# SAFE PRODUCE FOR ALL

## FARMERS ARE HEROES!

# SAFE PRODUCE FOR ALL

Produced by the

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**A note to educators**: Anthropomorphism is used to distinguish between pathogenic (bad) and non-pathogenic (good) microorganisms. The intent of the artwork is to visibly show cross-contamination and contamination sources, not to falsely give human characteristics to microorganisms.

Farmers put a lot of thought, effort, and investment into food safety. Curious about the FDA regulations larger farms are subject to? See Food Safety Modernization Act: https://www.fda.gov/food/guidance-regulation-food-and-dietary-supplements/food-safety-modernization-act-fsma

**Online information sources for consumer food safety**:

- Centers for Disease Control: https://www.cdc.gov/food-safety/index.html
- World Health Organization: https://www.who.int/news-room/fact-sheets/detail/food-safety
- U.S. Food & Drug Administration: https://fda.gov/food/resources-you-food/consumers

**Online food safety information sources for produce farmers**:

- Cornell CALS National Good Agricultural Practices Program: https://cals.cornell.edu/national-good-agricultural-practices-program
- Cornell CALS Produce Safety Alliance: https://cals.cornell.edu/produce-safety-alliance
- Food Safety Resource Clearinghouse: https://foodsafetyclearinghouse.org/home
- National Agricultural Library: https://nal.usda.gov

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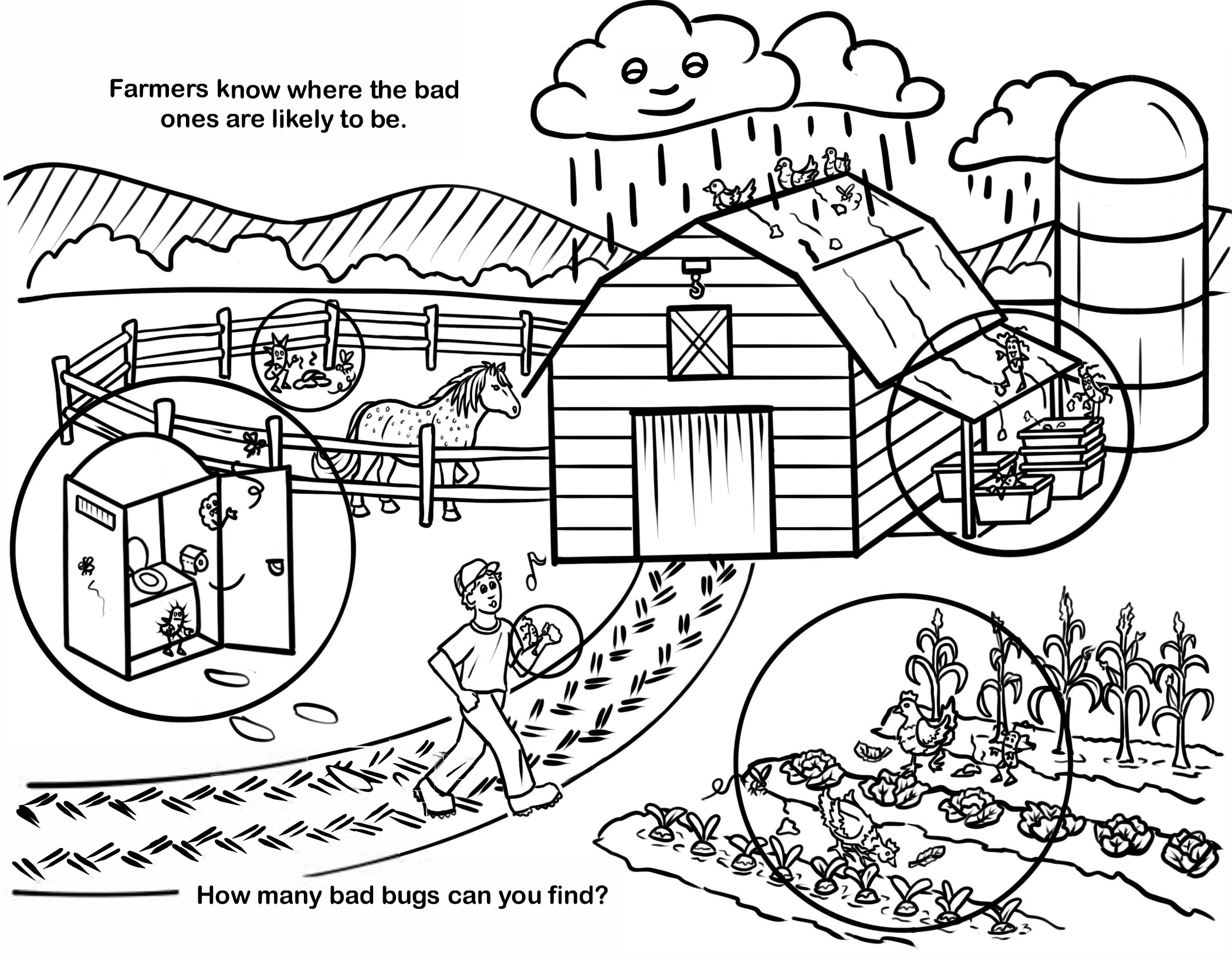
Microorganisms are like really small bugs that we can't see without a microscope. They can be everywhere!

