

Main facts about emperor penguins

[Environment](#), [Animals](#)



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Physiological Features

Emperor Penguins have to survive in some of the harshest weather conditions in the world (as low as -40°C and 200 km/h winds). They have a set of features that help them adapt to this. These penguins have large reserves of sub-dermal body fat to insulate them. They have many layers of stiff short scale-like-feathers which are very hard to ruffle. To reduce heat loss, the feathers are held erect by muscles while the penguin is on land which traps a layer of air close to the skin. On the other hand, the feathers are flattened in the water which waterproofs them and helps keep them warm. One of their survival mechanisms is to huddle for warmth, which also means they do not defend any territory.

In addition, Emperor Penguins can maintain their core body temperature without altering the metabolism in the thermoneutral range (-10 to 20 °C). When temperatures drop below this their metabolic rate quickly increases. This can be achieved by swimming, walking, shivering or breakdown of fats by enzymes induced by glucagon (Fraser, 1995).

Apart from the cold, Emperor penguins have to withstand high pressures and low oxygen when diving. For every 10 meters of depth, the water pressure increases by one atmosphere. Most land organisms would have their insides crushed by this pressure. However, the bones of a penguin are solid instead of air filled to avoid barotrauma (damage due to difference in pressure between a gas space inside the body, and the surrounding gas or fluid). Furthermore, oxygen expenditure is reduced by shutting down non-crucial organs and the lowering of their heart rate. In addition, their haemoglobin and myoglobin can bind to oxygen at low blood concentrations, allowing them to still be functional for long periods of time without an oxygen source. (Kooyman and Campbell, 1971)

Breeding

The breeding cycle can be put into 3 stages. First comes the pairing period, where courtship and breeding occurs, the second is the incubation period and lastly the rearing period (from chicks to fledgling). The emperor penguin cycle lasts 9 months plus 1-2 months for pairing period. As the ice layer reforms (March/April), the birds return to colonial nesting areas every year and the breeding cycle begins. Courtship begins with a lone male. He stands still and places its head on its chest before giving a courtship call for about 1-2 seconds. The male repeats this as he moves around the colony. This call establishes possession, warns other male penguins to stay away and attracts other females. Then a female will stand face to face with the male and they will both stretch their head and neck upwards, mirroring each other. They will hold this posture for several minutes in unison to strengthen the bond. Moving together in synchrony is the key to creating a powerful bond. Before

intercourse, one of them will bow deeply to its mate, with its bill pointed as low as possible and the mate mirrors it. The female lays an egg in May or early June. After laying the egg, the female has to return to sea for 2 months to look for food. She transfers the egg to the male. The male spends the winter incubating this egg on its feet and inside his brood pouch. Due to these long periods of fasting for the male they have to huddle for warmth to survive the cold and wind. The mother returns shortly after the chick hatches with food she has stored in her stomach and the male sets off spending 3 to 4 weeks feeding (Ancel et al., 2013)

Conservation Status

Emperor penguins went from a species of least concern to near threatened in 2012 by the IUCN and is currently under consideration to put under the US Endangered species act. (IUCN Red List of Threatened Species, 2012)The major causes are due to the effects of climate change and the industrial fishing of crustacean and fish populations. This has caused a decrease in food sources for emperor penguins. Furthermore, disturbances in breeding colonies by humans and the impact of tourism has been a problem from Emperor penguins.

A study by Woods Hole Oceanographic Institution forecasted that emperor penguins could be pushed close to extinction by the year 2100 if climate change follows the trend of recent years. This was concluded by predicting the loss of sea ice and how it would affect emperor penguins at Terre Adelie in Antarctica. This estimated an 87% decline in the population.(Jenouvrier et al., 2009). In 2014 this study was updated and concluded that all 45 colonies

of Emperor penguins would see a decline due to habitat loss and decrease of food supply. (Goldenberg, 2014)