# Lab 4 Response: Natural Selection of Rabbits Simulation

## Part 1: Factors Limiting Rabbit Populations

**Table 4.1. Number of rabbits at the start of each generation in the presence of different limiting factors. All rabbits have white fur for the first three simulations.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Generation number | No Limiting Factors | Limiting Factor: Food | Limiting Factor: Wolves | Limiting Factor: Wolves (with different rabbit fur color traits) |
| 1 |  |  |  |  |
| 2 |  |  |  |  |
| 3 |  |  |  |  |
| 4 |  |  |  |  |
| 5 |  |  |  |  |
| 6 |  |  |  |  |
| 7 |  |  |  |  |
| 8 |  |  |  |  |
| 9 |  |  |  |  |
| 10 |  |  |  |  |

Graph the data from your table. Use the templates below, one for each simulation of limiting factors. The graph should be a line graph in which you show your data points, connected by a line that passes through each point. The horizontal axis (x-axis) displays the generation. (Some simulations may end, i.e., rabbits die out, before reaching 10 generations.) The vertical (y-axis) will display the number of rabbits. Choose a range of values that encompass your data and be sure the intervals are consistent. Label both of the axes, i.e., provide a title for each axis.

Alternatively, you may insert a computer-generated graph, following the same criteria as the manually generated graphs. (Optional: plot each of the 4 lines on 1 graph; use different symbols or colors to distinguish each plot and provide a legend.)

0

1

2

3

4

5

6

7

8

9

10

0

1

2

3

4

5

6

7

8

9

10

0

1

2

3

4

5

6

7

8

9

10

0

1

2

3

4

5

6

7

8

9

10

## Part 1 Questions

1. Compare the white-fur-only rabbit population with no limiting factor and with limited food. What were the ending population sizes? Explain the shape of each curve and relate to what you learned about population growth patterns from your textbook.
2. Compare the white-fur rabbit populations with no limiting factor and with wolves. What were the ending population sizes? Explain the shape of each curve and relate to what you learned about population growth patterns in your textbook.
3. Compare the two rabbit populations exposed to wolves: the one with both white and brown fur to the one with only white fur. Did either one of them overpopulate? Die out? Why?
4. Summarize the simulated selective pressures of food availability (limited food) and wolves on the rabbit populations. Describe any differences between the white-fur-only population exposed to wolves and the population with mixed fur colors when they were both exposed to wolves.

## Part 2: Mutations That Matter

Table 4.2. Number of rabbits at the end of 10 generations (as possible) in the presence of different limiting factors. All rabbits have white fur. Floppy ears and long teeth represent recessive mutations.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Total Rabbits** | **Straight Ears** | **Floppy Ears** | **Short Teeth** | **Long Teeth** |
| **Wolves in Summer** |  |  |  |  |  |
| **Wolves in Winter** |  |  |  |  |  |
| **Tough Food in Summer** |  |  |  |  |  |
| **Tough Food in Winter** |  |  |  |  |  |
| **Limited Food in Summer** |  |  |  |  |  |
| **Limited Food in Winter** |  |  |  |  |  |

## Part 2 Questions

1. How did seasons affect the survivorship of rabbits in the presence of wolves? Why?
2. Did floppy ears appear to affect the survival and overall population growth of rabbits? Explain.
3. Were long teeth advantageous to rabbits? If so, under what conditions?
4. Which environmental factors were the selective agents (directly affected the survivorship of rabbits)? Which factors played an indirect role?
5. Connect your findings to the roles of mutation, variation, and adaptation in a population. Explain how natural selection was demonstrated.

## Part 2: Your Own Experiment

***Hypothesis***:

***Results***:

***Conclusion***:

## Part 3: Rabbit Invasion

1. In what year was the source of invasive rabbits brought to Australia?
2. How many rabbits in total served as the source of the invasion? Of those, how many were wild rabbits?
3. Describe how environmental and genetic factors played a role in the successful invasion of rabbits in Australia. Which factor appeared to have a greater impact?
4. Compare your simulations with the real-life invasion of rabbits in Australia. Describe similarities and differences.
5. The source you just used was a popular article that summarized and referenced a peer-reviewed scientific (scholarly) article. Provide the citation for this scientific article and compare it to the popular article. Explain, in general, what it means by peer-reviewed, then include some specific differences in the way these two articles present the findings of the scientific investigation.
6. With guidance from your instructor or a Library Research Guide, find another popular or scholarly article about a different local invasive species. Summarize information on the species and habitat(s) it has invaded, its impact on the ecosystem, and what, if any, mitigations are being used or attempted. Be sure to cite and describe how you found your source(s).