

Agricultural Water Contamination and Food Safety

According to the Centers for Disease Control and Prevention (CDC), in 2021, an estimated 47.8 million illnesses, 127,839 hospitalizations, and 3,037 deaths in the U.S. alone were attributed to foodborne illnesses. Fresh produce is commonly associated with foodborne illnesses, and agricultural water is suspected as a major causative agent. The Food Safety Modernization Act (FSMA) Produce Safety Rule (PSR) specifies that all agricultural water must be safe and of adequate sanitary quality for its intended use.

What Is Agricultural Water?

Agricultural (ag) water is water that is intended or likely to contact the edible portions of produce or food contact surfaces during growing (pre-harvest) or during/after harvest (post-harvest). The PSR outlines three common sources of agricultural water: **ground water**, **surface water**, and **municipal water**.

Ag Water Microbial Safety. The PSR currently uses a bacteria category called generic *E. coli* as an indicator of water quality. *E. coli* is a type of bacteria that is commonly found in animal and human waste (feces). For post-harvest water, there must be no detectable generic *E. coli*/100 mL of the water sample.



Why Is Ag Water a Produce Safety Risk?

Contaminated agricultural water sources can pose a serious food safety risk on your farm. For example, if a water source is contaminated with *E. coli*, it can spread this contamination when the water is used for activities like irrigation, spraying, or washing, especially if it comes into direct contact with the harvestable portion of produce commodity. Water can spread contamination from an individual produce item to the whole batch of harvested produce during bulk washing.

Once produce is contaminated with a pathogen, it is challenging to remove the contamination later. Post-harvest washing or sanitizing would not be effective in eliminating the contamination; therefore, it is better to prevent the contamination from occurring by using best practices throughout the entire production continuum.

Why Is it Important to Test Ag Water Quality?

Pathogens can be introduced into the water through various routes and are easily spread through the water.

Both irrigation and wash water were implicated in various produce foodborne outbreaks. Therefore, understanding risks associated with ag water is important to reducing the risks on your farm.

To understand the long-term microbial quality of the source water.

To identify any sources of contamination and implement corrective actions as needed.

In one study, these were the most commonly implicated sources of *E. coli* in Ag water used by produce growers in Kansas and Missouri:

- Bovine- 53%
- Human- 38%
- Ovine- 17 %
- Poultry- 11 %
- Caprine- 8%, and
- Deer 2 %. (¹Manville et al., 2023).

¹Manville, E., M.S. Bhullar, L. Nwadike, A. Mustapha, V. Trinetta (2023). Characterization of Escherichia coli Isolates from Agricultural Water on Kansas and Missouri Fresh Produce Farms by Whole-Genome Sequencing. Food Protection Trends, Vol 43, no 4, pp. 329-342. Jul 2023

How To Address Agricultural Water Contamination on the Farm

Some important steps you can take to mitigate the risk of spreading microbial contamination on the farm:

- Understand/identify the source of contamination and implement a corrective action. (For example, if there are livestock near your water sources, adequate measures should be in place to prevent the presence of cattle near the water source and limit the chances of runoff from the cattle to the water source.)
- Change the water application method (switch to a lower risk method of irrigation such as drip for most crops).
- Prolong the time between water application and harvesting.
- Shock your well with disinfectants and/or treat your water if needed.
- Install backflow preventers if you don't have them or ensure that they are working correctly.

- Check for any damage in your water system and perform any necessary repairs.
- Re-test your water after performing any corrective actions.

Water Treatment

FDA recognizes that agricultural water treatments could be a valuable tool in helping prevent foodborne outbreaks associated with fresh produce. Various water treatment methods are available: use of chlorine, peroxyacetic acid, hydrogen peroxide, UV-light, ozone, etc. Any kind of treatments **MUST** be used as defined by the federal, state, or local regulations.

Any method used to treat ag water must be effective to make the water safe and of adequate sanitary quality for use and/or meet the relevant microbial quality criteria.

Follow all label instructions when using any disinfectant products.

Things to consider to keep your ag water clean and safe:

- Keep your domestic animals out of the agricultural water sources.
- Keep composting or manure sites away from the water sources.
- Maintain sewage and septic systems.
- Always monitor wild animal access to your water sources.
- Use backflush water prevention methods or devices.
- Develop ag water management strategies; for example, water system surveys to identify and reduce risks.
- Test your ag water quality — more information available here: www.ksre.k-state.edu/foodsafety/produce/testing.html or contact your local produce safety personnel for more information on water testing services.

Knowing your microbial water quality through long-term testing will help to establish management practices for appropriate use of the water!

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Prepared by: Durga Khadka

Reviewed by: Manreet Bhullar, Londa Nwadike,
Katelynn Stull



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