2}

¹ Alaska SeaLife Center, ² University of California Santa Cruz, ³ University of San Francisco, ⁴ University of British Columbia

Objective and Methods

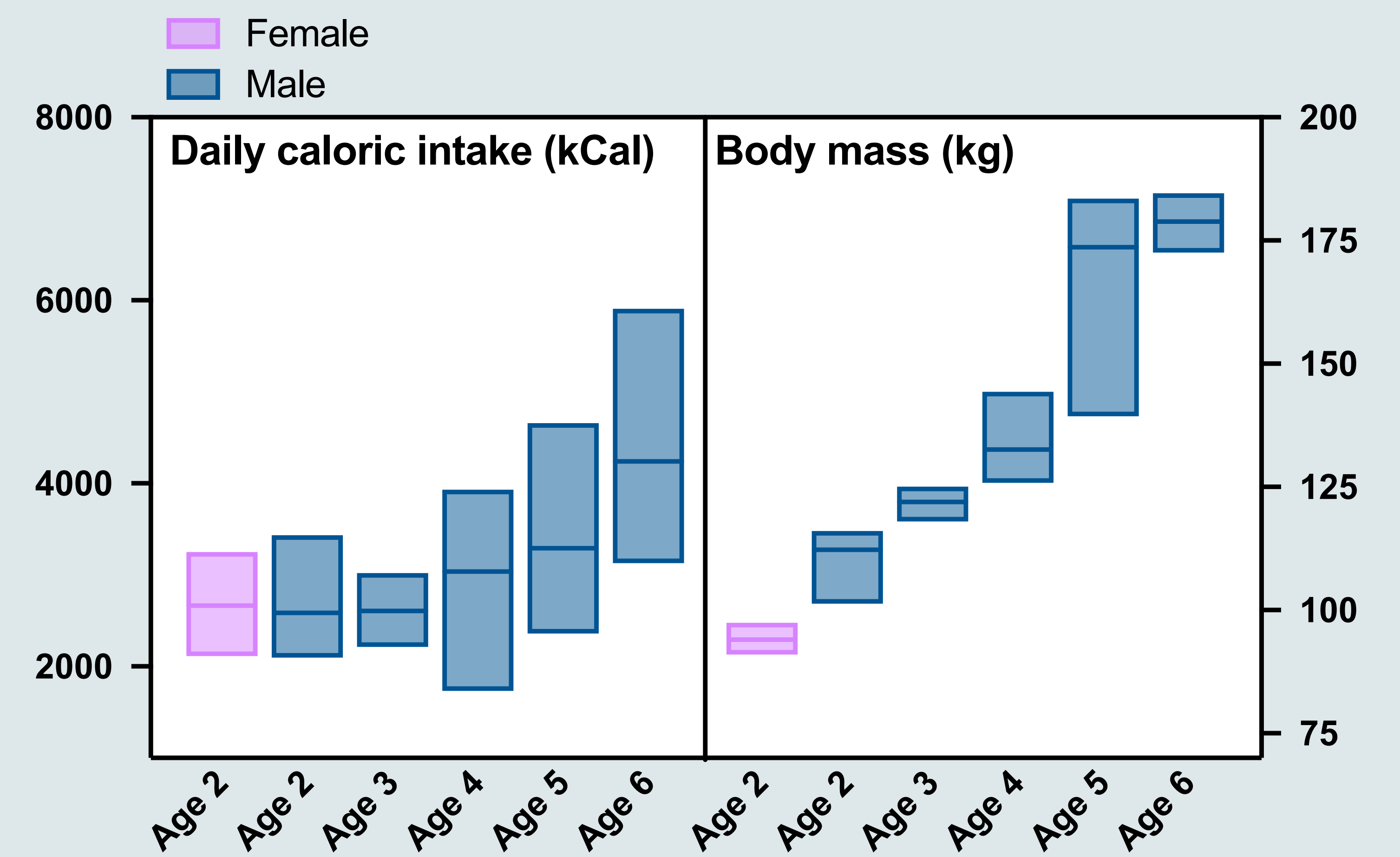
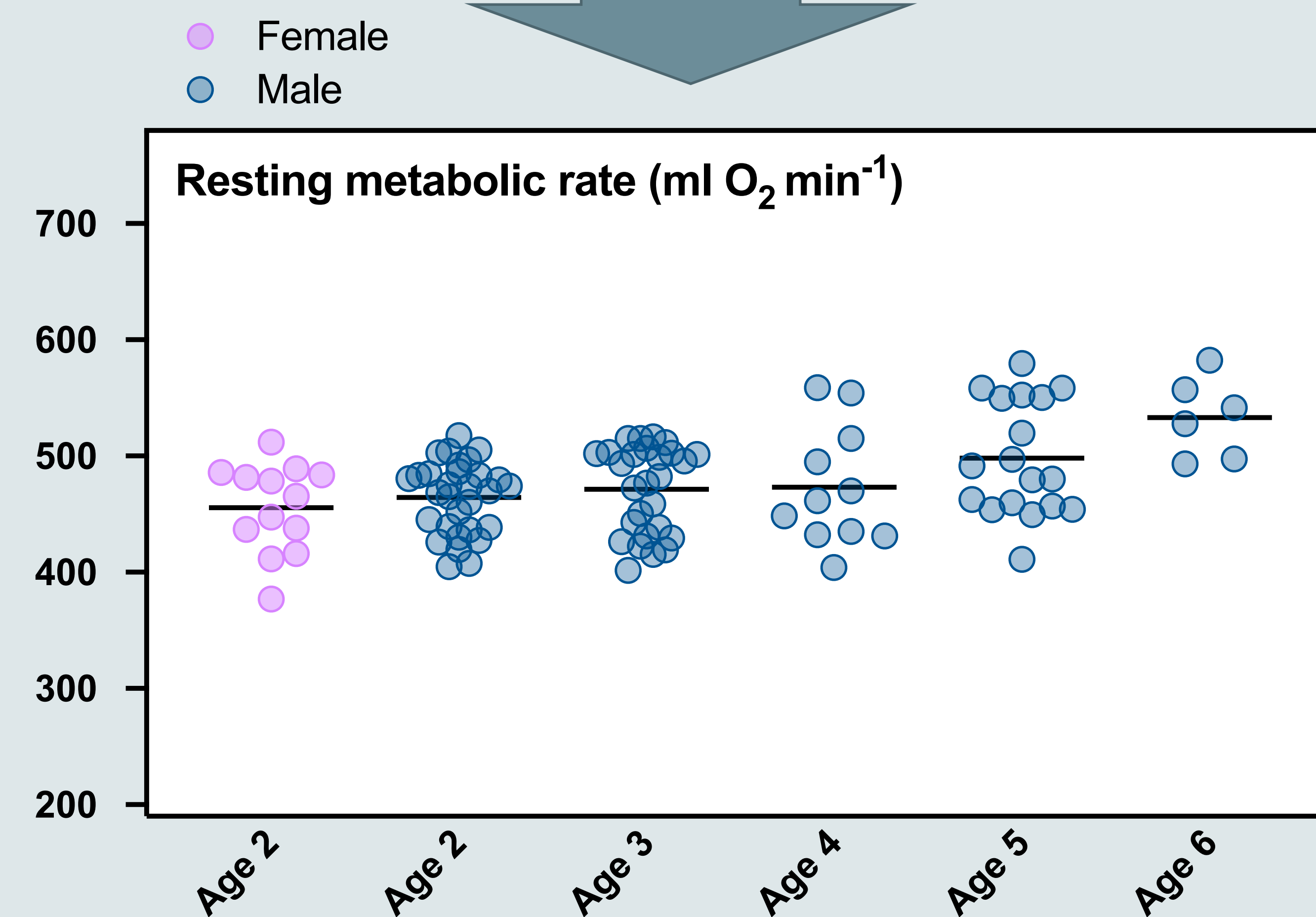
Bearded seals are threatened by global warming given their adaptation to Arctic conditions and reliance on broken sea ice as haul-out substrate. Predicting the consequences of environmental changes requires knowledge of the physiology and energy demands of individual seals, and how these differ over a seal's lifetime. To overcome limitations of field sampling, two bearded seals were studied at Long Marine Laboratory in Santa Cruz, California. Data on body condition, growth, energy intake, and metabolism were obtained from two bearded seals to investigate developmental changes in energy budgets.

Significance

Resting metabolism was relatively constant until maturation while body mass and food intake continually increased. Such data describing demographic trends in physiological parameters will improve bioenergetic models.

Metabolism

Resting metabolism was measured in two trained seals using open-flow respirometry. On an absolute basis, resting metabolic rate for the male seal remained stable from ages 2-4 years, averaging 470 ml O₂ min⁻¹. This was similar to the value of 450 ml O₂ min⁻¹ for the 2-year-old female. Metabolism for the male increased slightly in year 5 (498 ml O₂ min⁻¹) and significantly in year 6 (552 ml O₂ min⁻¹) as he reached maturity.



Growth and Energy Intake

While absolute metabolism increased by only 12% from juvenile (2-4 years) to subadult and young adult stages (5-6 years), absolute food consumption (in calories) increased by 37%. Over the same developmental interval, body mass increased by 44%, including a 7% increase in blubber content.