
Exploring Substrate Preferences in *Tenebrio molitor*, the Darkling Beetle

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Tenebrio molitor - Darkling Beetles



(Darkling Beetle Life Cycle Kit)

Often employed as a food source for many animals in captivity- typically in their larval forms.

Current research aims to make mealworms a sustainable food source for humans, but traditionally consumed in many cultures (Grau et al.).

Need to know viable, high efficiency food sources to pack with nutritional value. Currently many different kinds are used, from dog food to wheatmeal (Osimani et al.).

Our Experiment

Null Hypothesis: A *Tenebrio molitor* adult will show no significant preference for any of four substrate options.

Alternative Hypothesis: *Tenebrio molitor* adults will show a significant preference for a specific type of substrate when given the options of oats, wheat flour, almond flour, and dog food.

We predicted that the beetles would show a preference for dog food based on previous experience with mealworms.



Methods

Materials:

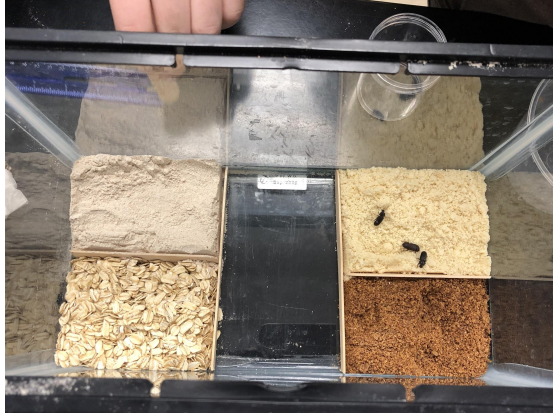
- Wheat flour
- Almond flour
- Oats
- Dog food (ground)

Participants:

- Control variables - for scent
- 20 individual beetles



Observations and Alterations



Procedure

- 1 minute acclimation period under glass beaker
- 3 minute trial
- Removed to recovery tupperware

Cotton-tipped applicator to remove them and flip when unable to turn themselves over.

Between trials:

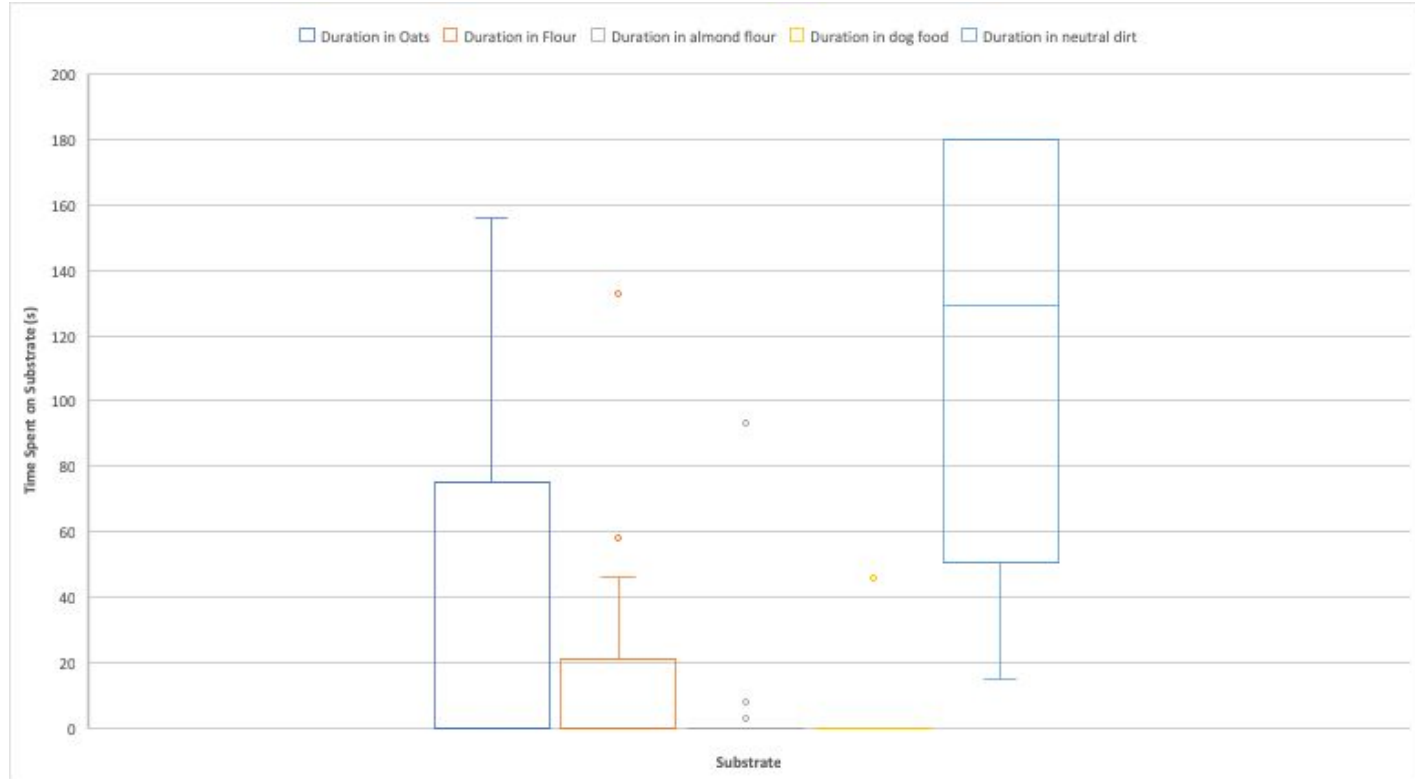
Beaker cleaned with ethanol, Stirred substrate, Rotated tank 90 degrees

