**Genotype-by-environment effects of dietary yeast on sperm traits in Drosophila melanogaster**

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**Introduction**

Most current models of the evolution of sperm function and sperm morphology assume that changes are the result of a response to sexual selection (e.g., Innler et al. 2011). Because of this, sperm studies (whether comparative, quantitative genetic, or using experimental evolution) usually involve the measurement and/or manipulation of sexual selection parameters (e.g., Fribert et al. 2005). However the abiotic environment can also play an important role in influencing sperm physiology and morphology (Amitin & Pitnick 2007, Morrow et al. 2008). Because of this, we decided to carry out an investigation of the effects of dietary protein on sperm traits in Drosophila melanogaster. For this study we are using a set of sequenced inbred lines provided by the Drosophila Genetic Reference Panel.

**Preliminary results**

The proportion of red-eyed offspring was significantly affected by yeast treatment ($P < 10^{-15}$). The large standard deviations (error bars) are the result of overall differences between the inbred lines ($P < 10^{-15}$). The interaction between yeast treatment and line trended towards significance ($P < 0.1$).

The number of matings obtained by the target males was significantly affected by yeast treatment ($P < 10^{-10}$). Again there were large differences between the lines ($P < 10^{-15}$). The interaction between yeast treatment and line was not significant ($P > 0.1$).

The paternity share obtained by target males showed a trend towards a significant effect of yeast treatment ($P < 0.1$). However there was no significant effect of inbred line and no interaction. More detailed analysis should help resolve whether this is a true effect or not.

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**Conclusions**

As expected from previous studies on longevity (e.g., Pum Lee et al. 2008), increased yeast is not necessarily beneficial. Increased yeast resulted in reduced fitness and attractiveness in males.

- Decreased yeast was also deleterious, resulting in decreased fitness and attractiveness, but less so than in the increased yeast treatment.
- There were highly significant differences between lines, consistent with a substantial genetic component to the traits that were measured.
- Currently no indication of significant differences in plasticity among lines, although sampling is not complete.
- Some suggestion of a trade-off between attractiveness and performance in sperm competition. This requires further investigation.

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**References**


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