

Mothers give interloper's offspring a head start in life

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A new study has revealed that mother birds can provide an early advantage to the chicks that they have sired with their non-social partner (known as extra-pair offspring).

It has long been known that female birds commonly mate with males other than their social partner, producing broods of mixed paternity in which the interloper's 'extra pair' offspring often outperform their half brothers and sisters.

While the superiority of these extra-pair offspring has generally been attributed to improved genetics, the new study has revealed that the difference may have more to do with mothers giving these 'extra pair' offspring a head start.

The team from the Universities of Melbourne and Groningen in the Netherlands have found that the superior performance of these extra-pair young arises largely because they are placed earlier in the laying order.

"Our findings indicate that mothers often give extra-pair offspring a better start in life, which can have life-long benefits" said Dr Michael Magrath from the Department of Zoology at the University of Melbourne.

"Our study examined a population of blue tits which are usually socially monogamous, but females commonly mate outside their pair to produce

clutches with mixed parentage. Remarkably, almost 75% of the offspring that resulted from these 'extra pair' matings were produced in the first half of the clutch."

The study will be published in the latest issue of [Current Biology](#) on May 12.

Over two breeding seasons, Dr Magrath and colleagues numbered all 1732 eggs from 190 blue tit nests to determine their laying order. They placed these eggs in incubators to determine hatching order and, as they hatched, brought the chicks back to their original nests to monitor survival and growth. All chicks were also genotyped in order to determine the offspring's sex and genetic father.

"Typically, the eggs in a clutch hatch over a period of several days, with the order of hatching closely reflecting the order of laying," said Dr Magrath.

"Consequently, extra-pair chicks ended up hatched almost 10 hours before their within-pair half-siblings, on average, allowing them to gain an initial size advantage because parents start feeding chicks as soon as they hatch."

Because of this early advantage, extra-pair chicks were more likely to survive and were also larger than their within-pair half-siblings by the time they left the nest. However, after correcting for variation in hatching time, the researchers found that all differences between extra-pair and within-pair chicks were reduced or absent, indicating that this non-genetic, laying order effect largely accounted for the observed superiority of the extra-pair offspring.

The next challenge for the team is to understand why there is a connection between paternity and the laying order of eggs in the first

place.

"Genetic testing now allows us to determine the paternity of individual chicks in mixed broods, but we still don't understand why extra-pair offspring are laid earlier or even why females choose to mate with extra-pair males," said Dr Magrath.

One explanation could be in the timing of copulations. Females may engage in extra-pair matings to guard against the possibility that their social partner is infertile.

"Because females can often store sperm for several weeks, they may typically only copulate with extra-pair males before the start of laying as this may be adequate to fertilise all eggs in the clutch in the event of pair male infertility. However, in the vast majority of cases the pair male is fertile and this scenario could explain why extra-pair offspring become less likely among later laid eggs."

Even if females obtain a mix of sperm before laying, it is possible that the sperm from extra-pair males is more successful in fertilizing eggs if it is of higher quality (e.g. swims faster), or gets stored in a more advantageous position within the female's reproductive tract such as closer to the site of fertilization.

"The differential success of sperm from different males is a fascinating possibility but remains untested in wild birds."

While the study suggests that the superior performance of extra-pair chicks has more to do with good fortune than good genes, the team still don't discount the possibility that females mate with extra-pair males to improve the genetic quality of their [offspring](#).

"Genetically determined advantages may become most evident in later

life, such as living longer or having greater [mating](#) success. And if this is the case, then placing extra-pair [offspring](#) early in the laying order may be the mother's strategy to promote their chances of survival through the most risky period of their life".

Source: University of Melbourne ([news](#) : [web](#))

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