PRODUCE SAFETY

BEGINNING FARMERS

Where are food safety risks on the farm?

Participants will explore the farm through the lens of food safety and discover how various farm activities can pose a risk to fresh produce.

TEACHING OBJECTIVES: WHY DO THIS?

- Foodborne illness risk factors are present on every farm.
- No farm can completely eliminate food safety risk. However, understanding where the risks occur can help beginning farmers take steps to reduce the risk of transmitting foodborne illness through fresh produce.

BEST LOCATION

On a farm that grows produce

BEST TIME OF YEAR

During the growing season

LEARNING OBJECTIVES: WHAT CAN PARTICIPANTS LEARN?

- Identify common food safety risks on farms:
  - Humans
  - Animals (including wildlife, livestock, and pets)
  - Water
  - Soil amendments
  - Chemical and physical contaminants
- Recognize symptoms of communicable illness and injury that pose a risk to produce
- Describe how to scout a farm for the presence of animals
- Use a water testing kit and interpret test results
- Use a soil testing kit and interpret lead test results

Produce Safety

WHERE ARE RISKS ON THE FARM?

IMPORTANCE FOR BEGINNING FARMERS

Beginning farmers want to provide fresh, healthy and safe produce for their customers. Understanding and managing food safety risks is an important part of achieving that goal.

Reducing the liability risk to the farm from a customer getting ill is also an important reason to pursue produce safety practices.

UNIQUE ASPECTS OF THE CURRICULUM

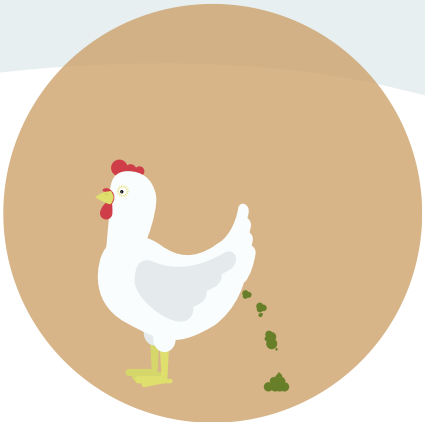
Other produce safety curriculum and resources are often quite technical and assume some prior knowledge, or at least familiarity with, food safety, the Food Safety Modernization Act (FSMA) and/or Good Agricultural Practices (GAP).

Facilitator Planning & Preparation

Activity	Est. Prep Time	Est. Instructional Time
Primary Activity 1: Animal Scouting	X Hrs, X Min	X Hrs, X Min
Primary Activity 2: Water Sampling	X Hrs, X Min	X Hrs, X Min
Primary Activity 3: Soil Sampling for Lead	X Hrs, X Min	X Hrs, X Min

Produce Safety

WHERE ARE RISKS ON THE FARM?



Technical Content

KEY WORDS:

Communicable illness	disease that is able to be transmitted from one person to another; contagious or infectious disease, for example: Norovirus, Hepatitis A, Salmonellosis (the disease caused by Salmonella bacteria)
Domestic animals	animals kept as livestock, working animals or pets, for example: chickens, goats, cattle, horses, dogs, cats, etc.
Feces	animal excreta; poop
Foodborne illness	commonly referred to as “food poisoning”; illness caused by consuming food contaminated with bacteria, viruses, parasites or toxins; examples of foodborne bacteria, viruses and parasites include:salmonella, campylobacter, E.coli, etc.

FACILITATOR BACKGROUND INFORMATION:

All types of produce are susceptible to contamination that can cause foodborne illness. Foodborne illness makes people very sick and can result in hospitalization, long term health problems and death. Those who are more vulnerable to severe illness include young children, older adults and immunocompromised individuals.

All farms, regardless of scale, location or type of produce grown, can reduce risks.

The following are common sources of produce safety risk on a farm:

- **Humans** can spread illness when handling fruits and vegetables, most commonly through unwashed hands
- **Animals**, including livestock, pets and wildlife, spread illness by:
  - Pooping in fields or produce handling areas
  - Moving through fields and feeding on crops
  - Manure storage areas that are too close to food
  - Runoff from manure storage

Technical Content

KEY WORDS:

Lead	an element that is naturally found in small amounts in the earth's crust, but can also be found in amounts that are hazardous to human health in some soils, particularly in urban areas
Mitigation	taking action to reduce the severity of something; in this context, reducing the severity and potential impact of a produce safety risk
Particulate	very small separate particles of a substance
Scouting	the practice of walking a farm for the purpose of observing something, for example crop diseases, pest pressure, or wildlife signs
Wildlife	animals naturally found in the environment; for example: deer, rabbits, wild turkeys, raccoons, mice, Canada geese, songbirds, moles, voles, etc.

FACILITATOR BACKGROUND INFORMATION (cont.):

- **Water** used on the farm for various activities can carry and spread disease if the water is not safe to begin with, or becomes contaminated. Water testing is an important tool to understand whether water is safe to use for various purposes such as:
  - Irrigation
  - Sprays
  - Cooling
  - Washing
  - Cleaning
  - Handwashing
- **Manure and other soil amendments** that have not been properly treated can spread illness if not properly handled and applied, such as:
  - Application too close to harvest
  - Improper/incomplete composting
  - Improper storage
  - Runoff
  - Spread by wind
  - Cross-contamination of tools, equipment, shoes, etc.

