

Mutations in Bunnies

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Abstract:

Animals such as bunnies utilize their physical features to adapt and survive to their ever-changing environments. In this document we will discuss how bunnies over time will go through changes in their ears, teeth, and fur that suits them better to the changes in their environment in order to survive, this process is called natural selection. We first began to theorize and hypothesize why would a bunny may need to change their fur, teeth, and ears to adapt to their environment to think about how this process occurs. Afterwards We used a simulator that emulates a real life experiment involving independent and independent variables, where we see how keeping changing environmental factors such as adding wolves , tough food, and limited food supply change bunnies survival. Which would then force them to develop certain mutation that would become more and more dominant or recessive depending if it helped them survived to the environmental factors. The simulations require us to pick a mutation (ears, teeth, and fur) and depending on the environmental factors we choose, we may see one of these mutation change and then become dominant. What we found is that our hypothesis does seem to align with the simulation results, we further explain the results and hypothesis to understand why our experiment confirms our explanations we gave for why bunnies may adapt with teeth, fur, and ears.

Introduction:

All animals must rely on their senses to survive, especially bunnies since they're omnivores and are prey to many predators like wolves, therefore bunnies must find a way to use their sense to hide from these predators. One way of doing so is camouflaging with their environment, our initial explanation for this, is that a bunny fur may change colors (white or brown) in different environments (desert vs snow place) to blend in better with their surroundings, making it difficult for predators to detect them. Similarly their ears are upright when there is a predator in their environment, given that they have to stay alert at all times from potential predators foot steps or movements. As for their teeth, the size may grow depending on how scarce the food (leaves) they get from the plants, the less leaves a plant produce means there is less food, so it may be likely they develop bigger teeth to chew parts of the plant that way they still get more food out of the plant. All of these processes are explained through natural selection, changes in the environment will force bunnies to obtain mutations in their fur, teeth, and ears to adapt to the environment to have better chance of survival. We just hypothesize how three traits (ears, teeth, fur) changes due to natural selection for bunnies to adapt and survive in their environments, our simulator was design to test these hypotheses specifically.

Results:

As mentioned, the experiment is done to show how natural selection works, specifically with bunnies. Through mating, the environment and overall idea of adaptation. We proceeded to alter some factors of the experiment to have independent variables. Those variables are what is being tested on. Unlike the constant group that stays the same throughout the experiment. With that said the variables that stay the same are the weather, and the environmental factors which are limited food. The independent variables are the mutations (dominant/ recessive fur, dominant/recessive ears and dominant/recessive teeth). To test out how and why we believe bunnies throughout generations and natural selection that in the winter, survive better with white fur, short teeth and straight ears.

Here are the results in comparison, when making 8 different combinations of mutations physically from the start. Collectively, yes white fur are the main features just like the short teeth and straight ears. They all have relatively healthy relationships with the population, so none are in a position of endangerment. The cause of low drops in population is due to max population competition. Meaning at a certain time throughout generations the population has met their highest "capacity". Highlighting the fact that there's a higher percentage at those times of competition in food, space, and water. Causing a large drop in population. Following up with the same cycle, meeting high population then drop again. Going back to our hypothesis which is that we believed the best genes a Bunny can have in winter, with the environment issue of limited food are white fur, short teeth, and straight ears. It shown variously this is