Some are good, some are bad. Bad ones can make people sick.

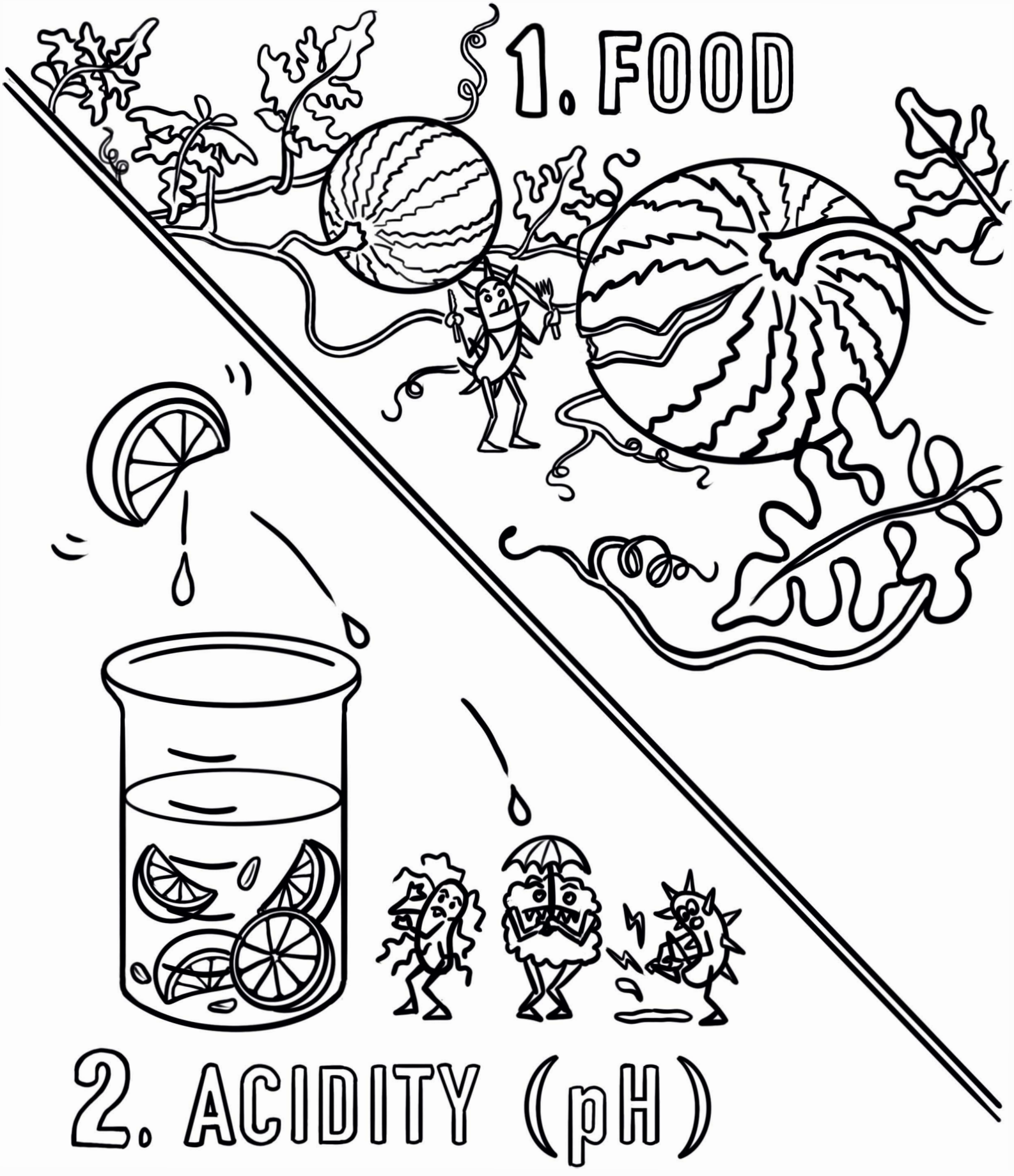

Good ones usually outnumber the bad ones, and keep the bad ones in check by competing for resources.

