

Survivor: the chicken edition

How can environmental conditions impact growth rate, behavior, and reproduction?

Standards

- **B.DI.3:** Loss of diversity
- **B.E.1:** Mechanisms

Introduction

Welcome to “Survivor: The Chicken Edition,” an exciting and educational journey into the world of biology where you will learn about evolution, natural selection, and biological fitness. This game is designed to help you understand how different traits can influence the survival and reproduction of chickens in various environments. The objective of “Survivor” is to manage a population of chickens in different environments, ensuring their survival through resource management, adaptation to environmental challenges, and successful breeding. You will use strategy and your knowledge of biology to help your chickens thrive. Imagine you are a biologist studying chicken populations in four distinct environments: Forest, Farm, Desert, and Wetland. Each environment presents unique challenges and opportunities for your chickens. As you play, you will draw event cards that simulate real-world scenarios, collect survival points to sustain your chickens, and use trait cards to represent individual chickens with specific traits.

Student prior knowledge

Familiarity with the concepts of inherited traits, natural selection, and environmental services are helpful during this lesson. Students should have an understanding that individual survival is based on meeting the basic requirements for life: food, water, shelter, and oxygen. Organisms must have access to these basic needs in order to reproduce, thereby passing inherited traits on to the next generation.

Suggested timeline

1–2 class periods (50–100 minutes)

Materials

Each student group will require:

- Trait cards
- Event cards
- Student worksheet
- Game pieces
- Game board
- Tokens for survival points optional (bingo dots, counters, dice, ect)

Teacher preparation

- Print off papers for students
- Create a chart paper or white board space for discussion

Procedure

1. As a class, discuss and provide examples of the possible ways species lose diversity. Create a Google Jamboard, etc. to help facilitate discussion. See examples below.
 - Climate change: heat waves, droughts, wildfires
 - Anthropocene effects: urbanization, building dams, creating manmade lakes
 - Invasive species: bird flu, animals, plants
 - Extinction: complete loss of species
2. Divide class into groups of 3–5 students.
3. Play the Survivor: The Chicken Edition game; refer to the student sheet. Each student will select a game piece and draw a trait and an environment card. Students will place their chickens on the game board in the appropriate environment to start the game.
4. Every student begins with 10 survival points.
5. At the beginning of each round, each student will choose one of three options:
 - Move chicken (–2) survival points
 - Breed chicken (–3) survival points
 - Homestead (+1) survival points
6. As a group, one event card is drawn. The event impacts all chickens in the specified environment according to the card's effects. Students must adjust their strategies based on the new conditions introduced by the event. Round one is complete.
7. Continue steps 7–10 for a total of 8 rounds. The player with the most survival points wins. If you run out of survival points then you are extinct and not able to play anymore.
8. At the end of 8 rounds, students will complete the reflection questions on the student worksheet.

Suggested wrap-up activity

As a class, calculate and graph the following data for a class discussion:

- How many chickens lived in which area
- Which chickens survived and which chickens died
- Which loss of diversity method is least/most common

Differentiation

- Change the number of rounds played. Have students work in pairs and manage two chickens they can cross breed to create new chickens. Use a Punnett square to determine which traits the new chicken receives.
- Select specific trait cards or event cards to make the game easier or more challenging.

More challenges

- Change the game to include more rounds. Have students create trait cards and event cards. Add a mutation card or an extinction card to make a specific trait change or to be eliminated from the population.
- At the conclusion of the game, assign student groups to research more specific effects of the loss of diversity items (climate change, anthropocene effects, extinction, and invasive species).
- How are modern poultry farms changing the natural environment to maximize production? What inherited traits are we supporting by utilizing animal science, engineering, and biosecurity features to increase bird health? Create a compare and contrast list of natural environments and commercial poultry environments.
- **Home connection:** How are commercial poultry farms creating habitats to maximize production for human consumption? How do they keep the birds healthy and productive? Discuss how habitats impact bird health and why commercial farms are more productive than the natural environment.

Support information

- **Extinction:** the complete disappearance of a species from Earth.
- **Anthropocene effects:** the time during which humans have had a substantial impact on our planet.
- **Invasive species:** non-native organisms introduced into a new environment that cause harm to the ecosystem or economy.
- **Natural selection:** process in which an organism adapts to its environment through selectively reproducing changes in its genotype.
- **Selective breeding:** also known as artificial selection. A process where humans choose organisms with desired traits to breed together, increasing the frequency of those traits in the population over many generations.
- Set up rules and guidelines of how to play games before you start. Play a practice round or a class round before you send them to play individual rounds. This will allow the students to ask questions about survival points, information to collect, and how to play the game.

Things to note about the game

- If you do not have that trait it does not affect you.
- If you have the trait and points are gained, you gain the total amount. Example: All chickens in the desert lose 1 survival point unless they have long legs, in which case they gain 1 survival point. This player would gain 1 point and retain their initial point for a total of 2 points. (They maintain their initial point, but add an additional point to their score).
- Article on biodiversity: news.un.org/en/story/2024/01/1145772
- Crash course video: youtu.be/5eTCZ9L834s
- David Attenborough: youtu.be/G1WNuzrqe7U

Teaching suggestions

- Allow students time to discuss their reasons for selectively breeding chickens.
- Have students research additional reasons behind diversity loss that affect other animals as well as chickens.
- Increase the size of groups playing and collect data on each chicken.

Career connections

Have you ever wondered what type of poultry careers help to make a healthy, safe environment for commercial birds? Let's take a look!

- **Poultry caretakers** help with monitoring flocks for their health and well-being, ensuring they have constant access to fresh food and water as well as a safe living environment. Caretakers walk their barns every day to check their flock and the equipment that helps to keep them safe and fed.
- **Animal scientists** apply principles of the biological, physical, and social sciences to the problems associated with poultry production and management. In other words, they study animal health and behavior in order to help design the perfect environment for commercial birds to live in and produce meat and eggs.
- **Nutritionists** are animal scientists who create diets for different types of poultry by examining their genetics, health conditions, or other factors to best determine their nutritional needs.
- **Veterinarians** care for the health of the poultry flock and work to protect public health. They diagnose, treat, and research medical conditions and diseases of pets, livestock, and other animals.