FACILITATOR BACKGROUND INFORMATION (*cont.*):

- **Chemical and physical contaminants** are also a risk:
  - Spills of cleaning products, fertilizers or pesticides
  - Broken glass or wood splinters from equipment or bins
  - Lead or other heavy metals in soil
  - Soil testing can help determine the risk of lead and other heavy metals to food and worker safety

KWL Process

Know, Want to Know, Learn

Suggested prompting questions for farmers to share from their experience:

- What concerns do you have about producing safe food?
- Where are some areas of your farm that may be more risky and what would help you feel better about them?
- Do you have any food safety concerns related to the soil you are farming in?
- How comfortable are you about the safety of the water you are using on your farm?

Suggested prompting questions to find out what participants want to learn:

- Which kinds of wildlife have you observed on your farm? (prompts if needed: squirrels, geese, deer, groundhogs, mice, etc.)
- What about domestic animals like dogs, cats?
- Have you ever found animal poop in your field? What did you do about it?
- Have you done anything to keep them out? How has that worked

Primary Activities

Overview of the main activities in this module

Activity 1

Animal Scouting

Participants will practice walking through a crop growing area to look for signs of animals and discuss whether or not the produce is safe to harvest based on the evidence found.

Activity 2

Water Sampling

In this two-part activity, participants will learn how to take a water quality sample, practice taking samples of different water sources, and review and interpret water quality test results.

Activity 3

Soil Sampling for Lead

In this two-part activity, participants will practice taking a soil sample for the purpose of lead testing, review the results, and discuss implications for food safety.

CONNECTIONS

- Learn about other types of scouting in the IPM curriculum
- Learn about soil sampling to understand soil composition in the Soil Health curriculum

Additional Resources/Activities

Resource 1

Communicable Illness and Injury Symptoms Handout

This handout can be used during instruction to highlight symptoms of disease and injury that pose risks to fresh produce. It doubles as a poster that can be taken back to the farm and posted in a high-traffic area for continuous reinforcement.

Resource 2

Sources of Contamination Infographic

This infographic could be used in a slide or as a handout to introduce the various ways that contamination can get on to fresh produce in a farm environment.

Resource 3

Water Testing Handout

This handout is a complement to Primary Activity 2: Water Sampling. It details which tests to use, how to find a lab, how to take a sample, and how to interpret what the results mean for your farm.

Resource 4

Sample Water Test

This handout is a complement to Primary Activity 2: Water Sampling. It shows an example of actual water test results.

Additional Resources/Activities

Resource 5

Rodents and Birds Handout

This handout outlines three steps for farmers to deal effectively with rodents, birds and other wildlife that could contaminate produce after it has been harvested, such as in packing and storage areas. It also details some practical management tactics for repelling wildlife from these areas of the farm.

Resource 6

Irrigation Methods Handout

This infographic could be used in a slide or as a handout to explain the risk levels of different irrigation techniques.

Resource 7

Livestock Handout

This handout outlines strategies for keeping food safe when livestock are present on the farm for any amount of time.

Resource 8

Probability of Water Contamination Handout

This graphic from the Produce Safety Alliance Grower Training Curriculum shows the spectrum of risk based on the source of water.

Review and Encouraging Further Learning

Module Review and Evaluation Questions:

- ?

Activities for Review:

- ?

Review and Encouraging Further Learning (cont.)

Actions to take on their own farm/garden to further understanding:

- ?

1. Animal Scouting

OVERVIEW

Participants will practice scouting a crop production area as a group for signs of possible animal contamination.

MATERIALS NEEDED

- Printed or digital sample Animal Scouting Record
- Printed or digital Animal Scouting Risk Matrix
- Signs of animal activity*

FACILITATOR BACKGROUND INFORMATION

Wildlife and domesticated animals, specifically their feces, present a major food safety risk when they enter crop growing, packing, or holding areas. “Scouting” refers to the practice of walking one’s farm for the purpose of observing something. Sometimes growers will scout crops for pests or disease pressure. From a food safety standpoint, growers are often scouting for signs of animals entering crop production areas, such as feces, tracks or crop damage.

*If no animal signs are currently present in the growing area, the facilitator can simulate using the following techniques:

- Milk Duds candy for deer poop, Baby Ruth candy for stray dog poop
- Use a stick to draw animal tracks in the soil
- Place printed pictures of animal tracks and feces in the field- trim off white space and try to hide these as much as possible so they are not immediately visible
- Decoys of Canada geese, rabbits, deer, mice, etc.

1. Animal Scouting (cont.)

PROCEDURE

- Provide each participant with a printed or digital copy the animal scouting record handout
- Guide the participants to a crop production area
- Explain what is meant by animal scouting and how to do it
  - Define scouting: “Scouting” refers to the practice of walking one’s farm for the purpose of observing something. Sometimes growers will scout crops for pests or disease pressure. From a food safety standpoint, growers scout for signs of wildlife entering crop production areas, such as feces, tracks or crop damage.
  - Talk about common wildlife farm visitors
    - What kind of wildlife have learners seen on their own farms or farms they have worked on?
    - How do they know those critters have been there? What kind of evidence are we looking for? (prompts if needed: wildlife sightings, footprints, chomped vegetables, poop, fur, feathers, etc.)
    - Which critters are not considered a food safety issue? (ex. Worms in the soil, snakes, frogs, insects, etc.)
  - Discuss different scouting techniques (refer to list on next page)
  - Talk about the importance of recording observations
    - Allows you to see patterns of animal activity on your farm -- is it seasonal? occasional? frequent?
    - Helps you manage the risk
    - Consider adding this record into harvest or preharvest records you’re already keeping
- Practice scouting together. Walking the field to look for actual or staged evidence of animal activity. When a learner finds evidence of animals, talk about the circumstances as a group and decide whether it would be safe to harvest the affected crops.