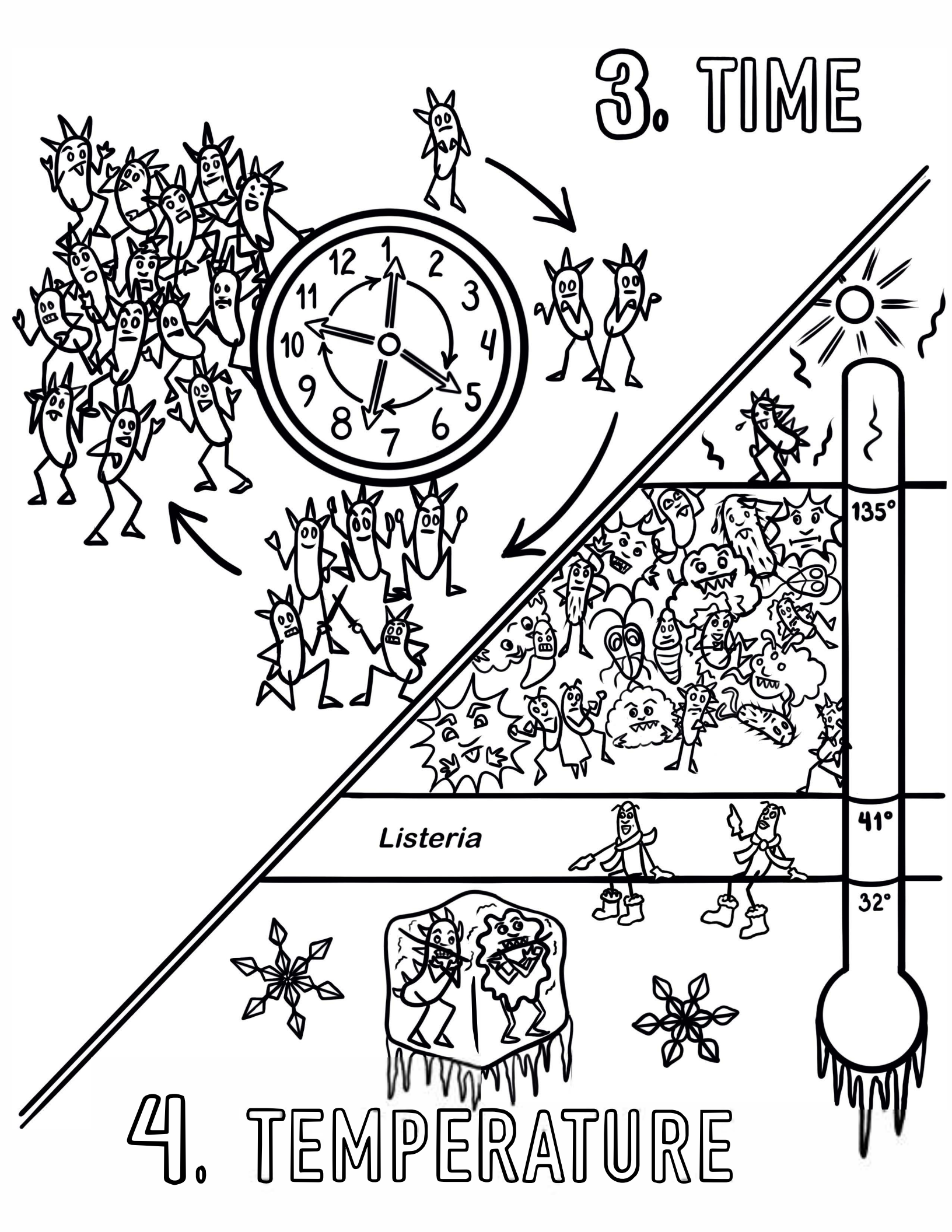
Farmers know where the bad ones are likely to be.

