



How Hungry are Foxes in Minecraft?



Have you ever rage-quit coming back from a mining trip to find a fox got into your farm and killed all your chickens? 🙄

This isn't just a Minecraft problem. Foxes 🦊 (Minecraft and IRL) are a **predator**, hunting chickens 🐔 which are their **prey** (or target). All animals have their own **predator-prey relationships** which affect how many animals are in the habitat. So understanding these relationships are crucial for **conservation scientists and ecologists** (the scientists who study nature) to keep ecosystems balanced.

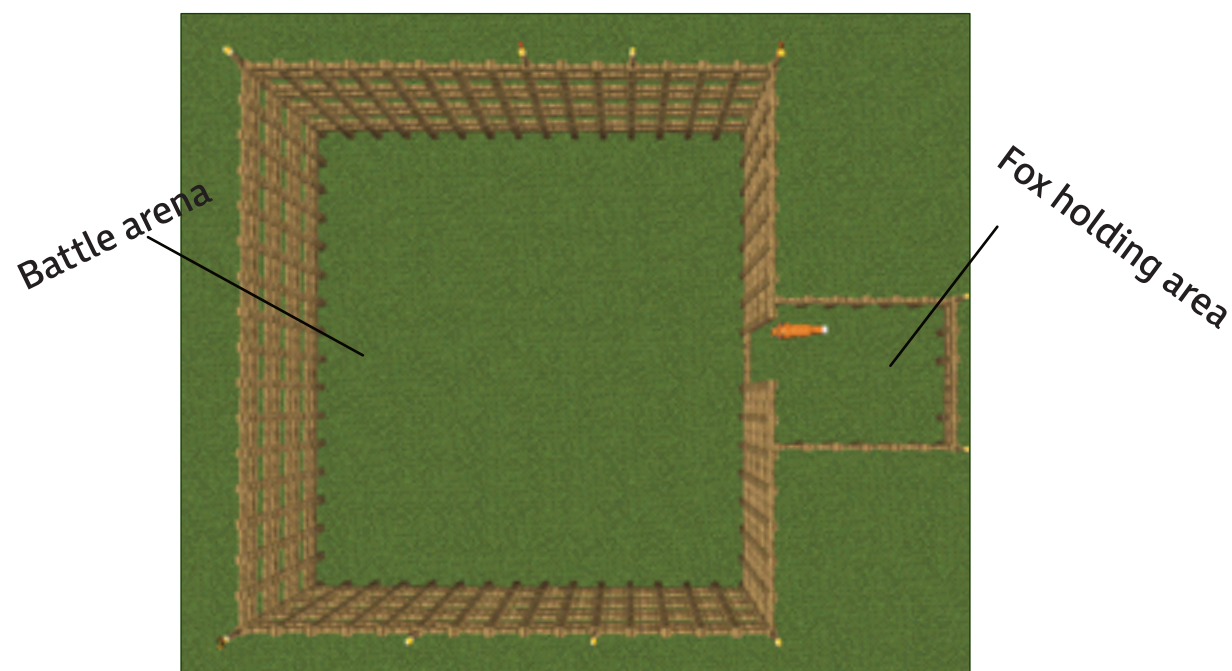
One of the tools to understand predator-prey relationships is called **functional response**. A functional response experiment assesses how quickly a predator can kill/consume its prey.

This worksheet will talk you through an **in-game functional response experiment** to help us understand the ecosystems inside Minecraft. World downloads and a full guide are available here: <https://www.sebiology.org/outreach/public-resources/minecraft-foxes.html>

This experiment has been tested on Minecraft: Java Edition version 1.21.10

This free educational resource is not an official Minecraft product/service and is not approved by or associated with Mojang or Microsoft.

Lab Prep: Building the Battle Arena



If you don't want to use the world download, you can set it up yourself:

1. Fire up a Superflat world in creative mode.
2. Fence off a 16 x 16 arena for the experiment, 4 blocks high to stop the fox cheating and jumping out
3. The 'Holding area': Build a small, 4x6 side room off the main arena. Use a fence gate to connect it. This is where the fox chills (or plots 😈) before and after each round.
4. Use 1 fox spawn egg in the holding area (or catch a wild one 😊)

Your Minecraft inventory:

- Chicken spawn eggs
- Leads
- Fox spawn eggs
- Sword (for emergencies)



Your IRL inventory:

- Timer ⌚ (kitchen timer, Minecraft redstone timer etc)
- Something to log the results

GO TIME! Run the Experiment

Each round:

1. **Chicken drop** 🐔: Spawn your batch of chickens on random blocks around the arena. We're using a doubling pattern for the number of chickens provided: 0, 2, 4, 8, 16, 32, 64 (more if you're feeling ambitious!).
2. **Release the beast**: Open the gate to let the fox in and **start the timer**.
3. **Battle time**: Let the fox hunt the chickens for 2 minutes. (You can change the amount of time, as long as it is the **same for each round**)
4. **Round End**: Once the timer buzzes, use the lead to quickly drag the fox back into the holding cell. **CLOSE THE GATE!** 🔒
5. **Data entry**: Count and record (table below or your own method) the surviving chickens 🐔
6. **Calculate**: Figure out the kills (Chickens provided – Chickens alive)
7. **Reset**: Pick up all the feathers and raw chicken drops. Prepare for the next round with a new batch of chickens.





The Scoreboard

Round	Number of chickens provided	Number of survivors	Number of chickens killed (chickens provided – chickens alive)	Kill ratio (chickens killed / chickens provided)
0	0			
1	2			
2	4			
3	8			
4	16			
5	32			
6	64			



Your Results Graph

There's graph paper on the next page. You could also use the graphing function in a spreadsheet app, or (if you're good at coding) in Python.

- **Horizontal (x) axis:** number of chickens provided
- **Vertical (y) axis:** number of chickens killed
- Plot your data points and join them up.



You did a science!

What you just did is run a **simulation**. Specifically, you generated a **functional response** curve!

Scientists IRL use simulations and other types of computer **models** to understand things like population changes, disease spread, and climate change effects.

Go online and look up:

- What functional responses can tell you about a predator?
- How do ecologists use functional responses to help with conservation?
- Why scientists sometimes use models rather than IRL experiments?

