

The penalty of having a sister -- why sibling sex matters for male saiga antelopes

March 7 2007



The research team's work with wild saigas in Kalmykia has enabled them to gain an unprecedented insight into the birth weight of calves over a three year period
Photo: Nils Bunnefeld

Having a twin sister could put male saiga antelopes at a reproductive disadvantage, says new research published today. The study shows that male twins with a sister are born lighter than those with a brother, making them smaller than the optimal size for males. The research also shows that saigas are the supermums of the hoofed animal world with no other similar species investing more in their offspring during pregnancy.

The study's results call into question current understanding of the development of male and female fetuses of this species, and give scientists a new insight into the importance of sibling sex and what implications this may have for the animals as they mature.

This study shows that when a female is pregnant with mixed-sex twins, the male foetus does not undergo the substantial amount of growth that occurs in a male foetus with a brother, resulting in a sub-optimal birth weight. Saiga males mate with many females and face strong male-male competition during short mating seasons. This means that size matters for males - being smaller than average is one of the major limiting factors for reproductive success.

Aline Kühl from Imperial College London's Division of Biology, lead author of the paper, explains that although they do not yet understand the precise mechanism behind this suboptimal development in male twins, its existence is clear. "When siblings in a litter vary in sex, maternal investment should be sex-specific, meaning that the male foetus grows bigger than the female. However, it seems there are limitations in the ability of the mother to provision mixed twin litters in the womb," she said.

The researchers point out that mixed-sex litters have been shown to have an impact on animal health elsewhere in the animal world. In dairy cows for example, it is well known that calves from mixed litters are less fit. Female heifers from mixed litters are generally infertile. But unlike dairy cows, in cases of saiga mixed-sex twins, the male foetus appears to be worse off, not the female.

Aline adds that the effect of size on male saigas later in life cannot be underestimated: "Even a relatively small decrease in birth weight is likely to have an amplified negative effect on male reproductive fitness in species where competition amongst males for mates is very high."

The saiga antelope provides scientists with an ideal opportunity to investigate the effects of mixed-sex twin litters on size and development, because there are a high proportion of twin births in the population, and because the optimal birth weight for males and females of the species are dramatically different.

The researchers' study of female saigas and their young also showed that they invest more in their pregnancy than any other hoofed mammal, with some mothers carrying young up to 38% of their own body weight.

The research was carried out on populations of saiga antelopes living on the Eurasian steppe in the autonomous Republic of Kalmykia, Russia. Data from saiga antelope monitoring during Soviet times from the Betpak-dala saiga population in Kazakhstan were also analysed. Both data sets are from different populations of saiga, from both before and after the recent extreme decline in saiga numbers – yet the results of both datasets are qualitatively the same.

The research team, alongside local rangers, weighed and measured saiga calves during the birth season in May over a period of three years. Saiga have a mass calving behaviour, whereby females come together in a densely packed herd to all give birth within a week. This makes it relatively easy to monitor the reproductive state of the population. Such monitoring has become vital since saiga have seen a dramatic decline in numbers of over 95% in recent years, making them one of the most critically endangered species on earth.

Future research will investigate what role sibling sex plays for lifetime reproductive success. The monitoring protocol of saiga antelopes is currently being improved to include non-invasive methods for monitoring to determine fecundity rates (from faeces analysis).

Source: Imperial College London

Citation: The penalty of having a sister -- why sibling sex matters for male saiga antelopes (2007, March 7) retrieved 19 April 2024 from <https://phys.org/news/2007-03-penalty-sister-sibling-sex.html>

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