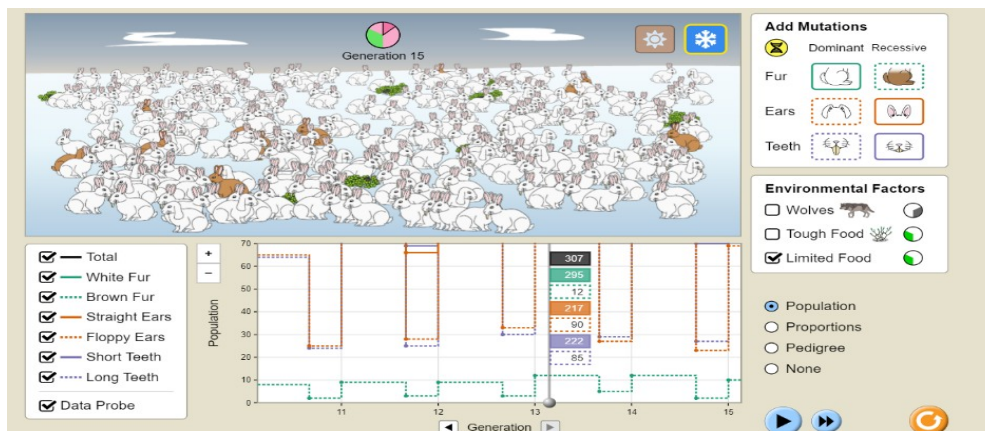
correct due to the high percentages in total pop in far long generations that white fur, short teeth and straight ears are the dominated features. On the other hand, we observed there was a balance of diversity shown in groups 5 and 6 which allows generations to be diverse without a problem in survival. We also observed that short teeth are caused when bunnies eat plenty of food or that long teeth mean they're unable to eat properly, enabling them to keep it short. Straight ears allows them to be more alerted in wild. Floppy ears are more common to house pets. Brown fur can be easily spotted in snow, white fur is easy to camouflage in the snow.

