

A close-up photograph of numerous ants, likely a species of carpenter ant, moving across a dark, textured surface. The ants are small, with reddish-brown bodies and black heads and thoraxes. They are scattered throughout the frame, some in sharp focus and others blurred, creating a sense of movement. The background is a dark, mottled grey, providing a high contrast for the ants and the white text.

# ANT FORAGING



# PROBLEM

Determining which is better,  
leaving longer lasting trails or  
having better smell



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# WHY PHARAOH ANTS?

- Pests
- Hard to remove
- pathogens



# PHARAOH ANTS

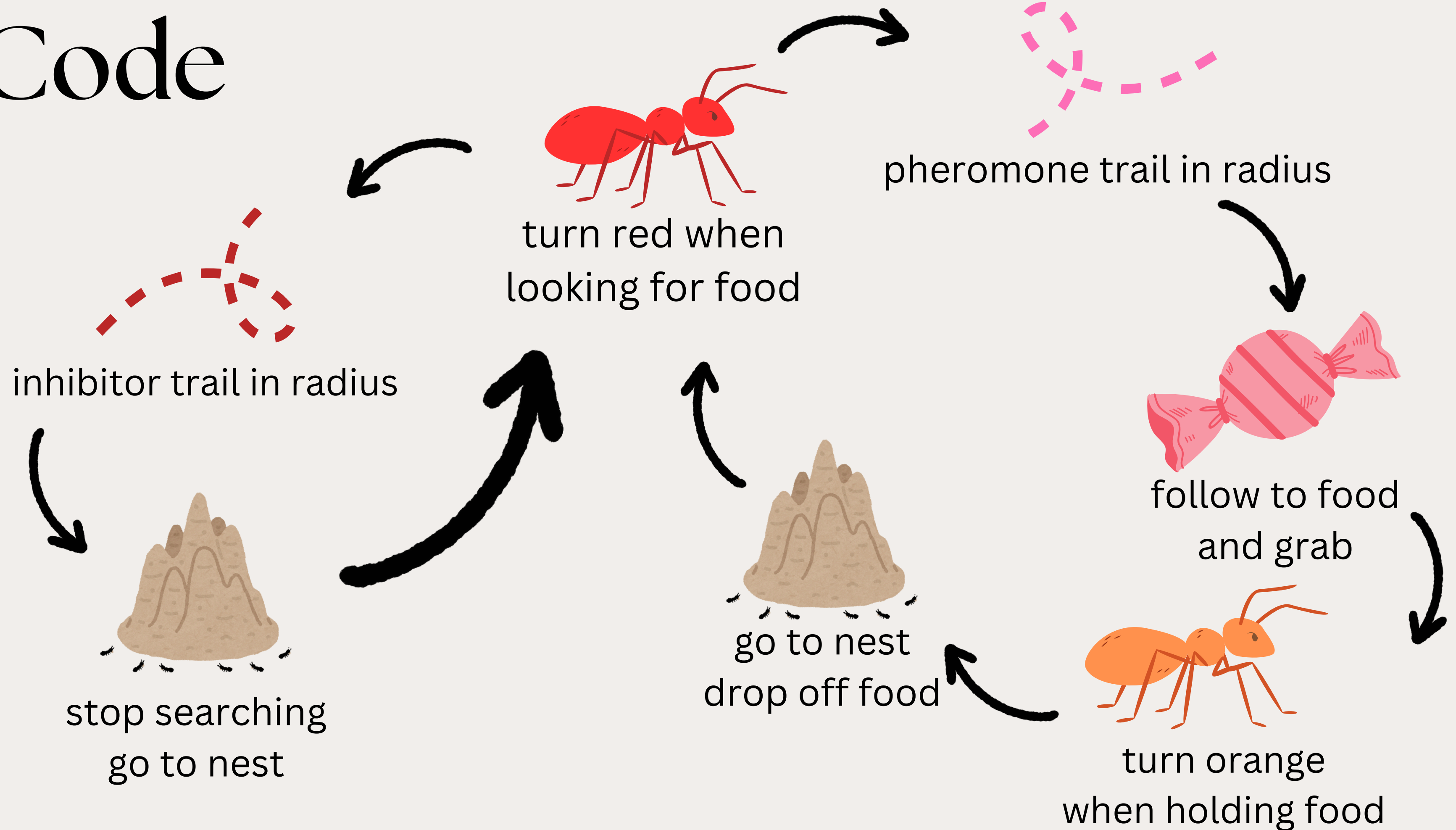
- Polygynous and polydomous
- Monomorphic
- 3 types of pheromones
  - Trail pheromone
  - Short recruitment
  - Inhibitory pheromone