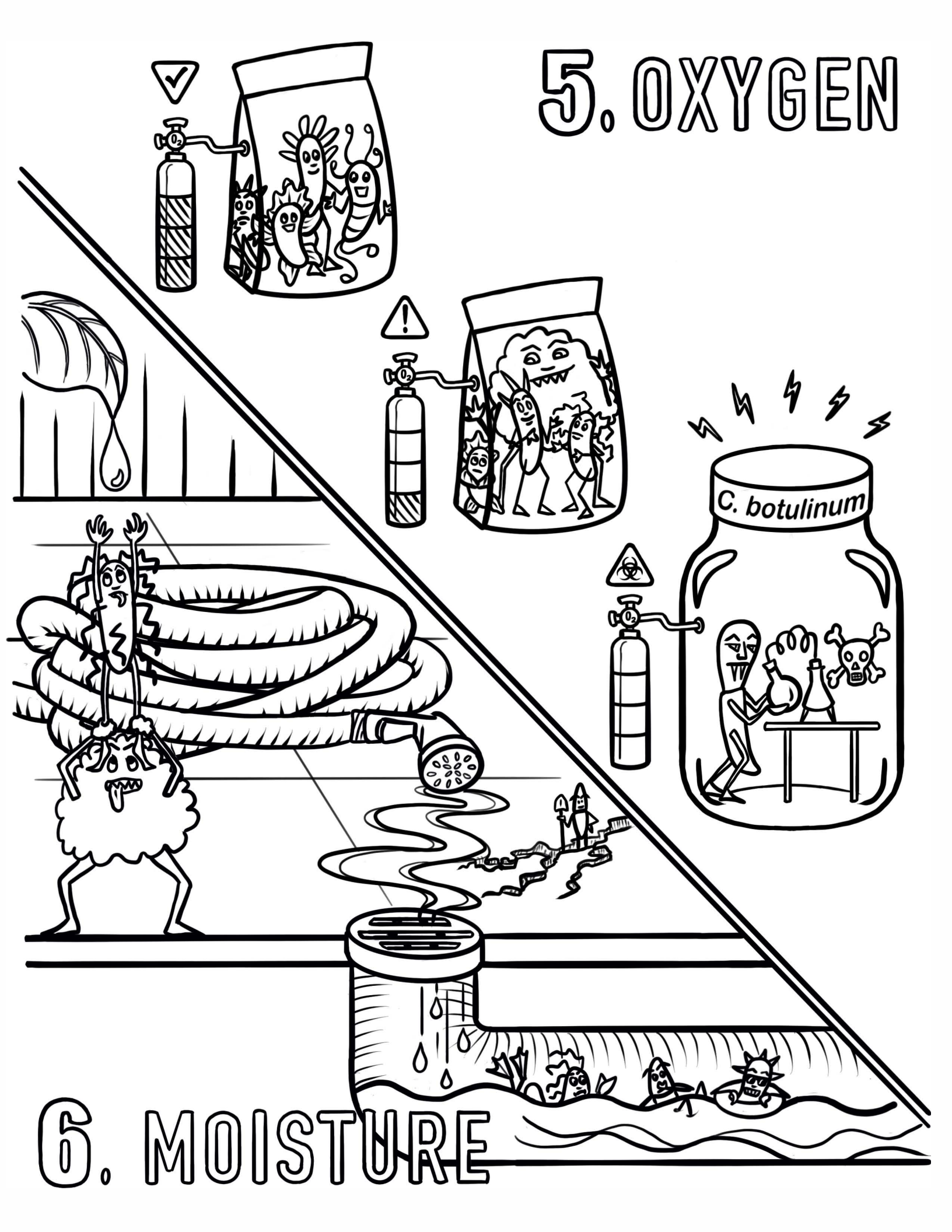


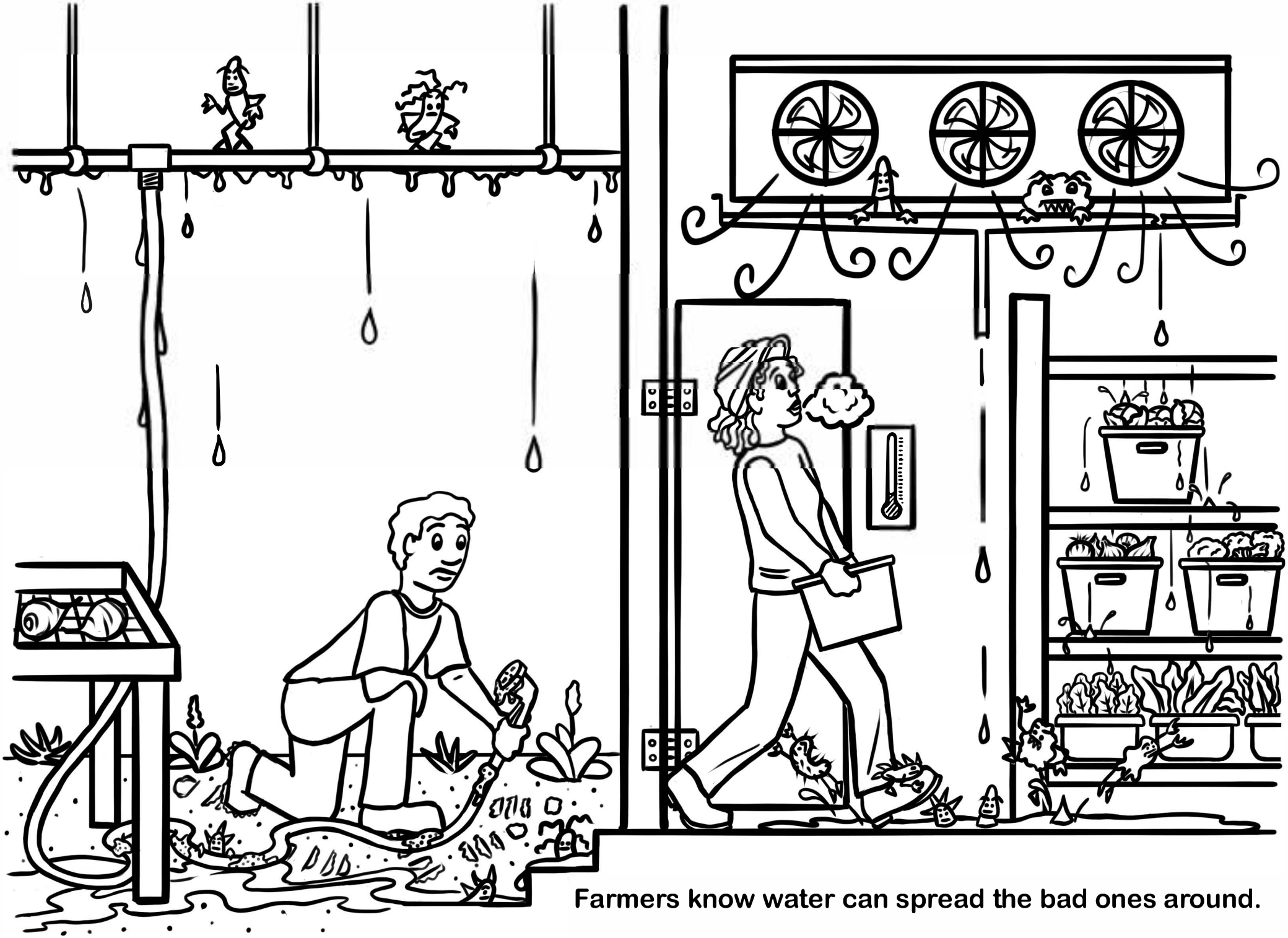
_____ How many bad bugs can you find?

