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Offspring sex ratio varies with maternal condition in mice

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Field and laboratory animal studies have demonstrated that maternal body condition can directly cause adjustments in offspring sex ratio. A mother's condition is affected by a variety of environmental and endogenous factors, but in particular food availability plays a major determining role. During famine conditions, the females should theoretically bias their offspring's sex ratio towards the sex with the lower reproductive value, e.g. daughters in most species. When resources become more plentiful, however, the dams should bias their offspring towards the sex with the greater reproductive value e.g. sons in most species. In our experiment, we have chosen to examine the effects of diet manipulation in NIH Swiss and CF1 mice housed under standard laboratory conditions. This experiment was a follow-up to an initial study performed by this laboratory that indicated mouse mothers fed a very high fat diet (VHF) before conception gave birth to more male offspring. However, female mice fed on the low fat (LF) diet produced more daughters. The aim of our current study is to determine when during gestation the shift in offspring sex ratio is occurring in the females provisioned with the two diets. We are focusing initially on two time periods, at fertilization and post-implantation or day 8 phase of pregnancy. To determine the sex of these early stage embryos, two approaches are being employed: 1) PCR analysis of sex chromosome DNA and 2) Fluorescence in Situ Hybridization (FISH) with X and Y chromosome probes. In the course of our experiments, we have met and are currently working to overcome several problems that have occurred. We are close to optimizing both procedures, and in the next few months, we anticipate having more data and a better understanding of when the shift in offspring sex ratio is occurring in the females fed the LF and VHF diets.