Paternal identity impacts embryonic development for two species of freshwater fish

Paternal, compared to maternal, contributions were believed to have only a limited influence on embryonic development and larval fitness traits in fishes. Therefore, the perspective of male influence on early life history traits has come under scrutiny. This study was conducted to determine parental effects on the rate of eyed embryos of Ide - Leuciscus idus and Northern pike - Esox lucius. Five sires and five dams from each species were crossed using a quantitative genetic breeding design and the resulting 25 sib groups of each species were reared to the embryonic eyed stage. We then partition variation in embryonic phenotypic performance to maternal, paternal, and parental interactions using the Restricted Maximum Likelihood (REML) model. Results showed that paternal, maternal, and the paternal × maternal interaction terms were highly significant for both species; clearly demonstrating that certain family combinations were more compatible than others. Paternal effects explained 20.24% of the total variance, which was 2-fold higher than the maternal effects (10.73%) in Ide, while paternal effects explained 18.9% of the total variance, which was 15-fold higher than the maternal effects (1.3%) in Northern pike. Together, these results indicate that male effects are of major importance during embryonic development for these species. Furthermore, this study demonstrates that genetic compatibility between sires and dams plays an important role and needs to be taken into consideration for reproduction of these and likely other economically important fish species.

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