

# The Weighbridge



## Did You Know?

1. A male Adélie Penguin weighs about 6 kg when spring arrives, but just 4.5 kg by the time the chicks fledge; similarly, a female's body weight decreases from about 5 to 4 kg during this time.
2. Adélie Penguins capture about 200 g of food on a foraging trip to feed themselves.
3. Adélie Penguins bring back as much as 1000 g in their stomachs when feeding an older chick.
4. It takes 23-36 kg of food to raise an Adélie Penguin chick to fledging weight.
5. Adélie Penguins can be gone for 6 days to catch food for their chicks, though normally they are gone no more than 3 days and sometimes just a few hours.
6. The amount of time away and the amount of food captured varies with colony size. And the amount of sea ice.

## How do we know this?



Figure 1 How to catch a penguin

Here is how one catches a penguin once and maybe twice, but after that it's impossible.

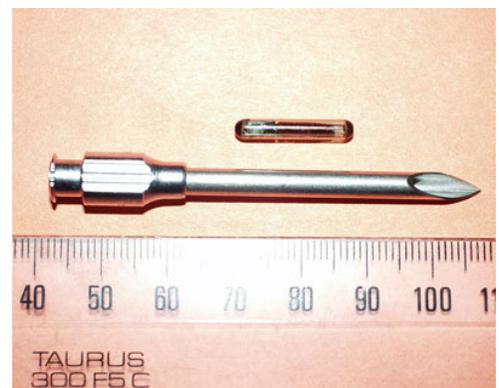


Figure 2 A RFID tag inserted under the skin

Figure 2 shows an RFID tag and the needle used to inject it just under the penguins' skin. It's about the size of rice crispy, about ½ inches long, and is the same type of tag given to pets and farm animals for their identification.



Figure 3 The weighbridge reader and scale

Every time the penguin crosses the weighbridge, it also passes through a hoop antenna. This antenna causes the RFID tag to send a radio signal. This signal is a unique series of numbers in each RFID tag. The weighbridge then sends this information to a computer, where it is stored for the entire season. We encircle a breeding group of penguins and allow them in and out of the enclosure (fence) only by crossing the weighbridge. Beginning from the start of the season and continuing to the very end we weigh each bird every time it comes and goes. We get 40-50 weights for each breeding adult per season!



Figure 4 The weighbridge colony inside the fence

This sub colony of nesting penguins is encircled by a fence. To travel between the sea and their nest, each bird must cross the weighbridge, which is to the left of the tent. No other opening is available in the fence. In the tent is a computer. It and the weighbridge are powered by a battery, which is charged by the solar panels to the right of the tent.

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"28/11/99","14:49:22.7","ID","AVID*006*791*884"  
"28/11/99","14:49:24.6","Opto 2"  
"28/11/99","14:49:24.6","Weight","1.23"  
"28/11/99","14:49:24.6","Weight","2.28"  
"28/11/99","14:49:24.6","Weight","3.23"  
"28/11/99","14:49:24.6","Weight","3.82"  
"28/11/99","14:49:24.6","Weight","4.08"  
"28/11/99","14:49:24.6","Weight","4.03"  
"28/11/99","14:49:24.6","Weight","3.96"  
"28/11/99","14:49:24.6","Weight","4.05"  
"28/11/99","14:49:24.6","Weight","4.24"  
"28/11/99","14:49:24.6","Weight","4.32"  
"28/11/99","14:49:24.6","Weight","4.18"  
"28/11/99","14:49:24.6","Weight","3.83"  
"28/11/99","14:49:24.6","Weight","3.46"  
"28/11/99","14:49:24.6","Weight","3.07"  
"28/11/99","14:49:24.6","Weight","2.49"  
"28/11/99","14:49:24.6","Weight","1.78"  
"28/11/99","14:49:24.6","Weight","1.14"  
"28/11/99","14:49:24.6","Weight","1.27"  
"28/11/99","14:49:24.6","Weight","2.22"  
"28/11/99","14:49:24.6","Weight","3.38"  
"28/11/99","14:49:24.6","Weight","3.96"  
"28/11/99","14:49:24.6","Weight","3.90"  
"28/11/99","14:49:24.6","Weight","3.58"  
"28/11/99","14:49:24.6","Weight","3.20"  
"28/11/99","14:49:24.6","Weight","2.59"  
"28/11/99","14:49:24.6","Weight","1.82"  
"28/11/99","14:49:24.6","Weight","1.05"  
"28/11/99","14:49:24.6","Weight","0.53"  
"28/11/99","14:49:37.0","Opto 1"
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Here is what a record looks like that the weighbridge has sent to the computer. It gives the date, time, the number of the RFID tag and the weights. The scale measures weights 12 times per second. The 'optos' are light beams. When the penguin crosses the light beam it activates the signal to either turn on or off the antenna. This is a single crossing; many weights are taken as the penguin is moving across the scale. The

computer uses a mathematical formula to determine the actual weight of the penguin. It appears complex, so we are glad the computer does the work. After the chicks go off to sea to begin lives of their own, we look at the data that the weighbridge computer has stored. We compare the weights of breeders and non-breeders from the start to the end of the summer. That way we know how much weight they lost due to raising chicks. We also subtract the weights of parents before and after feeding their chick(s). This gives us the amount of food fed to the chick. We add up all the food weights for the entire period from hatching to fledging for each chick. This tells us how much food was needed to raise a chick.

We have found that competition for food is greater at large colonies and therefore penguins in large colonies must swim longer and dive deeper to get the food they need. Penguins at smaller colonies do not need to work so hard. Penguins from larger colonies bring back less food to their chicks. The amount of sea ice, and therefore the climate, all effect how penguins at small and large colonies forage for food. To learn more about how penguins are coping with climate change see our Climate & Penguins section.