Yeast-deprived diet extends *Drosophila melanogaster* larval period

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Purpose

The purpose of this experiment is to understand the effect on developmental timing when decreasing the percentage of yeast from 5% to 1% in a standard *Drosophila melanogaster* diet. This lab will specifically focus on the time to eclosion, which is the time it takes for eggs to mature into larvae, pupae, and finally, adult fruit flies. To answer this question, 30 eggs were transferred to multiple vials containing the standard diet for Drosophila melanogaster and either 1% or 5% yeast. Following roughly 10 days, the number of enclosed flies was counted and subsequently removed from each vial. Previous research has shown that a decrease in the nutritional value of food results in a longer period between the larval stage to pupariation (Shimada-Niwa & Niwa, 2014). This research suggests that the developmental timing of flies maturing in food with 1% food should be delayed compared to flies maturing in 5% yeast.

Methods

To prepare the customized diets for fly eggs to develop in, standard *Drosophila* diets were prepared identically except for yeast extract. In addition to either 1% or 5% w/v yeast extract, each diet contained agar (1% w/v), sucrose (2% w/v), dextrose (4% w/v), cornmeal (5% w/v), propionic acid (1% v/v), and Tegosept (0.16% v/v). To prepare food, agar, sucrose, dextrose, cornmeal and either 1% or 5% yeast were weighed out and mixed into ddH2O. After boiling the solution in a microwave, it was allowed to cool before adding propionic acid and Tegosept (microbial growth and mold inhibitors, respectively). Seven mL of prepared food was added to each fly vial and labeled respectively. All vials were allowed to cool completely before the addition of eggs.

Sample calculation for food preparation:
500ml total food x 0.05 cornmeal = 25g cornmeal
500ml total food x 0.01 propionic acid = 5 ml propionic acid

Canton-S strain of *Drosophila melanogaster* was used for all experiments. Initial experimental setup consisted of collecting and isolating virgin females in vials (1/25). A few days later, egg lay plates were set up with four virgin females and three males (2/1). The next day (2/2), eggs were collected, and 30 eggs were transferred to each vial: 5 vials with 5% yeast food and 5 vials with 1% yeast food. While the eggs were developing, the vials were rehydrated with water twice. Beginning on the first day that flies eclosed (2/12), eclosed flies from each vial were counted, sexed, recorded, and then disposed of. This process was repeated until the final day of data collection on 2/24. All data was collected in the late afternoon or early evening of each day.

Results

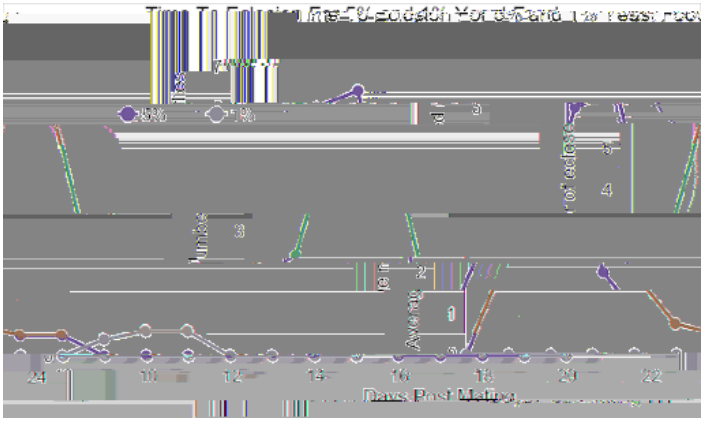

Figure 1. General trend of time to eclosion shows shorter time to eclosion for majority of flies from 5% yeast food compared to flies from 1% yeast food.

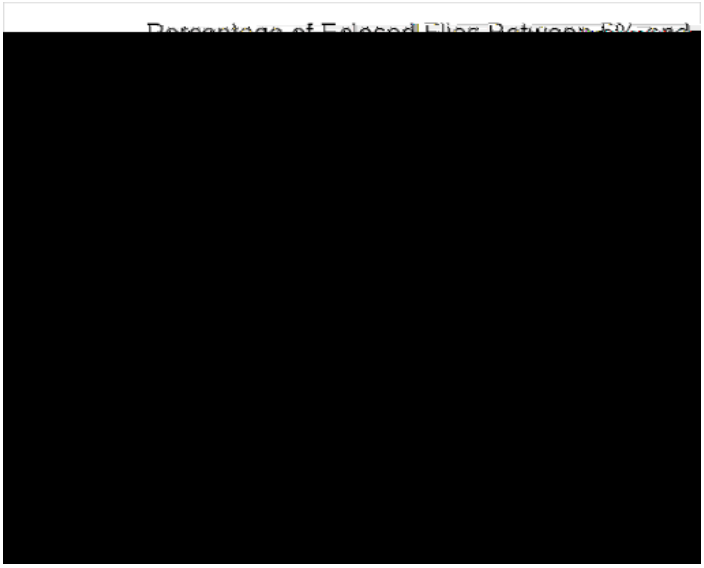

Figure 2. Higher average value of eclosed flies from flies in 5% yeast food compared to 1% yeast food ($P < 0.05$).

Figure 3. Examination of sex differences between time to eclosion for flies from 5% yeast food and 1% yeast food. (a) Comparison of the average number of male and female flies eclosed from 5% yeast food. (b) Comparison of the average number of male and female flies eclosed from 1% yeast food.

Figure 3 examines the differences between d_and Qo

Discussion

In the present study, Figure 1 illustrates that the trend in developmental timing of flies is affected by the percentage of yeast in their food. Specifically, flies in 1% yeast food took multiple days longer on average than flies in 5% yeast food. Figure 2 shows that fewer