1. Animal Scouting (cont.)

SCOUTING TECHNIQUES

- **Scout the perimeter:** Walking the perimeter of the field can help focus your scouting and it allows you to see where critters have entered the field.
- **Scout a row:** Scouting a row provides a sample to judge how much contamination may be in an area and also give you a heads up that adjacent rows have also been affected. However, it's not representative of the whole growing area.
- **Zig Zag the field:** This involves walking the entire crop production area. The benefit of scouting the whole thing is that you are less likely to miss any evidence of animals and greatly reduces the risk of harvesting contaminated produce. Depending on the size of your farm, zig zagging through the field and checking each row can be time consuming
- **Scouting common animal habitats**: Edge of woods, water sources, brush piles, compost piles, tall grass or wildflower areas, equipment in grass, bunched up used plastic from tunnels, piles of remay, piled fence posts, etc.

1. Animal Scouting (cont.)

EXTENSIONS

- Practice animal scouting on participants' own farms.
- Talk about what you would do if you found the following scenarios (use the Animal Scouting Risk Matrix handout as a guide):
  - Find only footprints, NO crop damage or feces
  - Find a few piles of dog poop in your leafy greens
  - Find that deer have significantly munched on your swiss chard.
  - Find widespread bird poop on raspberries
  - Find one pile of raccoon poop in your carrots

VARIATIONS

1. Virtual version: This interactive video leads participants through a simulated preharvest wildlife assessment. The participant can choose which areas they think are important to scout within a carrot field. They can then make a decision on what to harvest based on their observations, and receive feedback on their choices. This activity can be done by each participant individually. It could also be done as a group within a classroom setting, where participants can discuss the choices together. (bit.ly/3lvsMMN)

2. Wildlife Damage Flashcards: (bit.ly/3LAPZb3)

Animal Scouting Record

Date	Animal Activity	Area Found	Action Taken	Recorded By

Animal Scouting Risk Matrix

	One Instance	Sporadic	Widespread
Animal Tracks	Low Risk	Moderate Risk	Moderate Risk
Crop Damage	Low Risk	Moderate Risk	High Risk
Animal Poop	Moderate Risk	Moderate Risk	High Risk

Matrix Source: Michigan State University Extension Agrifood Safety

2. Water Sampling

OVERVIEW

This is a 2-part lesson that occurs on two different days. During the first lesson, participants practice taking water samples on the farm. The second lesson should be scheduled for a time after water testing results come back, as part two involves a discussion of the results and implications for food safety.

MATERIALS NEEDED

- Water sampling kits (at least 1 per learner + 2 for the instructor)
- Handwashing station with soap, water, paper towels and waste basket
- Hand sanitizer or alcohol wipes
- Ice
- Sampling pole (if sampling a pond, river, stream)

FACILITATOR BACKGROUND INFORMATION

Testing water used on the farm is one way to determine if there is a concern for produce safety for activities like irrigation, spray water, rinsing harvested produce, cleaning with water and handwashing. Water testing involves taking samples of the water at the farm and sending them to a lab for processing.

The Michigan Produce Safety Workgroup recommends testing water for generic E. coli bacteria. Depending on the tests available at an individual laboratory, you may be able to get a quantified result or you may simply get a result that indicates whether generic E. coli bacteria is present or absent. Growers may choose to select a laboratory based on what type of tests are offered.

2. Water Sampling (cont.)

FACILIATOR BACKGROUND INFORMATION, (CONT.)

County health departments have water sampling kits for the Drinking Water Laboratory at the Michigan Department of Environment, Great Lakes and Energy (EGLE). MSU Extension also maintains a list of water testing laboratories that meet FDA Food Safety Modernization Act requirements at https://www.canr.msu.edu/agrifood_safety/produce-safety-education/water.

A water sample test kit will generally include a water collection bottle and shipping materials. It is critically important that when opening the sample bottle to not touch the inside of the bottle. People often carry E. coli bacteria on our skin and touching the inside of the bottle can contaminate the sample. It is also very important not to open the bottle until ready to collect the water as airborne bacteria could also contaminate the sample.

Generally it is best to take a water sample at the point of usage-- for example a faucet or end of a hose. Sometimes this is not practical and the grower may need to take the sample at the point of intake. For example if they are irrigating with drip tape and the water is being pumped directly from a pond they should take the water sample from the pond as close as possible to the pump. Similarly, if drip irrigation is gravity-fed from a rain barrel and the hose is not easily detached from the irrigation system, the sample should be taken from inside the barrel near the hose intake.

