



Why hibernate?

Bats are mammals, which is why they are warm and furry. Mammals are warm because they are endothermic - they convert a large proportion of their food intake into heat so that they can keep a constant body temperature, usually 37°C, whatever the temperature of their surroundings. The furry covering provides insulation to reduce the amount of this valuable heat lost to the environment. Birds, the only other animals to do this trick, use feathers instead of fur. The advantage of being endothermic is that, as long as there is enough food to supply the mammal's energy needs, it can laugh off cold weather and poke a finger in the eye of winter. The disadvantage is that, if that food consists of ectothermic animals which can't generate body heat and therefore become inactive or die in winter, there may *not* always be enough food. Insects are ectothermic, and the bats that feed on them in northern latitudes therefore have a problem.

Birds are often faced with the same problem, and they solve it by migrating to places where the food is still available. Some bats do the same in Europe and North America, but others, including the British species, have opted for hibernation. A hibernating mammal is able to switch between being endothermic and ectothermic according to the availability of food.

How is hibernation different from sleep?

A bat in hibernation has switched off its heat generating ability. It is therefore cold, because its body has dropped to the same temperature as its surroundings. It uses only a tiny amount of food from its fat stores to keep its metabolism ticking over at a very slow rate. It breathes only very slowly (once or twice an hour) and its heart rate drops drastically (to once every few seconds – perhaps one thirtieth of the rate when it is flying). A sleeping mammal has a normal metabolism, breathing rate and heart rate. It will therefore use up a great deal of food during its sleep to maintain its high body temperature. Hibernation lasts for weeks, but sleep can only last for a few hours before there is a need to eat.

Hibernation and summer torpor

Bats have taken this process a stage further. They can stop generating heat and allow their body temperature to drop whenever it suits them. During the day, or when weather makes feeding difficult – in heavy rain for example – a bat can drop its body temperature and become torpid, conserving its resources until it can feed actively again. Bats are said to be heterothermic, meaning that they can switch between being endothermic and being torpid as their needs and the circumstances dictate.

Bats have BAT

When a bat revives, either from summer torpor, or from hibernation, it needs to raise its body temperature rapidly to the 41°C needed for flight. To help it do this, it has some specialised tissue called brown adipose tissue (BAT for short), which can generate lots of heat in a short time. Even in the middle of winter, a bat can revive and become active every now and again. It may change its position in the roost, and even fly out to feed or to move to a completely different hibernation site. During the winter hibernation checks, we often find that bats have moved or changed sites completely between one month and the next, and we have occasionally seen bats flying around.

Where do bats hibernate?

Bats select hibernation sites with stable and suitable conditions. They need to be humid, free from disturbance and cold but not freezing. They also need crevices for the bats to hang in. Pipistrelles hibernate in trees or buildings and are very rarely seen in winter. Some species choose underground sites such as caves, icehouses, cellars or tunnels, and we can find some of them there.

Why do we look for hibernating bats?

Hibernaculum checks give us a way of monitoring bat numbers from year to year. Looking for hibernating bats is cold, dirty and uncomfortable work, but fortunately there are some of us crazy enough to do it. We are rewarded with close views of hibernating bats, and occasionally with an encounter with a rare species. It was through winter bat checks that we discovered that barbastelles are present in Bedfordshire, and that eventually led to the discovery of summer roosts and feeding areas. There is, however, an element of risk to the bats from our visits, and they are therefore licensed by English Nature and carefully controlled. Disturbance can cause the bats to come out of torpor early, leading to excessive use of stored food and starvation before the end of winter. We are allowed to check each site only 3 times per winter, with a very limited number of people led by a licence-holder. We also need to take care to minimise the disturbance to the bats, especially if they not completely torpid and showing signs of activity.

Bob Cornes

you can find out what this year's checks found in the next issue of the newsletter.

