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From The Times

March 16, 2007

As the weather gets hotter so the sheep are getting smaller

Lewis Smith, Environment Reporter

While every physics pupil knows that heat can usually be relied on to make objects expand, for the semi-wild sheep of the Outer Hebrides it appears to have the opposite effect.

Observations of Soay sheep on Hirta island have shown that the warmer temperatures associated with global warming allow more smaller animals to survive the winter. And with greater numbers of smaller sheep living through the cold months, the average size of the animals falls.

Research led by Imperial College London, published in the journal *Science*, is the first to establish a direct link between the genetic changes of an animal population and climate change. It indicates that mankind, on top of the ecological legacy of causing species to become extinct or vastly reduced in number, is leaving an evolutionary legacy by affecting natural selection.

On Hirta, the researchers used a combination of population data and field observations to track the size of individual sheep and how their survival rates influenced their numbers.

They found that in years when there were harsh winters, more of the largest sheep survived, whereas in milder years more of the smaller sheep thrived and brought the average size down.

Tim Coulson, from Imperial College London, said that the alterations in the genetic traits could be linked to climate change. "Data shows that in the 1980s big sheep were genetically favoured in this population, as big sheep had more chance of surviving the Outer Hebrides' harsh winters," he said.

"But as the climate changes and the Soay sheep are not subject to such tough winters, there will be reduced natural selection for larger animals. Winters have been getting better on this island. This could mean that if the climate in this region of Scotland continues to change, there will be changes in the size of sheep due to natural selection, which could have a significant impact on the population dynamics of the Soay sheep overall."

He added: "We already know that human activity affects the ecology. We've seen lots of species numbers going very, very low, so we are leaving an ecological legacy."

"What this study means is that we are going to be leaving an evolutionary legacy. We are changing the way animals are being selected. Climate change is leaving an evolutionary signature."

The research is likely to have implications for animals which live in a similar environment to the Soay sheep, where the harshness of winters has a direct bearing on the size of individuals and the overall population.

There was no evidence that climate change led to an increase in the average number of sheep, but it did even out the peaks and troughs in population numbers caused by harsher weather.

The Soay sheep are closely related to the wild sheep originally domesticated by man. They run wild on the island, which was abandoned by its human inhabitants in the 1930s after 2,000 to 3,000 years of occupation.

Wild and woolly

— Latin name *Ovis aries*

— Unlike other sheep, they do not group in flocks

— Shearing is unnecessary because the fleece is shed naturally

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permanent human occupants were evacuated

— Soay is said to derive from the old Scandinavian name Sudaey, meaning "Island of sheep"

— Biologists began researching them on Hirta in 1955

— In 1971 the Queen became the only British monarch to visit Hirta

— Hirta is part of the St Kilda archipelago

— In bad years up to 60 per cent of the sheep die during the winter

Source: *Times Database*



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