Farmers know the 6 things bad ones need to grow.



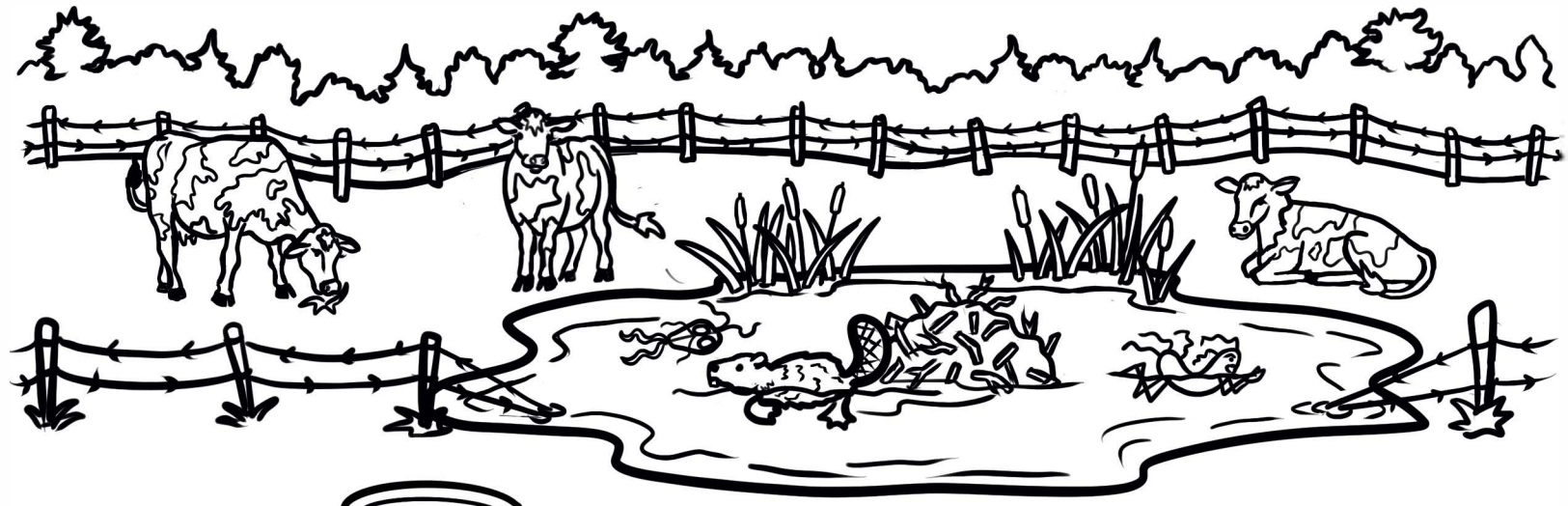

3. TIME
12
1
2
3
4
5
6
7
8
9
10
11
135°
41°
32°
Listeria
4. TEMPERATURE

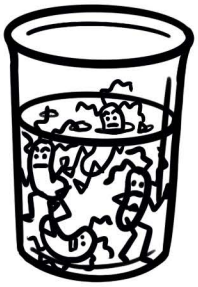

5. OXYGEN
C. botulinum
6. MOISTURE



Farmers know water can spread the bad ones around.