2. Water Testing (cont.)

PROCEDURE - PART 1

- Facilitator identifies multiple water sampling locations on the farm There should be at least one sampling location that is a hose or faucet and at least one that is a surface water source (pond, rain barrel, river, etc.). Depending on available facilities, these could include:
  - A faucet of a handwashing sink and/or spout of a portable handwashing station
  - The end of a hose used for irrigation and/or produce rinsing
  - A rain barrel
  - A pond, river, stream, etc.
  - A demonstration pond made out of a water-holding vessel such as large plastic storage bin, a stock tank, a barrel or a kids swimming pool

- Facilitator models the basic procedure for taking a water sample:
  - Guide participants to a sampling location that has a faucet or hose.
  - Wash hands (wet hands, apply soap, scrub for 20 seconds, rinse, dry with paper towel, turn off faucet with paper towel, dispose of paper towel in waste basket)
  - Have ice on hand so that the sample can be immediately placed on ice.
  - Open one test kit but do not take out bottle
  - Turn on the water source to let it run for several minutes. Explain that you are doing this to flush out any dirt or debris from the system that could affect the sample.
  - Apply hand sanitizer or wipe hands with an alcohol wipe
  - Take out sample collection bottle but do not open yet
  - Explain that there is usually a preservative tablet or powder in the bottle. Do not remove this. If you think it's going to fall out when you are taking a sample that requires plunging the bottle into water, you can gently tip the bottle so that it goes into the cap for safe storage while you sample. Remember not to touch the inside of the botte, cap or the preservative.
  - Open the bottle, remind participants that you are being careful not to touch the inside of the bottle because people tend to have E.coli bacteria on our hands and we do not want to contaminate the sample.

2. Water Testing (cont.)

PROCEDURE - PART 1, CONT.

- Place the bottle under the hose or faucet stream to collect at least 100 mL.
- Replace the cap and place the sample on ice immediately. Explain to participants that E.coli bacteria can either grow or die off in the sample between the time it is collected and the time that it is delivered to the lab, so it is important to store it properly on ice and deliver it to the lab within 6 hours of taking the sample.
- Guide participants to a surface water sampling location.
- Open the second test kit but do not take out bottle
- Apply hand sanitizer or wipe hands with an alcohol wipe
- Take out sample collection bottle Open the bottle, remind participants that you are being careful not to touch the inside of the bottle because people tend to have E.coli bacteria on our hands and we do not want to contaminate the sample
- Demonstrate gently tilting the bottle so that the preservative rolls into the cap for safe keeping. Again remind participants not to touch the inside of the bottle, cap or preservative in the process.
- Secure the bottle to a sampling pole if needed. Quickly plunge the bottle into the water, avoiding any plants, algae or bottom sediments that may be present. Make sure to collect at least 100mL of water in the bottle.
- Replace the preservative and cap and place the sample on ice immediately.

- Have participants divide into small groups to practice taking samples at multiple water sampling locations on the farm. By working in small groups, peers can observe one another taking samples.
  - Each participant should be given the opportunity to take at least one sample.
  - Each group should take a sample at each of the identified sampling locations in order to practice how to take a sample at each source.

- Facilitator delivers samples to the lab for processing within six hours of the first sample being taken.

2. Water Testing (cont.)

PROCEDURE - PART 2
(after receiving test results)

- Compare the test results and discuss as a group why certain locations might be more likely to have generic E. coli bacteria present. Let learners think and respond first before prompting with:
  - A pond or uncovered rain barrel is open to the environment and is more likely to become contaminated by airborne bacteria, wildlife and domestic animals.
  - Rain water that lands on a roof and is collected in a rain barrel may pick up any contamination that may be on the roof (ex. bird poop) on its way down.
  - Municipal water is maintained to drinking water quality standards by the municipality.
  - Well water from a capped well is less likely to become contaminated than water from an uncapped well.

2. Water Testing (cont.)

EXTENSIONS

Ask participants to assess water usage on their own farms and make a list of different water sampling locations. Remind participants to use a separate kit for each sampling location.

VARIATIONS

If unable to provide enough test kits for all participants, this activity could be done as a demonstration with the instructor and a few learners demonstrating for the group.

CONNECTIONS

Any to add?

3. Soil Sampling for Lead

OVERVIEW

This is a 2-part lesson that occurs on two different days. During the first lesson, participants practice taking soil samples on the farm. The second lesson should be scheduled for a time after soil lead testing results come back, as part two involves a discussion of the results and implications for food safety.

MATERIALS NEEDED

- Soil auger (or corer) and shovel to demonstrate using each
- Clean plastic bucket
- Measuring cup or jar
- Clean plastic bag
- Label for bag (if not pre-printed)
- Marker for labeling the bag

FACILITATOR BACKGROUND INFORMATION

Lead is naturally found in soils in very small amounts. In urban areas, unsafe levels of lead may be found in soils, due to lead historically being used in house paint, gasoline and industry. Leaded paint was banned in 1978 and leaded gasoline was banned in 1986. However, it persists in soil and presents a chemical food safety risk, as well as a risk to individuals who come in contact with the soil through farming activities.

Lead can be hazardous to human health. It is especially hazardous for children under under 6 years of age. Lead poisoning can cause learning and speech problems, hyperactivity and nerve damage that are difficult to reverse and likely life-long.

3. Soil Sampling for Lead (cont.)

FACILITATOR BACKGROUND INFORMATION, CONT.

To avoid the food safety and occupational hazards associated with lead, soil in urban areas or sites where prior land use included buildings or industry should be tested for lead. This involves taking a sample of the soil and sending it to a laboratory for testing.

If lead levels of concern are detected in the soil, it is advised that the grower install raised beds and bring new soil into the farm site to fill them.

PROCEDURE - PART 1

- Begin by asking what participants know about the dangers of lead and lead testing of soil
  - If participants have not sufficiently covered the topic, review the information provided in the "Facilitator Background Information" section of this activity with group to explain why they will be doing an activity around soil lead testing

- Facilitator explains to participants that the process for taking lead soil samples is very similar to the process of taking soil nutrient samples. Wearing PPE is advised to avoid potential lead exposure during sampling.