# ASSUMPTIONS

- Same speed
- Same pheromone/inhibitor drop
- No short recruitment
- Same food pick-up
- Know nest location
- Random if no pheromone
- Return if they smell inhibitor
- Same job
- Trails diffuse at the same rate



# Code

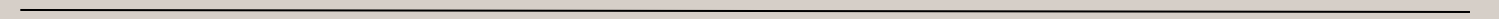




# When Orange

- Always leave pheromone trail back to nest
- If food source depleted
  - Leave inhibitor trail back to nest

# RESULTS





# VARIABLES – Controlled Ants

## Controlled

- Smell radius of ant 2
- Pheromone dropped 3
- Population 90

## Independent

- None

## Dependent

- Time (ticks)



# VARIABLES - Smelling Ants

## Controlled

- Population 90
- Pheromone dropped 3

## Independent

- Smell radius of ant

## Dependent

- Time (ticks)

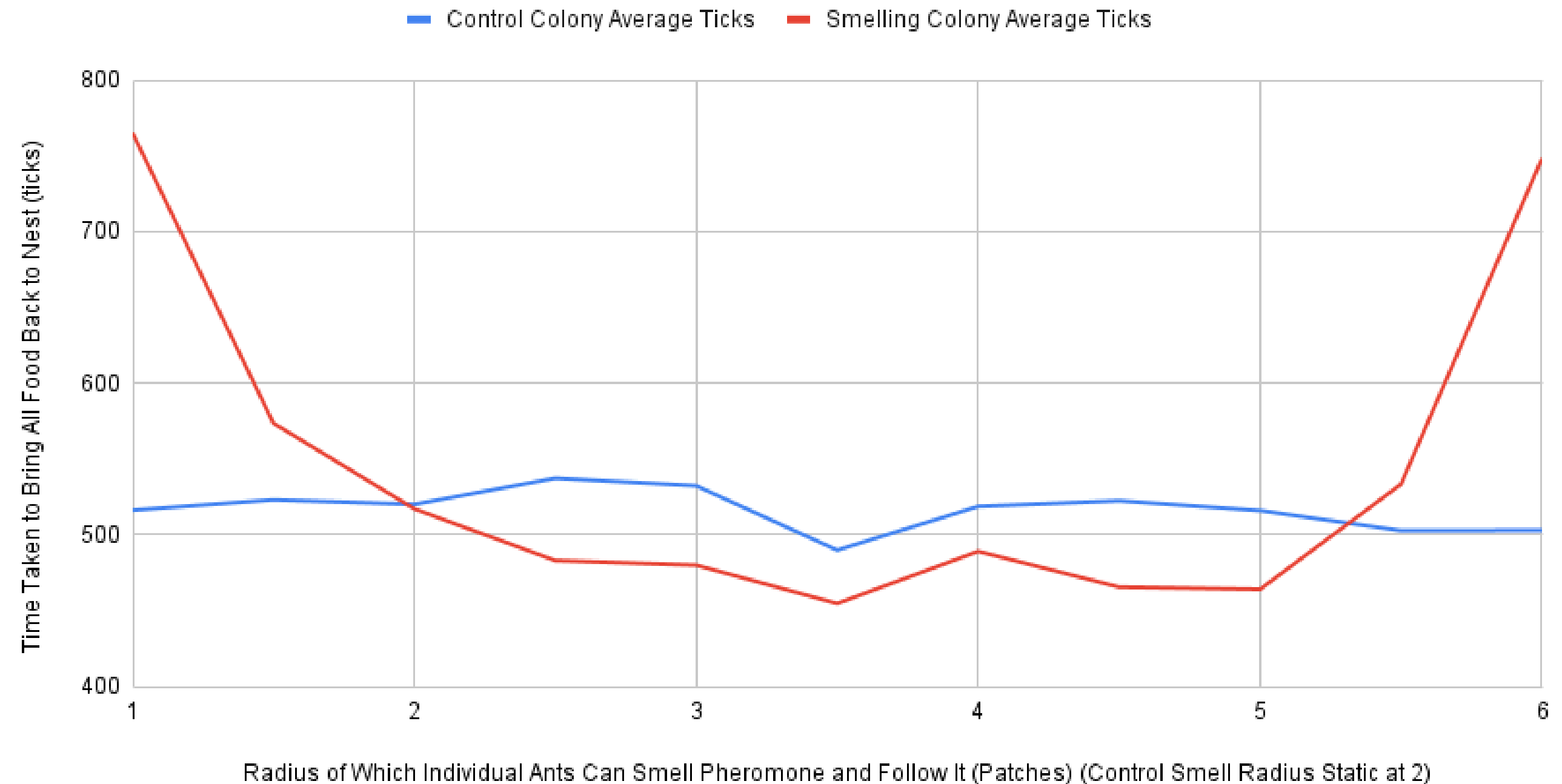


# BETTER SMELL

**Lower  
Line  
=  
Shorter  
Time  
=  
Better**

## Time Taken (ticks) vs. Smell Radius of Ant

Difference Between Control Colony with No Change and Colony with Increasing Smell Radius (Both with Pheromone Drop 3)