Group 1

Dominant: fur

Recessive: ears

Recessive: teeth

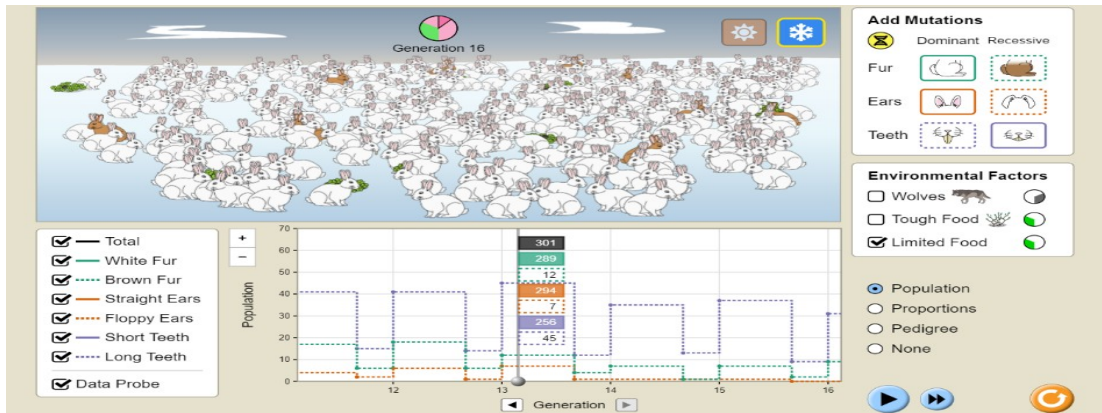


Group 2

Dominant: fur

Dominant: Ears

Recessive: teeth

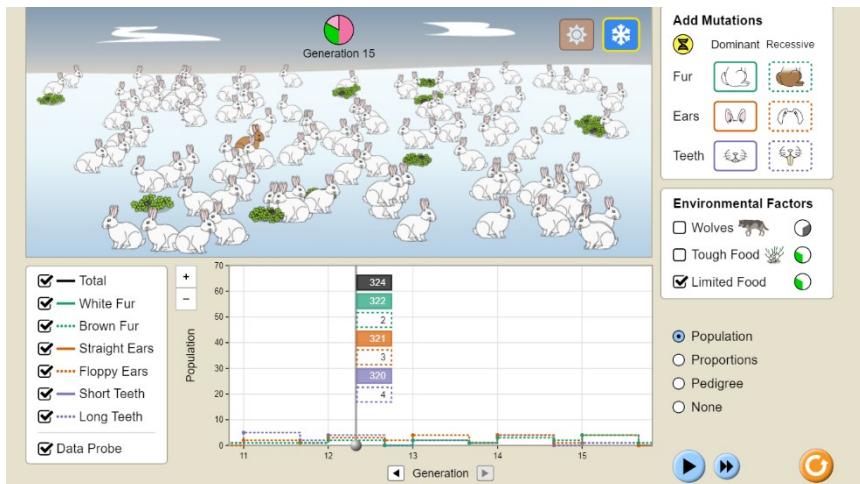


Group 3

Dominant: fur

Dominant: ears

Dominant: teeth

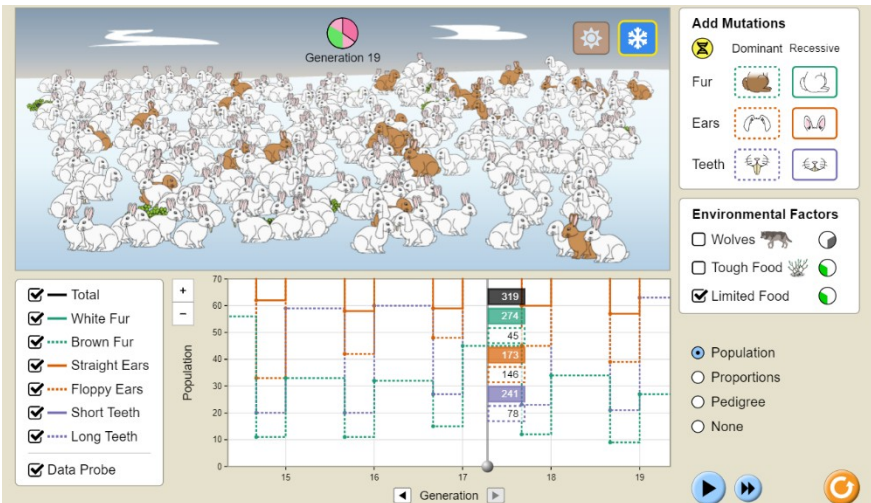


Group 4

Recessive: fur

Recessive: ears

Recessive: teeth

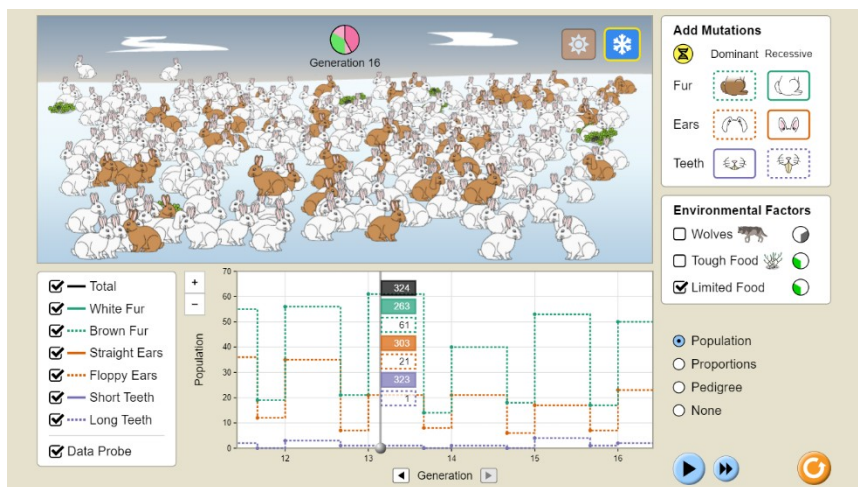