3. Soil Sampling for Lead (cont.)

PROCEDURE - PART 1, CONT.

- Facilitator explains how to take the samples:
  - If soil has not yet been disturbed, you would take the sample from the first 1-2 inches of soil. However, for a site that already has beds established, you'll want to take the samples from 6 inches.
  - Demonstrate using a soil auger or corer
  - Demonstrate using a shovel
  - You'll want to take 8-12 samples and mix them together in the bucket. Then you'll measure out about a cup of the mixture to send into the lab. Let this cup of soil air dry (for how long?) and then place it in a clear plastic bag with a label.
- Facilitator invites students to practice taking soil samples using the provided tools
- Facilitator sends sample to a laboratory for testing

PROCEDURE - PART 2 (after receiving test results)

1. Review and discuss the results as a group
2. Talk about options for starting or continuing to farm on a site that tests positive for lead.
   a. Install raised beds and bring soil into the site

3. Soil Sampling for Lead (cont.)

EXTENSIONS

?

VARIATIONS

?

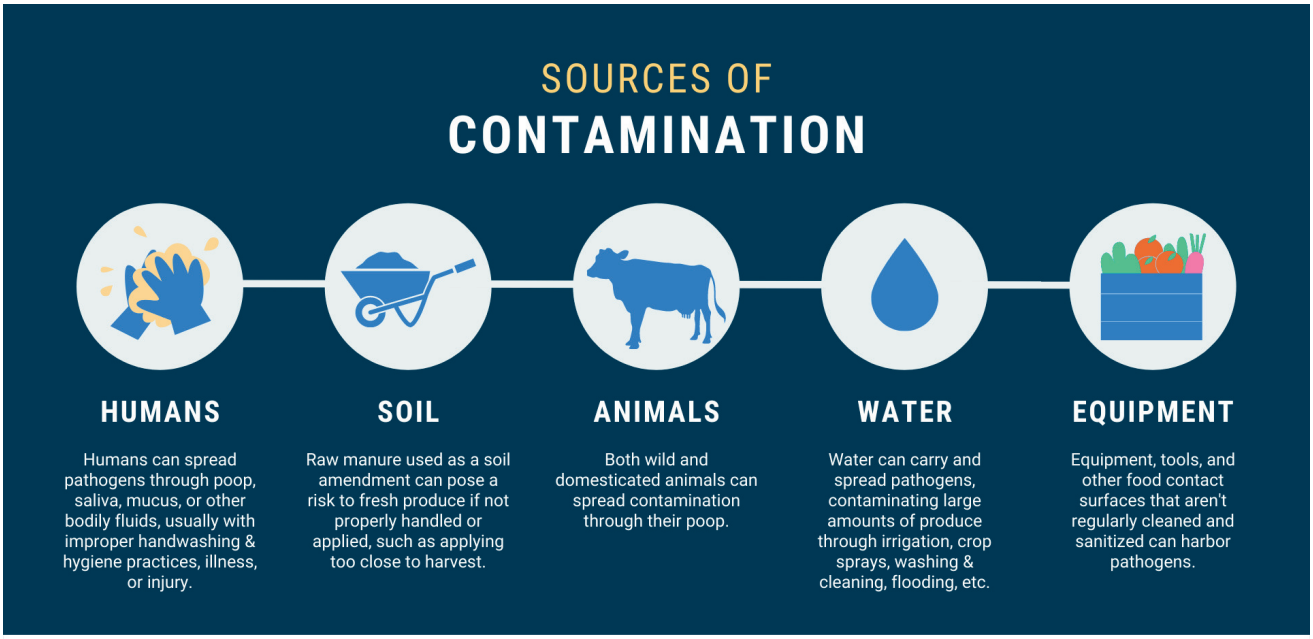
CONNECTIONS

Soil nutrient testing is covered in the soil health curricululm

Communicable Illness and Injury Symptoms

A .pdf file of this poster can be downloaded from the additional resources page: LINK

Sources of Contamination Infographic



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Source: Produce Safety Alliance Grower Training Module 1

A .png file of this infographic can be downloaded from the additional resources page: LINK

Water Testing

Water testing can be tricky. If done correctly, water testing can yield accurate results that will both save you money and ensure safe food. If done incorrectly, a false positive can require a costly fix to keep from using contaminated water.

The first step in getting a water sample is understanding what tests you need. A widely accepted thing to test for in irrigation water is generic E. coli bacteria. Labs use different methods to test for generic E. coli. The results of some of these methods are labeled as colony forming units per 100 ml water (CFUs/100 ml) and others are labeled as Most Probable Number (MPN). For folks wanting to use safe water in farming, these labels are roughly equivalent.

Now that you know what to test for, you need to find out where the labs are. County health departments all have bottles and forms for the Michigan Department of Environment, Great Lakes, and Energy (EGLE) Drinking Water Laboratory. In this factsheet we'll talk about water testing using the EGLE forms and materials. When using supplies from another testing facility, addresses and forms may change, but how the test should be taken and how quickly you need to get it to the lab will not.

On the EGLE request for water analysis, choose Test Code NPEC-LO regardless of the sample source. The results will be reported in colony forming units (CFU) per 100 ml of water. Results from the state lab will be on record at both the state and the county. Record all sampling information (including results) on the water testing log sheet.

