

ANT PREFERENCE

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Abstract

Optimal foraging theory states that under normal conditions, animals should select food sources that maximize their rate of calorie acquisition. The assumption is that “the behavioral mechanisms underlying diet selection are the evolutionary product of natural selection, and that individuals that maximize caloric intake would have more energy for the production of offspring and other fitness-promoting activities” (Alcock, 93). Your class will work together to see if ants will show a preference for a high calorie food source over a reduced calorie food source.

Purpose

To discover if ants will prefer a high calorie food source over a reduced calorie food source.
To practice using the Sign Test.

Materials

2 small petri dishes per student
3 pieces of Hill’s Science Diet - Feline Growth cat food (555 calories per 8 oz cup)
3 pieces of Hill’s Science Diet - Feline Maintenance - Light cat food (243 calories per 8oz cup)
old shoes
clipboard
lab instructions

Procedures

1. Place 3 pieces of the high calorie cat food in 1 labeled petri dish and 3 pieces of the low calorie cat food in another labeled petri dish.
2. Place the 2 petri dishes (with lids off) directly next to each other somewhere outdoors.
Place your petri dishes as far as possible from any other student’s dishes.
3. Let dishes sit for approximately 30 minutes and wait for ants to enter the trap.
4. Simultaneously place the lids on both petri dishes and count the number of ants in each trap.
5. Record your data and then release the ants.
6. Compile your data in the class data table.
7. Subtract the number of ants in the low calorie column from the number in the high calorie column. If there were more ants in the trap with the high calorie food than in the trap with the low calorie food, put a (+) sign in the third column. If there were fewer in the high calorie column put a (-) sign in the third column. If the number of ants in each trap were equal, put a (0) in the third column.
8. Complete a Sign Test using page 78-80 of *A Handbook of Biological Investigation Fifth*

Edition, Ambrose and Ambrose 1995. Create a line graph for your data with a separate line for the number of ants found in the low calorie traps and another for the number of ants found in the high calorie traps. Put the trial numbers on the x-axis and the number of ants on the y-axis.

Individual Data

Number of ants in the high calorie trap	Number of ants in the low calorie trap

Analysis

1. Do ants show a preference for one food type over the other? If so, which one did they prefer? Explain your answer.
2. Was your class data statistically significant and what does this mean concerning a conclusion?
3. Name another variable that you could test regarding ant foraging and briefly describe your experiment.

Connections/*Textbook or Internet Research

Give an example of an ant species that has a mutualistic relationship with a plant species (make sure to include the name of both the ant and the plant species) and explain the nature of this relationship.

Conclusion

Did the class data support optimal foraging theory for ants? Explain your answer using your statistical analysis (use the specific numbers you used for the sign test to refute or support your answer).

Class Data

Student #	# of ants in the high calorie trap	# of ants in the low calorie trap	Sign of high calorie - low calorie
1			
2			
3			
4			
5			
6			
7			
8			
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14			
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27			

Teacher's Notes

1. This lab can be done during class time or students can bring 2 petri dishes home and collect data there.
2. This lab works best in sunny dry weather. You may want to postpone the lab if it has been raining or cold.
3. If you are going outside for another lab, this lab can easily be done in conjunction with that lab. It is a good idea to have something else for students to do while they are waiting for ants to come to the traps.
4. Differing concentrations of honey can also be used but it is much messier. If you do use honey, you should make both concentrations 50% or below. Ants will get stuck in pure honey and will be unable to recruit other ants.
5. If you have students do this at home you may want to tell them that if they get a large number of ants and are having difficulty counting them they should put the petri dishes in the freezer for a few minutes. This immobilizes the ants and allows you to take off the lid and move them around in order to count them. You should tell them to put the lid back on when they are done and wait for the ants to revive. If they leave the ants in the freezer for more than a few minutes the ants may die.
6. The phone number for Hill's is 1-800-445-5777. The web address is www.hillspet.com.

References

Ambrose, H.W., and K.P. Ambrose. 1995. *A Handbook of Biological Investigation*, Fifth Edition. Hunter Textbooks Inc.

Alcock, J. 1993. *Animal Behavior*, Fifth Edition. Sinauer Associates, Inc.

Kent, B. 1999. *Environmental Biology Institute Course Pack*.