Re-Evaluating Reproduction: The Transgenerational Effect of High-Fat Dairy Intake on Fertility in Drosophila melanogaster

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It has been established that high-, low-, and non-fat dairy may potentially act as driving factors in varying human fertility rates. Given the unprecedented global rate of infertility, this project focused on how such dietary aspects can impact reproduction using D. melanogaster as a biological model. A powdered dairy supplement was added to fly media in three concentrations (high-, low-, and non-fat), using plain yeast paste as a control. Through a multifaceted procedure including egg, pupae, and eclosed adult counts, the effect of augmented dairy intake on reproductive output was determined in both male and female flies. Furthermore, the transgenerational effects of dairy intake were tested in subsequent generations of flies, which were then dissected to be assessed for variance in ovary/germarium function. RNA-sequencing technology was used to assess altered genetic expression in flies as a result of their augmented dietary intake. It was determined that high-fat dairy intake in both male and female D. melanogaster promotes significantly increased fertility in measures of eggs, pupae, and eclosed adults. Moreover, three subsequent generations of flies exhibited trends in reproductive output almost identical to those of their parents without consuming augmented dairy additives. Flies consuming high-fat dairy (and their progeny) showed heightened intermediate stage development in ovarioles and what appeared to be increased localization of pole plasm in the germarium. This could serve as an indicator of increased stem cell count, division rate, or variation in the function of a mid-oogenic quality control checkpoint. RNA-sequencing is ongoing with a focus on isolating a potentially causative mechanism in this transgenerational effect.

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