# VARIABLES - Long Lasting Trails

## Controlled

- Population 90
- Smell radius of ant 2

## Independent

- Pheromone dropped

## Dependent

- Time (ticks)

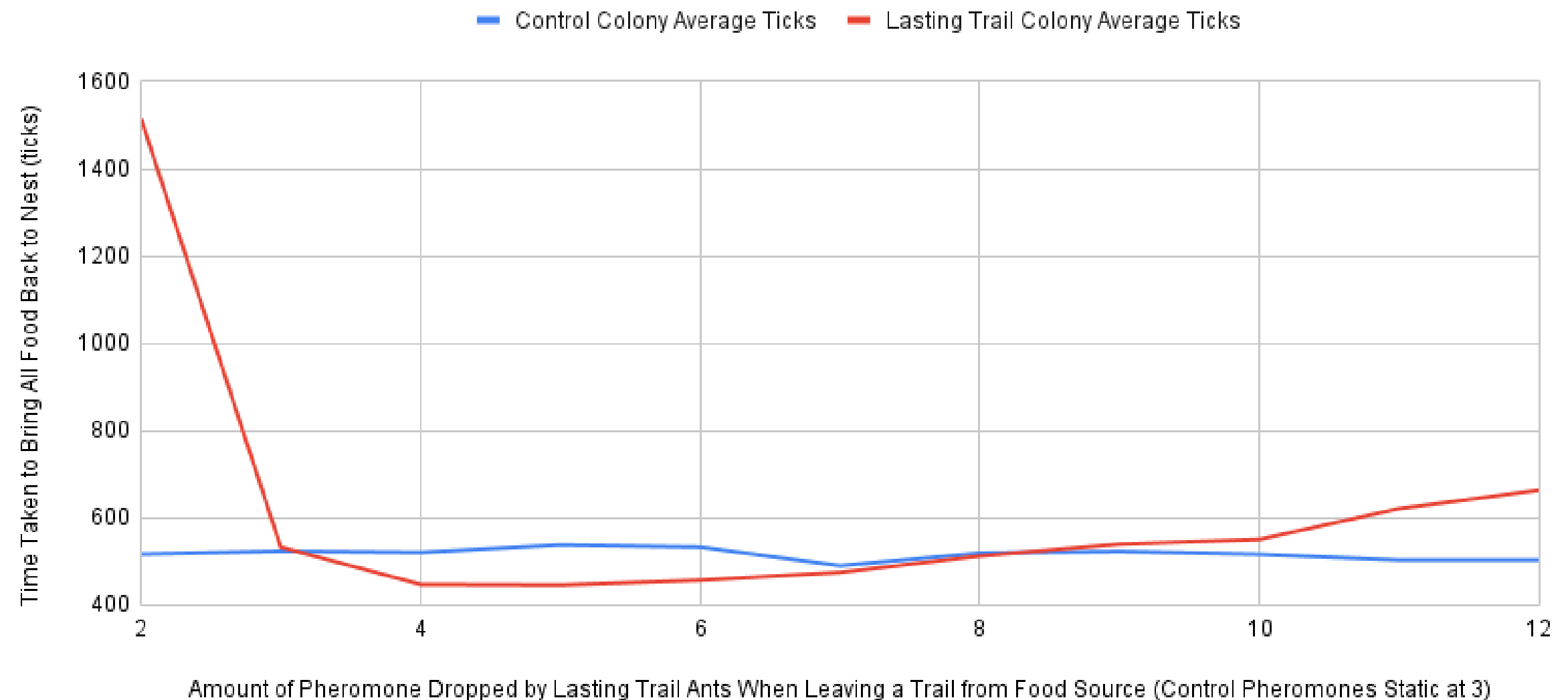


# LONGER LASTING TRAIL

**Lower  
Line  
=  
Shorter  
Time  
=  
Better**

Time Taken (ticks) vs. Amount of Pheromone Dropped

Difference Between Control Colony with No Change and Colony with Increasing Pheromones Dropped (Both with Smell Radius