**Farmers know how to manage the bad ones by using safe water while growing.**

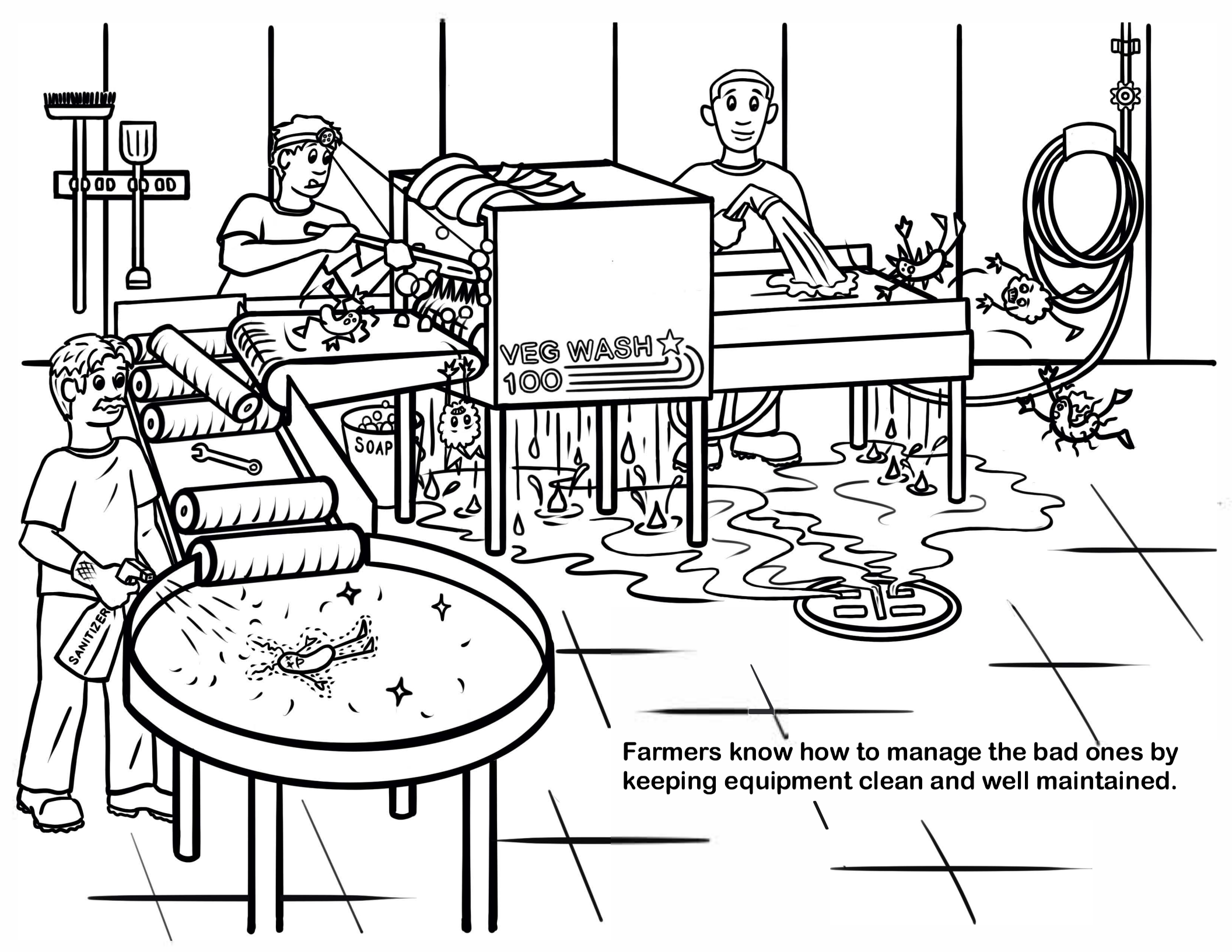




500 E. coli = X

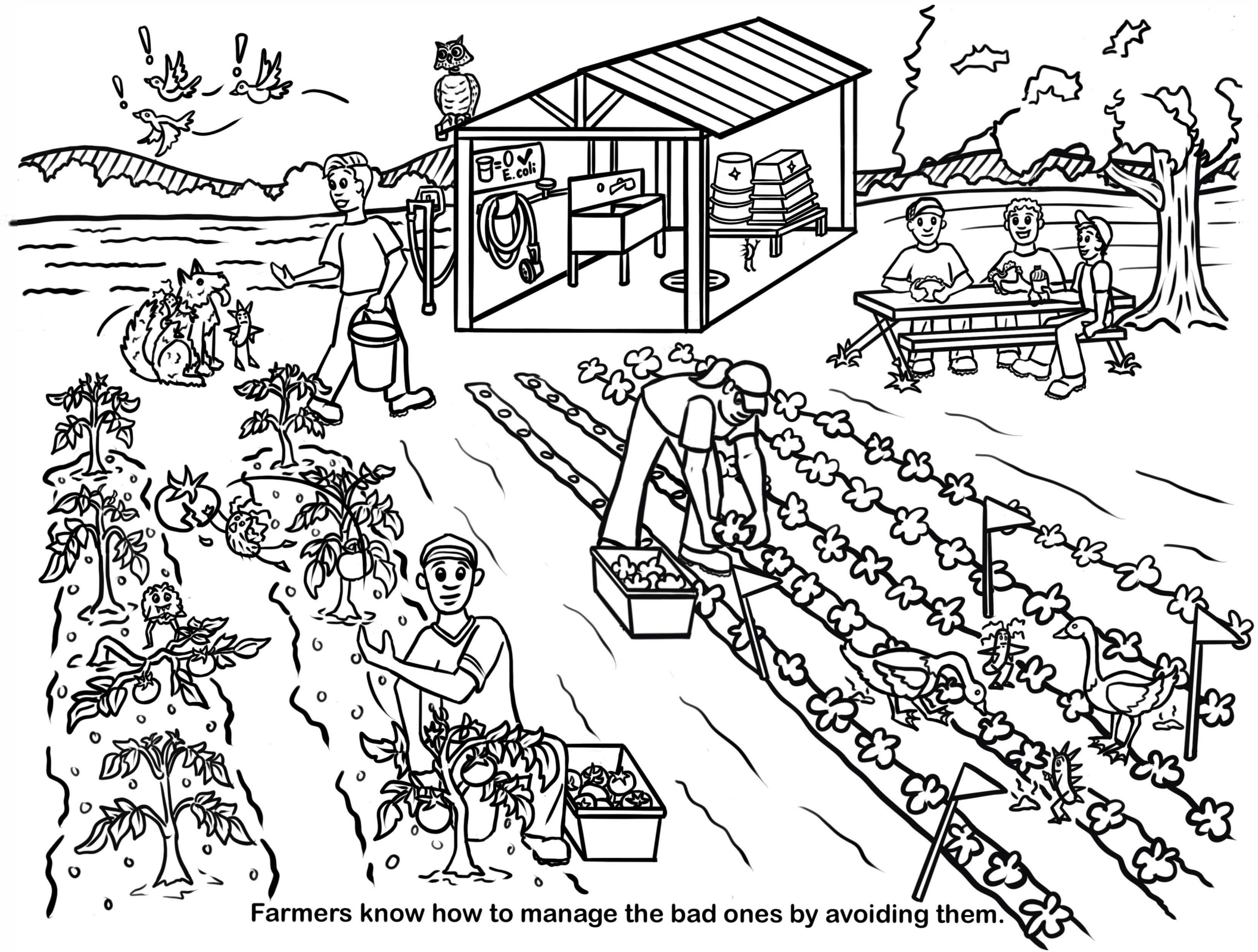


100 = ✓
E. coli




Farmers know how to manage the bad ones by keeping equipment clean and well maintained.

Farmers know how to manage the bad ones with employee training and personal hygiene.




Farmers know how to manage the bad ones by avoiding them.

People know to wash their fresh produce before eating it, keep cut produce in the refrigerator, and consume it within 7 days.


People are thankful for farmers that grow safe produce.

THANK YOU FOR GROWING SAFE PRODUCE !

