

**AQUAPONICS AND FOOD SAFETY**

# Keeping Aquaponics Products Safe

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**ARE AQUAPONICS PRODUCTS SAFE?**

Fish and plant products from Minnesota’s aquaponics facilities are a great source of quality nutrition for Minnesota families. Similar to most fresh food products there is a risk of foodborne illness. Fortunately, there are several steps that can be taken to reduce the risk of foodborne illnesses.

**A BRIEF OVERVIEW OF FOODBORNE ILLNESS**

Illnesses caused by food are common. As many as 1 in 6 Minnesotans experience some type of foodborne illness every year. Most of these illnesses are caused by viruses and bacteria, and a few are caused by small parasites. Table 1 shows a list of some of the more common causes of foodborne illness. Most, if not all, organisms could occur in aquaponics facilities and in the food they produce.

*Listeria monocitogenes* and *Salmonella spp.* are two common foodborne illnesses that can easily survive and grow in aquaponics facilities.

**Where’s the risk?**

Fish raised in most aquaponics systems are usually a very safe product. Most finfish do not contain significant levels of human disease causing bacteria. Because most fish products are thoroughly cooked at home,

**Table 1:** Some potential disease causing organisms in aquaponics products and their likely sources.

CATEGORY	DISEASE CAUSING	SOURCE
VIRUS	<i>NOROVIRUS</i>	HUMANS- WORKER HYGIENE
BACTERIA	<i>LISTERIA MONOCYTOGENES</i>	ENVIRONMENT AND PROCESSING EQUIPMENT
	<i>SALMONELLA SPP.</i>	BIRDS AND MAMMAL MANURE
	SHIGA-TOXIN <i>E. COLI</i>	MAMMALS – ESPECIALLY RUMINANT MANURE
	<i>AEROMONAS SPP.</i>	FISH AND WATER SOURCES
	<i>VIBRIO SPP.</i>	SHELLFISH AND WATER SOURCES
	<i>SHIGELLA SPP.</i>	HUMANS – WORKER HYGIENE
	<i>CAMPYLOBACTER SPP.</i>	BIRDS AND POULTRY MANURE
PROTOZOA	<i>CRYPTOSPORIDIUM SPP.</i>	RUMINANT MANURE
	<i>GIARDIA LAMBIA</i>	HUMANS AND WATER SOURCES
	<i>CYCLOSPORA SPP.</i>	WATER- TROPICAL ENVIRONMENTS

any contamination is usually quickly eliminated. A special note of caution for those raising shellfish (shrimp, crayfish, prawns) and mollusks—certain species of the *Vibrio* bacteria are commonly associated with crustaceans and mollusks.

These species may be a little riskier to use in an aquaponics facility than more traditional finfish species.

Leafy greens and raw produce are higher risk products. Nearly half of the foodborne illness outbreaks in the U.S. are caused by raw fruits and vegetables.

Many of the plant products grown in aquaponics facilities are consumed raw. While good agricultural practices and thorough washing can greatly reduce the risk of illness, there is always some risk of bacterial contamination when products are consumed raw.

Leaves with complex surfaces, like savoyed or curly leaved greens, are especially difficult to clean and disinfect. Bacteria are very good at sticking to the tiny folds and crevices in leaves, and no amount of washing can remove all attached bacteria.

If plants are contaminated with harmful bacteria, the amount that people eat is directly related to the risk of those people becoming ill. Herbs, like basil or mint, tend to have a lower risk simply because less of these plants are eaten at any one time compared to salad greens such as lettuce.

### **Chemical Hazards**

Chemical and toxin contamination of food is a concern as well. The controlled environment in aquaponics facilities may make these hazards less likely than in other forms of agricultural production. Remember that any chemical product used with plants could affect fish, and any product used with fish could affect plants and consumers. Always follow label, EPA and FDA guidelines for any products used in aquaponics facilities.

### **ENSURING FOOD SAFETY IS EVERYONE'S RESPONSIBILITY**

It all starts with water. Potable water from a clean source is always preferred for a recirculating aquaponics system. Surface waters, even if they look clean, can be contaminated with animal manures and parasites.

If you use well water, have your well tested for harmful contaminants. Contact the Minnesota Department of Health for more information on well water testing (651-201-4600, [health.wells@state.mn.us](mailto:health.wells@state.mn.us), or <http://www.health.state.mn.us/divs/eh/wells/waterquality/test.html>)



Growing, harvesting, and processing ready-to-eat produce requires extra precautions to prevent foodborne illness.

Feed inputs matter. After water, fish food is the primary input in aquaponics systems. Purchase your feed from a reputable source. Always store feed in a dry and secure area where birds, rodents and other pests will not be able to contaminate or eat it. Contaminated feed is an important route in which dangerous bacteria like Salmonella could be introduced into your aquaponics systems.

There are a myriad of ways to grow plants in an aquaponics system, and each has certain production advantages and disadvantages. It is unknown at this early time in aquaponics production, if some configurations have greater risk for contamination than others. In general, grow systems should strive to minimize plant contact with water, sediment and equipment. That way, if any harmful bacteria are present in the water, edible portions of the produce are less likely to become contaminated.

### Harvesting and Processing

Produce can become contaminated with harmful pathogens during harvesting and processing. Most aquaponics produce requires a high level of worker handling.



There are many ways to grow plants in aquaponics systems. Systems should be designed for minimal contact between leaves and water, sediment, and equipment.

Aquaponics operators should make sure all workers are trained on health and hygiene practices for the aquaponics farm. Worker training includes: instruction on proper hand washing technique and correct use of gloves, explaining and implementing a clean clothing and footwear policy, and explaining first aid procedures for cuts and injuries. Sick workers, and those with open wounds or cuts, should not handle produce, fish, or equipment.

Facility cleanliness and tidiness is important as well. Debris and standing water should be removed daily for employee safety as well as to minimize pest attraction and harborage. Harvest tools and totes should be cleaned and sanitized regularly and knives kept sharp and organized in the workplace.

After fish or plants are harvested, keep the product at the appropriate temperature to slow or stop the growth of harmful bacteria. The “cold chain” starts at harvest and ends with the consumer.

Processing of fish includes certain risks beyond what usually occurs with plant production.

If you process fish on-site, make sure you follow Minnesota Department of Agriculture guidelines.

THIS PROJECT HAS BEEN FUNDED BY A MNDRIIVE GLOBAL FOOD VENTURES RESEARCH AWARD. [MNDRIIVE.UMN.EDU](http://MNDRIIVE.UMN.EDU)