Results

Friedman Test

The Q statistic is 29.83 (4, N = 20).

The p-value is < .00001.

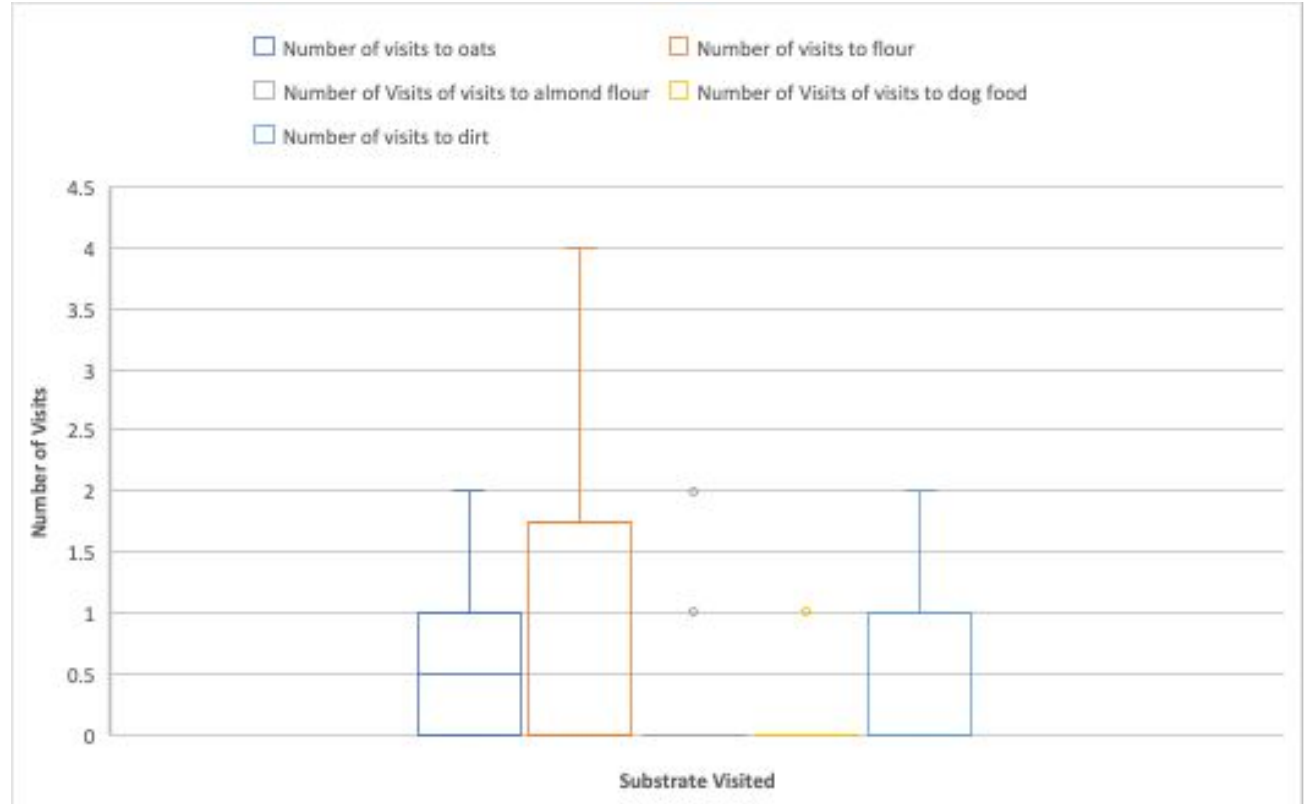


Results

Friedman Test

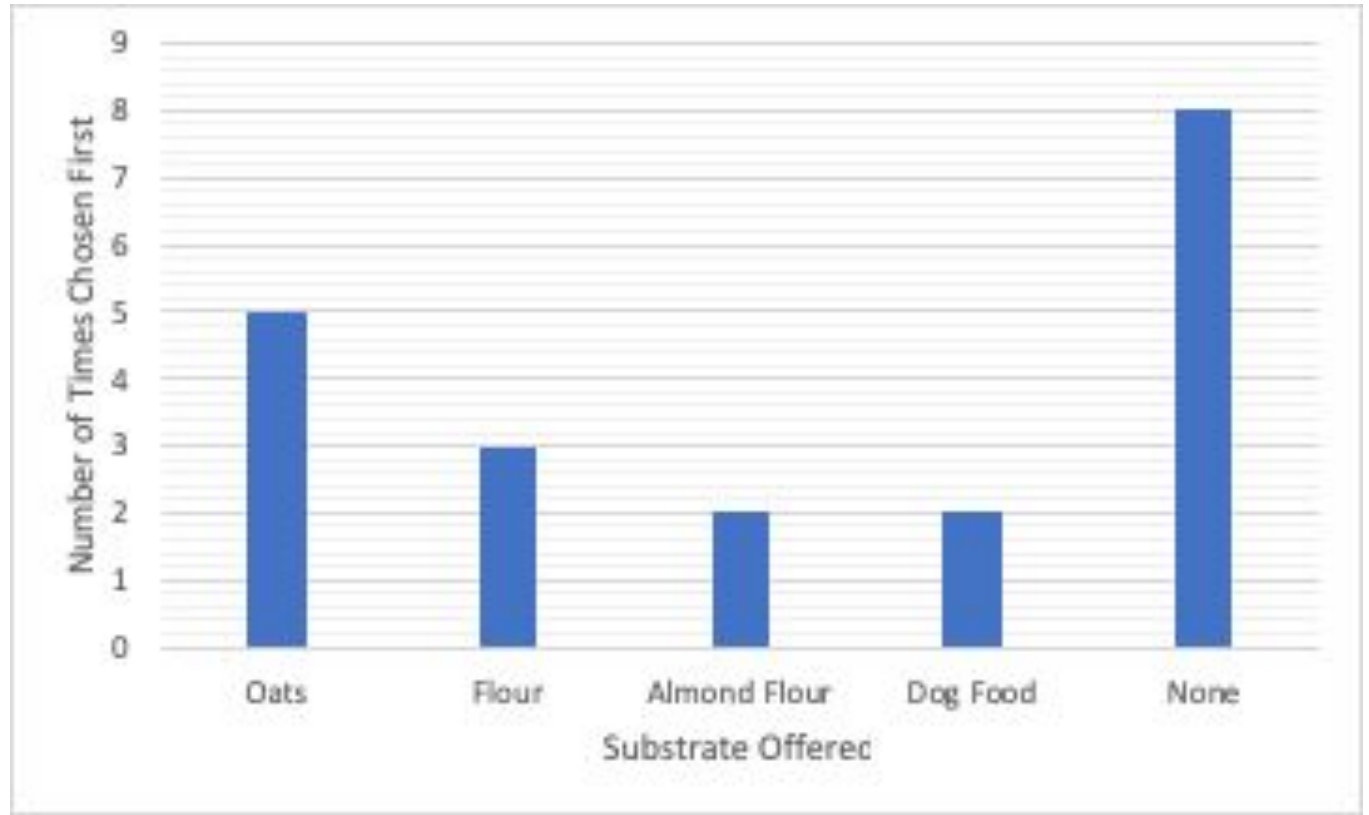
The Q statistic is 9.07 (4, $N = 20$).

The p -value is .05937.



Results

One sample binomial
p-value = 0.0437.



Discussion

The *Tenebrio molitor* beetles did not show a significant preference in visiting a substrate, but the trend favors wheat flour.

Beetles spent the most significant duration of time on the dirt. Oats had the second highest duration average.

The darkling beetles showed a significant preference to remain on the neutral substrate.

Limitations and Implications

When dirt is removed from the data, the significance of the results is lost. Unfortunately we were unable to have them remain upright enough to explore with a glass or paper neutral zone.

It can be seen that after dirt, oats and wheat flour were the most preferred food substrates. This can be used in the care of beetles in lab settings.

In future studies, we may limit the number of options, control for the time spent flipped over, and house in a different neutral substrate, such as gravel.

Works Cited

Darkling Beetle Life Cycle Kit. <https://www.homesciencetools.com/product/darkling-beetle-life-cycle-kit/>. Accessed 17 Mar. 2019.

Grau, Thorben, et al. “Sustainable Farming of the Mealworm *Tenebrio Molitor* for the Production of Food and Feed.” *ZEITSCHRIFT FUR NATURFORSCHUNG SECTION C-A JOURNAL OF BIOSCIENCES*, vol. 72, no. 9–10, Sept. 2017, pp. 337–49. *EBSCOHost*, doi:10.1515/znc-2017-0033.

Osimani, Andrea, et al. “The Bacterial Biota of Laboratory-Reared Edible Mealworms (*Tenebrio Molitor* L.): From Feed to Frass.” *International Journal of Food Microbiology*, vol. 272, May 2018, pp. 49–60. *EBSCOhost*, doi:10.1016/j.ijfoodmicro.2018.03.001.
