

# Why bats, rats and cats store different amounts of fat

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Animals differ in the amount of fat they carry around depending on their species, status and sex. However, the causes of much of this variation have been a mystery. The Bristol study shows that many differences can be understood by considering the strategies animals employ to avoid two causes of death: starvation and being killed by predators.

These causes of death often exert opposite pressures on animals, for example, storing lots of fat helps animals survive periods without food but also slows their running and so makes getting caught by a predator more likely. Animals can be stronger to compensate, but the energetic costs of extra muscle mean that the animal would starve quicker during a [food shortage](#).

Led by Dr Andrew Higginson of Bristol's School of [Biological Sciences](#), the researchers used mathematical models to explore how much muscle and fat animals should have in their body to give themselves the best chance of survival. They showed that an important consideration was how much carrying fat increases the energetic costs of movement. The models revealed that the size of this cost influenced whether larger animals should have more fat than smaller animals, or vice versa.

Dr Higginson said: "Our results explain differences between different families of mammal. For example, larger bats carry proportionally less fat than small bats but larger carnivores carry more fat than small carnivores. Among rodents, it's the medium-sized species that carry around the most fat! These differences agree with the models predictions

if you consider the costs of carrying fat for these three groups. Bats fly and so have high costs of carrying extra weight, whilst [carnivores](#) spend much of their time resting and so will use less energy than busy scurrying rodents."

The work, published in The [American Naturalist](#), also shows that much of the variation between animals in their amounts of fat and muscle can be explained by differences between the sexes, how much animals have to fight to get food, and the climate in which they live.

The researchers plan to put the theory to the test by looking in more detail at the amounts of fat stored by different animals. If their theory is correct, much of the mystery in how species and sexes differ in their amount of fat will have been solved.

Provided by University of Bristol

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