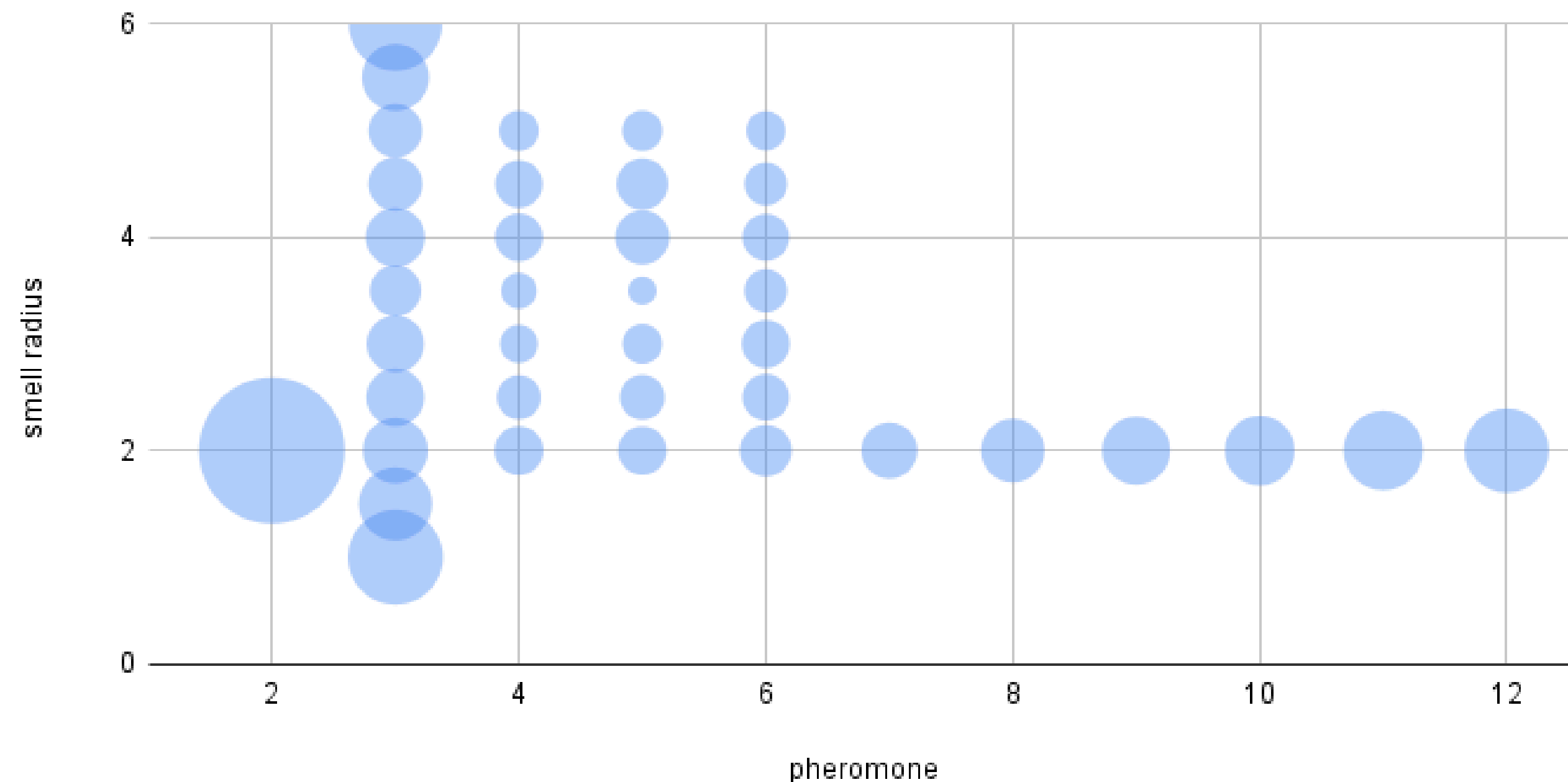


# OPTIMAL ANT

**Smaller dot  
=  
Shorter  
Time  
=  
Better**

## Finding the Optimal Ant Colony

Population of Ant Colony Kept at 90





# Limitations

- Losing our code
- Power of computers
- Limitations of the language
- Time spent learning the code
- Difficult to code simultaneously
- Time limit
- Having a no show



# Improvements

- More realistic ant behavior
- Fixing “ant bomb”
- Adding worker/scout jobs
- Streamline data collection





END

