Point Blue Publication Brief

Adélie penguins become more efficient at finding food as they age

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Living in a highly seasonal, harsh environment, Adélie penguins are a useful study species for understanding how different individuals cope with environmental changes. In most animal species, middle-aged breeders produce more offspring than younger ones and/or very old ones. The reasons for these differences are unclear. For example, individuals may become better breeders over time by learning and then decline as they become affected by old age, or poor breeders may die earlier, leaving only high performing breeders at older ages.

Because the ability of individuals to gather food from their environment determines the amount of energy they can invest in surviving and producing offspring, it is important to understand how an individual's ability to gather food changes with age. In this study, we used small electronic devices to follow 191 breeding Adélie penguins of different ages (4-17 yrs) during their foraging trips at sea. These devices recorded the body movements of the penguins at high frequency, allowing us to calculate how much energy they were expending, as well as the details of their diving behavior. Using the number of "wiggles" performed during their dives as an index of prey catch, we were able to quantify the foraging efficiency of the different individuals.

We found that Adélie penguins became more efficient at gathering food as they aged, with no sign of declining with old age. Penguins are subject to high predation by leopard seals and harsh environmental conditions which may prevent them from reaching an age where a decline would be evident.

No matter their age, males and females gathered the same amount of food for the same effort, but the effort of males was more compressed: they foraged more intensively and gathered the same amount of food more quickly.

Our results suggest that individual improvement more than selective disappearance of poorly performing individuals is responsible for much of the increase in foraging efficiency with age.

Main Points

Adélie penguins of both sexes become more efficient at gathering food as they get older.

Males forage more intensively, returning to their chicks in less time, while females use the same amount of energy but spread over longer foraging trips to bring back similar amounts of food.

High predation levels and harsh environmental conditions may cause many penguins to die before reaching an age when they might exhibit a decline in foraging performance.

Lescroël A., Ballard G., Massaro M., Dugger K., Jennings S., Pollard A., Porzig E., Schmidt A., Varsani A., Grémillet D. & Ainley D. 2019. Evidence of age-related improvement in the foraging efficiency of Adélie penguins. Scientific reports 9:3375. Point Blue Contribution number 2220.