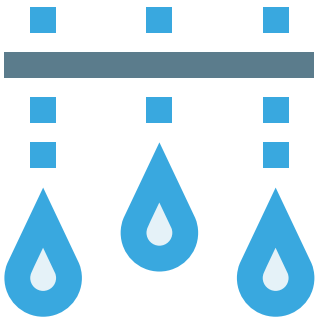
When opening the sampling bottle, it is important not to touch the inside of the bottle. We often carry E. coli on our skin and may inadvertently contaminate the sample. Even if your hands are washed, you may still have trace amounts of bacteria on your skin that can alter the test results. It is best to use an alcohol wipe or hand sanitizer prior to opening the bottle.

A curated list of water labs that do generic E. coli testing for farmers can be found at go.uvm.edu/waterlabmap.

Water Testing, cont.

Remember that accurate results depend on proper sample collection and handling. Without an accurate test, you may need to spend a lot more time and money on food safety than you have to.

Once you get your results back, the next step is figuring out what they mean. The water testing results below are an example of what you might get back from a testing agency. As reported on the test results, the water sample had 1600 Most Probable Number (MPN) of coliform and 45 MPN of E. coli per 100 ml. Take a minute to find each of these numbers on the report. It's very easy to look at the wrong number and use it to make management decisions. The coliform number is a measure of total coliform. Some of these coliform might be from poop in the water, and some might just be living in the soil. It's a pretty good bet that MOST of the coliforms measured will not make a person sick.



The E. coli number tells us a little bit more about the quality of the water. First, any E. coli in the water sample lets us know that there is definitely poop in the water. There also is a greater chance that some of the E. coli might make a person sick. That said, does this mean the grower has to do something to reduce the E. coli? The answer is that it depends.

If we are using water for irrigation or crop sprays, 45 MPN will likely be alright. If you are using the water source for postharvest washing, however, it's not acceptable. Likely a grower would either need to find an alternative water source that has no detectable generic E. coli or they need to treat the water.

Testing water can give you information you can use to better assess what to use that water for. Knowing the quality is the first step, implementing practices to mitigate any risks is the next step. Recording what you did is the final step. If a grower has specific questions about reading a water test or has difficulty tailoring food safety practices to their farm, they are welcome to contact the Agrifood Safety Work Group at gaps@msu.edu or (517) 788-4292.

Water Testing, cont.

Steps to taking a good water sample:

1

Do not open the sampling bottle until you are ready to collect the sample. Airborne bacteria can also alter test results.

2

When sampling from your irrigation system, water should be collected directly into the sampling bottle. Water that is collected into another container could pick up contaminants along the way. Run the water for several minutes to flush dirt and debris out of the system.

3

When taking a sample from a pond, lake or stream, secure the bottle to a sampling pole. quickly plunge the bottle into the water, avoiding plants, algae and bottom sediments. Make sure there is at least 100 ml in the bottle. Keep in mind that there is usually a preservative tablet or powder in the bottle. Keep the preservative safely stowed in the cap while you sample, then add it to the water.

4

The sample must be put on ice immediately and delivered to the testing lab within 6 hours. E. coli can grow or die off in the sample between the time it's collected to the time the sample is delivered to the laboratory, so it's important to collect, store and transport the sample properly within 6 hours, on ice.

Sample Water Test

GREAT LAKES SCIENTIFIC, INC.
2847 Lawrence St.
Stevensville, Michigan 49127
(269) 429-1000
(269) 593-5947 (FAX)
www.glslab.com
email: gls@glslab.com

Name: Berrien Conservation District
3334 Edgewood Rd.
Berrien Springs, MI 49103

Date: February 14, 2022

Laboratory Analysis Report

Sample	Sample Date	Code	Coliform MPN per 100ml	E.coli MPN per 100ml	Nitrate (N) ppm			
Galien River: Lancor Farm 17505 Gardner Rd. Galien, MI	2/10	11:30AM Outside	1,600	45	< 1			
				< = Less than MPN = Most Probable Number				
				Method: Standard Methods for the Examination of Water & Wastewater 9223B with Quanti-Tray, 4500NO3D				

GREAT LAKES SCIENTIFIC
EGLE Lab #8000
MI Dept of Environment Great Lakes & Energy

Great Lakes Scientific maintains accreditation to ISO/IEC 17025:2017 for the specific tests listed in PJLA Certificate # L21-759. The results above relate only to the analysis tested and to the samples as received by the laboratory. Limits of detection and measurement variability are available upon request. This report may not be reproduced, except in full, without written approval of Great Lakes Scientific.

Lab Director: Wayne E. Gleiber, Ph.D.

Microbiological testing started: 02/10/22 5:00PM

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Page 1 of 1

Rodents and Birds

Rodents and birds pose a significant contamination risk to produce both before and after it is picked. Poop from rodents and birds can spread bacteria such as E. coli and Salmonella to produce, packaging and food contact surfaces. Minimizing and controlling rodents and birds where produce is packed or stored should be a part of a farm's steps to promote safe food production.

