

Why piglets shudder to keep warm

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Researchers at Uppsala University, Sweden, have uncovered a genetic reason why newborn piglets are less tolerant to cold than other newborn mammals. It turns out that the gene that codes for the protein UCP1 was inactivated some 20 million years ago in the evolutionary line that pigs belong to. These findings are presented in the latest issue of the scientific journal *PLoS Genetics*.

Brown fat plays an important role in newborn mammals, including our own children, since this tissue helps the newborn to maintain its body temperature by burning fat, which converts into heat. The protein UCP1 (Uncoupling Protein 1) has a key role in this energy conversion, which takes place in the cell mitochondria.

Piglets are sensitive to cold and shudder in order to maintain their body heat. No brown fat or UCP1 protein has previously been found in domesticated pigs. In a new study, Frida Berg and her colleagues have been able to show that the UCP1 gene was shut down about 20 million years ago in an ancestor of the wild boar. These scientists have found four different mutations, each of which would be sufficient to knock out the function of the protein.

“This ancestor of pigs thereby lost the ability to use brown fat to maintain body temperature after birth. A reasonable explanation for this is that brown fat was not essential during a period in the evolution of pigs, when it lived in a warm climate,” says Leif Andersson, who directs the research team.

The ancestor of the domesticated pig, the wild boar, is the only pig that lives in cold climates. All other species, such as the wart hog, live in tropical or subtropical climates. The wild boar has compensated for the loss of brown fat by a series of adaptations for survival in a cold climate. It is the only hoofed animal that builds a den when it is time to give birth (Figure 1), and its young shudder to maintain their body temperature. A previous study has shown that the temperature in such a den can be as high as 20°C in an outdoor temperature of -20°C. In modern pig production heat lamps are used to help the newborn piglets retain their body temperature (Figure 2).

The findings show that an important biological function can be lost if it is not vital to life during a period in the evolutionary history of a species, and that if the living conditions once again change, compensatory mechanisms can be developed. The lack of UCP1 and brown fat in the pig resembles the inability of humans to produce vitamin C, a feature we lost during our evolutionary history.

“The findings we present are fully consistent with the theory of evolution. An important trait can be lost if it is not absolutely necessary to life during the development of a species,” says Leif Andersson.

“At the time the study illustrates why the idea of intelligent design is such a poor explanatory model for the variation we find in nature. If a creator happened to make a mistake with the UCP1 gene in the pig, why four different mistakes when one would have been enough to disrupt gene function. And why was the same mistake made when the wart hog and other closely related species were created? It cannot possibly be a matter of intelligent design.”

Source: Uppsala Universitet

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