

Inbred sperm fertilize fewer eggs: research

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Inbred male sperm have been found to fertilise fewer eggs when in competition with non-inbred males according to a new study by the University of East Anglia.

Research into the breeding habits of the red flour beetle, published today in [Proceedings of the Royal Society B](#), shows that the reduced fitness of inbred beetles, known as 'inbreeding depression', reveals itself in competitive scenarios.

Inbreeding is a potentially important problem in declining species across the world, and conserving [genetic variation](#) is now recognised as a priority by the International Union for Conservation of Nature. The new research is potentially vital for the successful implementation of recovery programmes of inbred species.

When populations deplete or fragment, relatives can be forced into reproduction, often leading to inbreeding depression.

Led by Dr Matt Gage, the new research into the promiscuous red flour beetle (*Tribolium castaneum*) measured how male reproduction responded to forced inbreeding.

After mating brothers with sisters for eight generations, the research found no changes in male fertility or mating behaviour.

However, inbred male [sperm](#) fertilized fewer eggs when in competition with another non-inbred male, and sperm became more variable in size.

Dr Gage said: "The experiment was designed to make comparisons with non-inbred control lines. Using multiple inbred lines, we measured the effects of inbreeding on pre and post-mating success, in the absence and presence of male-male competition."

The results showed no differences between inbred and non-inbred males in terms of mating success, latency, duration, the number of mounts or persistency in a non-competitive setting.

However inbred males suffered significantly reduced sperm competitiveness, fathering an average of 15 per cent fewer [offspring](#) than non-inbred males across 330 sperm competition comparisons.

Dr Gage said: "It seems that inbreeding depression in sperm competitiveness was caused by a decrease in either sperm quantity or quality that is critical for relative competitiveness, but still allows full male fertilization success to be achieved under benign, competition-free conditions.

"We have shown that male fertility and mating competence are not affected by inbreeding and that any decline in sperm quality under inbreeding is only detectable when sperm competition is invoked.

"One limitation to this study is that the ancestral laboratory stock we have used is likely to carry relatively reduced genetic diversity. Also insect sperm do not generally manifest cellular abnormalities akin to those commonly found in more complex mammalian sperm," he added.

The next stage of the research will explore ways that female [beetles](#) use multiple mating to generate [sperm competition](#) and thereby avoid inbreeding depression of their own fertility.

Provided by University of East Anglia

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