There are three steps to dealing effectively with rodents and other potentially contaminating wildlife in packing and storage areas. These steps are:

1. assessing the risk and identifying mitigation tactics you will use
2. implementing the tactics on the farm
3. documenting that you are carrying out the tactics

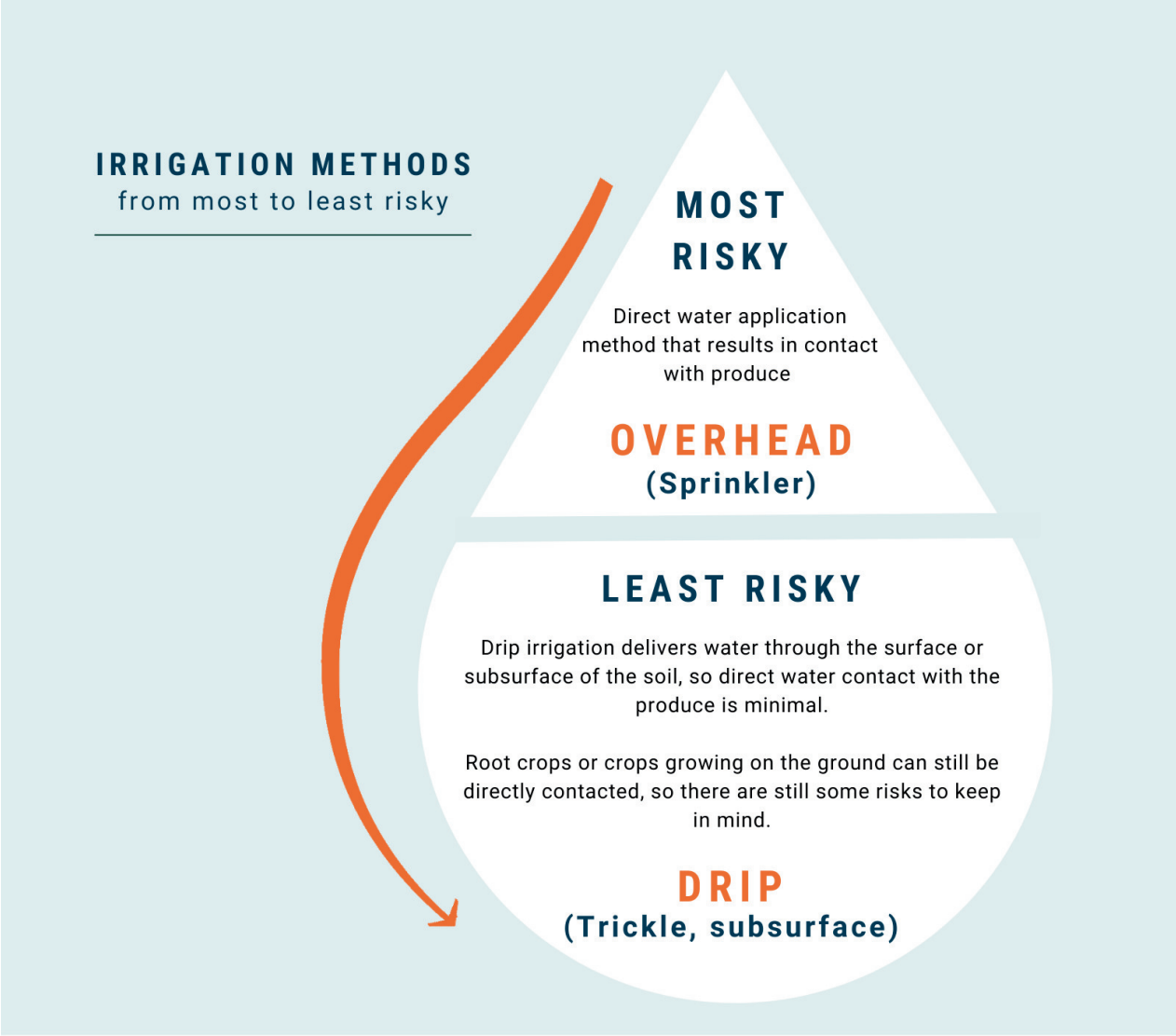
In assessing risk, you want to consider the areas your crop is held or stored in from the time it is harvested until it leaves your farm. Think about storage areas and wash/pack sheds . Are these areas prone to rodents or birds getting into them? Are there roosting spots for birds over the areas you keep harvested produce, such as rafters in a covered shelter or barn? Are there tall grasses or other plants around the perimeter of packing or storage areas that could provide habitat and refuge for unwanted critters? What could you do to help minimize contamination by these pests?

The best way to manage rodents and birds is to use multiple tactics to minimize the impact of them. Try to reduce the suitability of habitat around your packing and storage areas by reducing rubbish piles and high grasses. Store produce in shady structures equipped with netting in the rafters to exclude bird roosting. Use bird repellents like the distress calls of birds, Avitrol* or noise cannons to deter roosting. Place a series of rodent traps around the packing area and monitor them daily to check for caught rodents. While it may seem tempting to hire a cat to handle rodents, this is not recommended for a few reasons. One, cats are not discriminate about where they kill rodents and dead rodents on produce or produce contact surfaces is not sanitary. Additionally, cats can carry the parasite that causes toxoplasmosis, a disease that can get onto produce and infect humans who consume it.

If you use traps to kill rodents, always opt for those traps that actually kill the rodent in the trap and avoid poison bait traps. Dying rodents can pose a food safety risk if they crawl off into a produce container to die. Many growers number their traps for ease of monitoring. To make the traps conspicuous, some growers mark the areas above the locations of the traps with a label listing that a rodent trap is there and what number it is.

IGrowers are welcome to contact the Agrifood Safety Work Group at gaps@msu.edu or (517) 788-4292 with any questions.