Group 5

Recessive: fur

Recessive: ears

Dominant: teeth

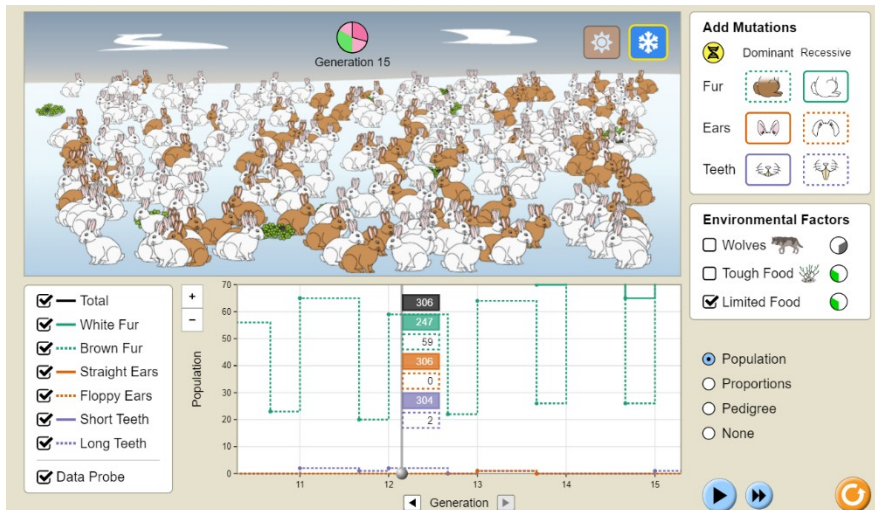


Group 6

Recessive: fur

Dominant: ears

Dominant: teeth

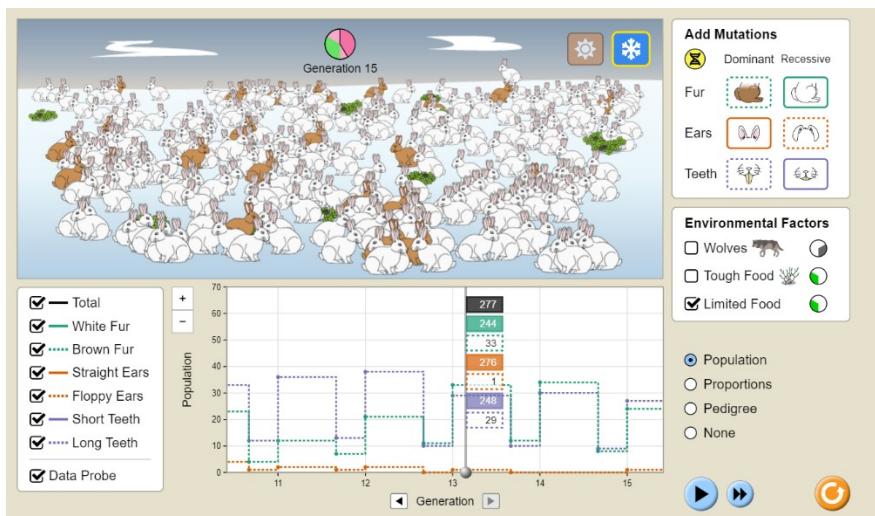


Group 7

Recessive: fur

Dominant: ears

Recessive: teeth

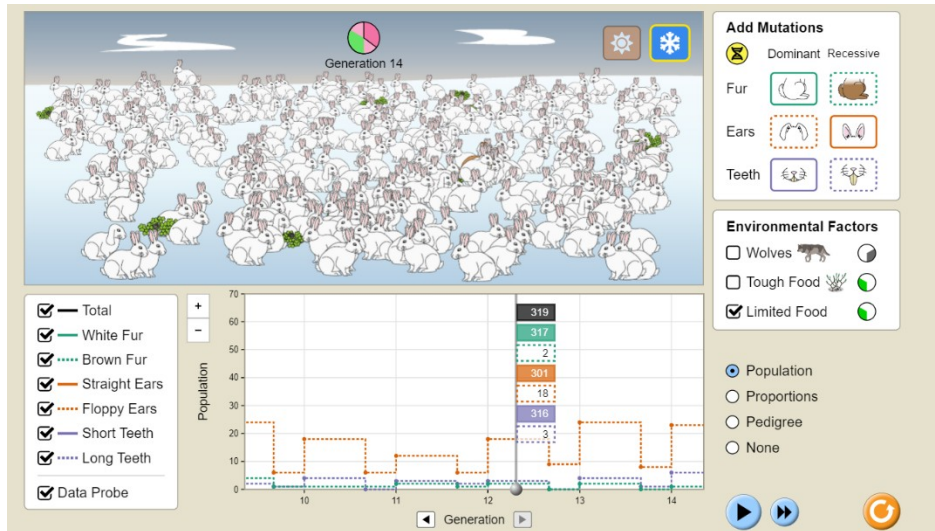


Group 8

Dominant: fur

Recessive: ears

Dominant: teeth



Discussion:

The purpose of this lab was to experiment with the factors that affect a population of bunnies positively or negatively on our own. Our group did not know how mutations could affect the bunnies' population at the beginning of the lab, but we all agreed that in a cold and snowy environment, bunnies with white fur could best survive predators, and other factors such as mutations that could help or not the stability of the bunnies' populations. We chose 8 different combinations of mutations with the same environmental factor (limited food). Throughout these scenarios, we observed that in the absence of predators, bunnies with white and brown fur maintain relative equality in their populations. But, if we include wolves in this scenario, the bunnies with white fur will have the biggest population, even if the white fur mutation is recessive, meaning it is less likely to be found in future generations. Our hypothesis was correct, bunnies with white fur do better in cold weather, while bunnies with brown fur do better in sunny weather. In a similar fashion, bunnies who encountered predators (wolves) would go on to develop a mutation with ears, they would have upright ears, and as each generation encountered wolves, this mutation became dominant. As for teeth becoming dominant, we noticed this occurred when limited and/or tough food had been used for several generations. These observations under controlled conditions doesn't contradict with what we hypothesize with each mutation, in fact in aligns exactly in the way we said it.

Conclusion:

After all the trials we made through the experiments, we found three main observations. These observations are how the mutations of the teeth, ears, fur color, changes from a recessive mutation to a dominant mutation based off the environmental conditions we chose. When you perform the experiment with no environmental conditions added (wolves, food supply, tough food), this led to the bunnies populating quickly and staying with the same ears, teeth, and fur they started with, thus no change in the environment causes no change in the bunnies. Now if you add only wolves, and start with brown bunnies in a winter location you'll see that the bunnies develop a mutation for their fur color, which becomes white, this mutation becomes dominant over time, a similar thing happens with snow bunnies in a desert location, this result implies bunnies change their fur color to blend in their environment which supports our hypothesis on fur. Now if you start of with wolves as environmental condition, and remove them later on you'd find that the bunnies develop a mutation from their ears, it goes upright to floppy style, our initial hypothesis was that this occurs because they do not need to be as alert when wolves are around thus its no longer upright. Now if you add tough food and limited food supply, and you will mutations in the bunnies population that causes them to develop big teeth over time becomes more dominant, this doesn't support our hypothesis completely on big teeth as we though its mainly caused by tough food, but this result doesn't contradict the hypothesis. The results\observations algin with our initial explanation as to why bunnies may develop mutations in fur color, ears, and teeth size. Overall these traits show how animals such as bunnies develop mutations to change and adapt to changes in their environments to continue to survive.

References

"A rabbit's coat is a great camouflage in its natural environment. In many areas, shades of brown, white, and black imitates the grasses they inhabit. From the side, you might walk by a rabbit in its natural habitat and never notice it is there."

[Do All Rabbits Have White Tails? This May Surprise You - Petsia!](#)

"Overgrown teeth can grow into the roof of your bunny's mouth or grow into their gums. Rabbit teeth are sharp and can cause sores and injuries in the inside of their mouths. This can

cause an avalanche of health problems such as lack of appetite, physical inability to eat, and even their teeth getting stuck not only on things they chew on but even stuck on their cages or hutches. ”

[The Definitive Rabbit Teeth Guide. \(rabbitpros.com\)](http://rabbitpros.com)

[Genetics Practice Problems \(uca.edu\)](http://uca.edu)

“Wild rabbits never have floppy ears, and will usually have light brown fur. Wild rabbits have long, narrow faces; pet rabbits have plumper cheeks and wide, round eyes. Non-domesticated rabbits will be afraid of humans as they are prey animals and will never approach us.”

[How To Tell if a Rabbit Is Wild or Domestic — Rabbit Care Tips](#)