Artwork by: _____

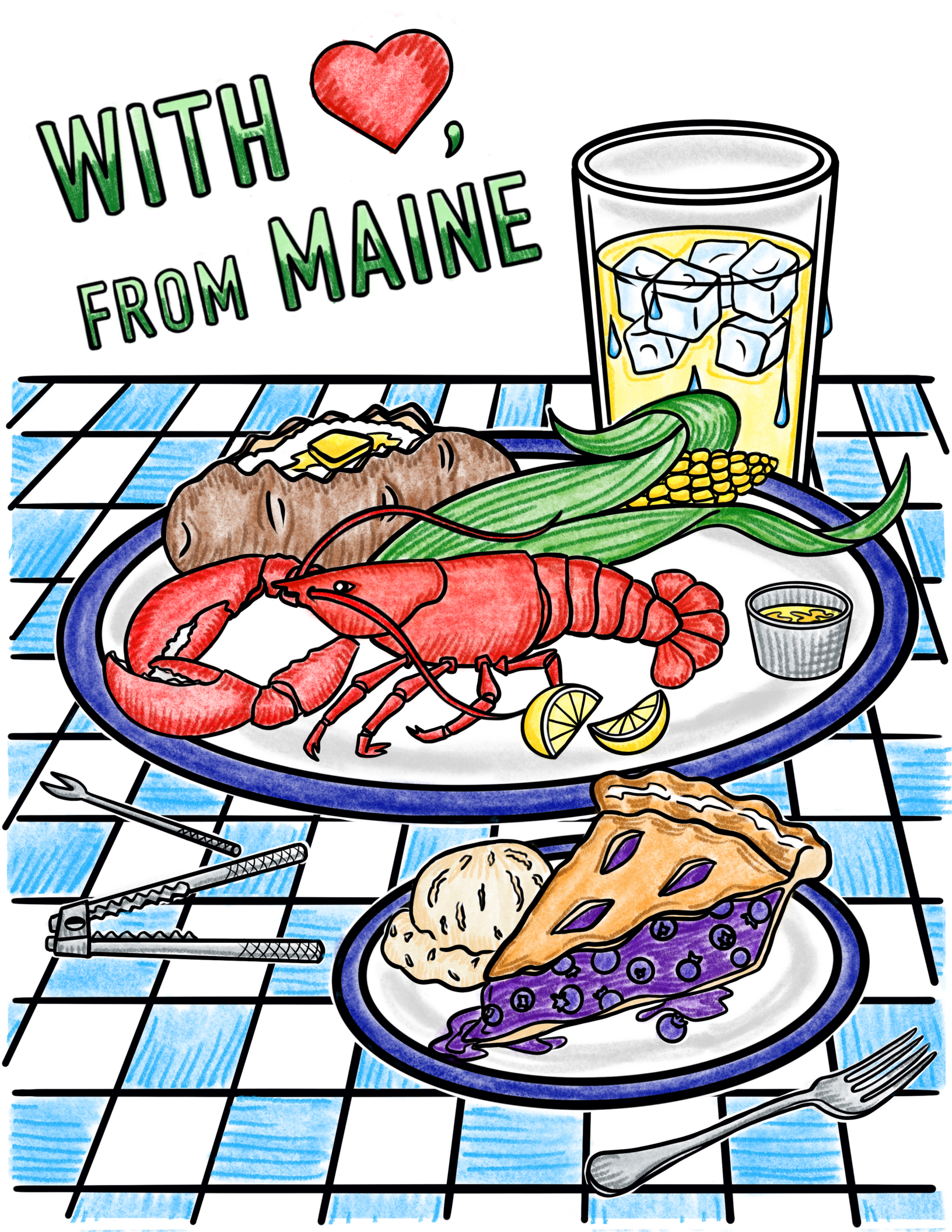
# Food Safety Science Summary

Bad bacteria, viruses, and parasites are all microorganisms (bugs) that can make people sick. Bad microorganisms are called pathogens. Good bacteria help us digest food. Spoilage bacteria break down food waste and generally don't make people sick unless they eat too many of them. Good bacteria help keep bad bacteria in check by competing for resources. All bacteria need resources and the right conditions to for them to grow. We know how to manage pathogens by removing their food source, managing their environmental conditions, removing them with cleaning practices, and killing them by processing (e.g. cooking) or sanitizing (e.g. chemical application). Pathogen growth is slowed or stopped if their environment pH is too acidic or basic, or their environment temperature is too hot or cold or too dry. The more time pathogens are exposed to favorable conditions the greater their numbers will become until resources are no longer available for growth. Some pathogens do not require oxygen to grow while *Clostridium Botulinum* only grows and produces toxin in the absence of oxygen. Vacuum packaging can slow spoilage bacteria growth but make it possible for toxin production by *C. botulinum* if present.

Microorganisms are not mobile so the easiest way for them to move around is by hitching a ride or via water (cross contamination). It is important to use water with low numbers of bacteria when it will contact parts of plants that will be consumed unless the food will be processed to adequately remove or kill pathogens. Bacteria levels in water are measured by testing for generic *E. coli* which are indicators that bacteria associated with fecal matter are present. Not all strains of generic *E. coli* are pathogenic, but it is too hard to test water for pathogen strains specifically. During and after harvest, it is important to use water with no generic *E. coli* in it. It is also important to clean and maintain food contact surfaces. Because bacteria are so small, they can become established in crevices where food particles and moisture can also accumulate, even if not visible to the human eye. Cleaning food contact surfaces frequently and keeping things dry can prevent bacteria from becoming established and multiplying.

Humans and animals are a great way for parasites and viruses to spread because people and animals are their required hosts. Pathogens can enter the body and be spread through bodily fluids and feces. That's why it's important to avoid human and animal fecal matter and practice good personal hygiene such as frequently wash hands, keep gloves and clothing relatively clean, not handle food that will be consumed by other people when sick or injured and prevent spray from sneezes and coughs from getting on food or food contact surfaces. Farmers don't handle food or food contact surfaces if they have symptoms of sickness such as upset stomach, nausea, loose poops, fever, yellowish eyes/skin.

It is important that everyone handle food properly. Fresh fruits and vegetables are very healthy but because they were grown outside of a sterile environment, they will have microorganisms on them and could sometimes have pathogenic microorganisms on them. Washing produce can reduce but not eliminate microorganisms. Cutting produce can introduce bacteria to the inside tissues which are an ideal environment and food source for bacteria growth. Refrigeration slows down bacteria growth but does not stop it. That's why it's important to throw away cut produce if not consumed within 7 days and minimize its exposure to room temperature.


WITH ♥,
FROM MAINE