Irrigation Methods



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Source: Produce Safety Alliance Grower Training Module 5-1

A .png file of this infographic can be downloaded from the additional resources page: LINK

Livestock

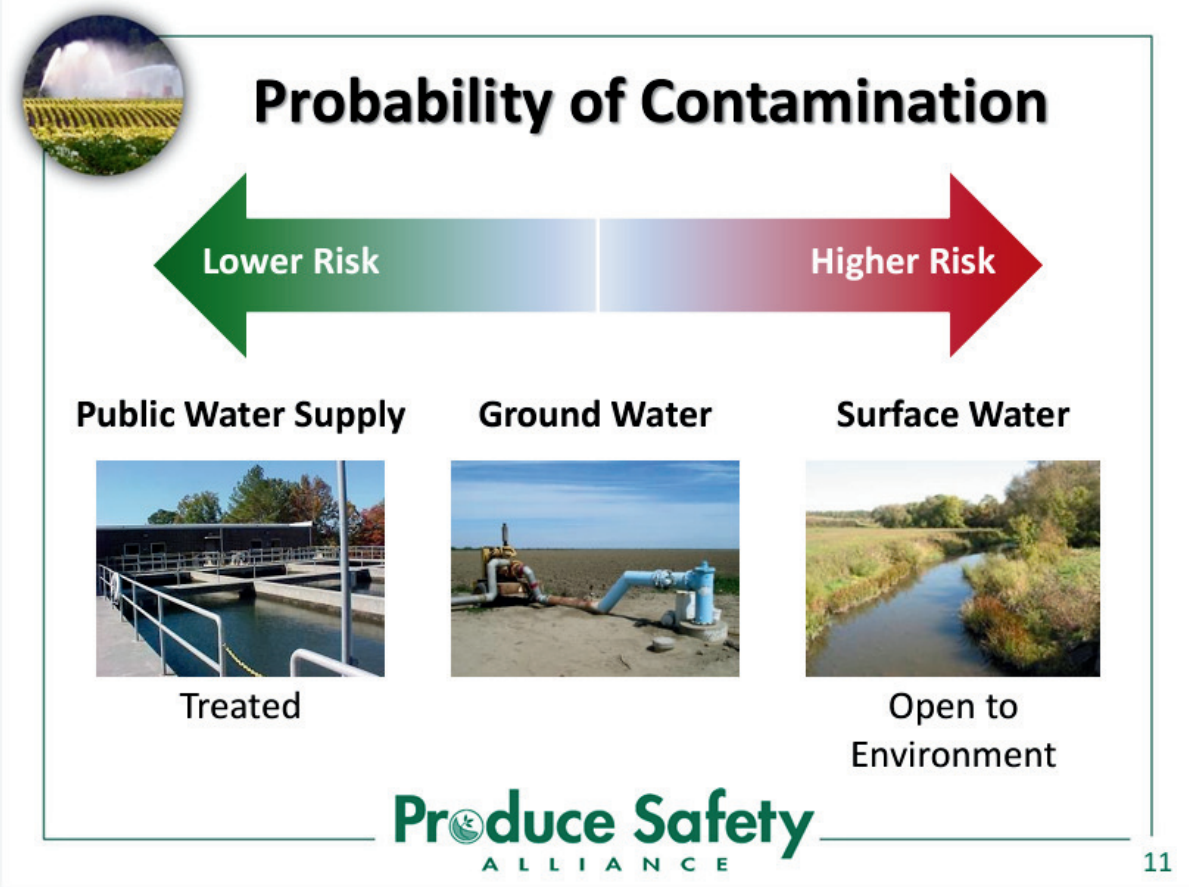
Livestock that are close to food production areas can pose significant food safety risks. With proper mitigation strategies, the two can coexist. Without these mitigation strategies, you could be making people sick.

It's important to remember that all animals pose a food safety risk to crops. Any time a person brings animals together, the risk of contaminating adjacent cropland increases. For the purposes of this article, livestock means all domesticated agricultural animals, regardless of size or number. This also includes domesticated animals that may be kept only for a short period of time, such as broilers or 4-H animals.
Keep as much distance as possible between livestock and produce growing. 100 yards is ideal. If the livestock are too close, the best solution is to move either the production area or the livestock to get more distance.

In some cases, growers will not be able to move either the livestock or the production area. In these cases, a mitigation strategy must be put in place. The mitigation strategy should impede the movement of manure and particulate into the production area under most weather conditions.

Possible mitigation strategies could include berms or ditches high enough or deep enough to prevent manure-laden water flow into the production area. If these earthen barriers were planted with fast growing trees, such as poplars, a particulate barrier can be established in short order.
A grower can have both fresh produce and livestock, it just requires a little thought and planning. If a grower has specific questions about produce safety or has difficulty tailoring food safety practices to their farm, they are welcome to contact the Agrifood Safety Work Group at gaps@msu.edu or (517) 788-4292.

Probability of Water Contamination



This graphic from the Produce Safety Alliance Grower Training Curriculum shows the spectrum of risk based on the source of water. Public or municipal water is treated and presents the lowest risk. Ground water may be very low risk or higher risk depending on the condition of the well. Surface water is the riskiest source because it is open to the environment. Surface water includes natural sources such as ponds or streams, but also rainwater systems such as barrels or cisterns. The risk of surface water sources can be mitigated by strategies such as drip irrigation, treatment or application intervals for irrigation and sprays.

A PowerPoint file with this image can be downloaded from the additional resources page: LINK