

# In the Lab



## Prep Rally

Five crucial steps for keeping your food laboratory squeaky clean

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**S**afety is the foundation of food quality. It's critical that any laboratory, manufacturing plant, and production facility that handles food maintains the highest standard of safety and follows careful procedures to the letter. There's no room for error; a single isolated shortcut can lead to disastrous results.

The USDA estimates that one in six Americans become sick from foodborne illness each year. Since New Year's Eve 2023 alone, the agency's Food Safety and Inspection Service (FSIS) site's Recalls and Public Health Alerts page ([fsis.usda.gov](https://fsis.usda.gov)) has featured multiple cross-contamination incidents. The alerts warn consumers away from specific food products, with concerns such as "possible *Salmonella* contamination," "possible *E. coli*

contamination," and "possible extraneous material contamination."

Here are five safety steps that are absolute musts when it comes to preventing cross contamination and running a squeaky clean and safe laboratory.

### 1. Institute, Document, and Mandate Cleaning Procedures and Techniques

Everyone who steps foot in a lab space should be educated about agreed-upon safety procedures so they can be consistently followed. Methods must be adhered to without fail; something that was "barely used" or "looks clean" is not acceptable.

- Prevent cross contamination by moving from high to low in a cleaning cycle, such as cleaning shelves

above a workspace before the workspace itself.

- Avoid cleaning while testing is taking place.
- Keep equipment clean at all times, without exception. This means wiping down equipment after every use and scheduling regular deep cleaning as applicable.
- Establish and follow a cleaning checklist to prevent the risk of a missed or over-looked step. Checklists can also help keep others in the lab informed so there is no miscommunication.
- Know the risks of cross contamination and institute fail-safe cleaning methods. For example, pipettes are a leading cause of cross contamination within a lab setting. Best practice in equipment sanitation is to completely sterilize, not just clean, if possible. Sterilization can include disassembly and autoclaving for at least 20 minutes at 121°C (252°F). Each lab should have the procedures for the type of use and equipment outlined in detail.

### 2. Maintain Proper Air Circulation and Ventilation

Surfaces are not the only source of contaminants; the air within a closed room can harm employees and contaminate food or samples. Air handling in a food lab is not the same as air handling in a non-food-related commercial operation.

- Air handling in a food lab begins with a risk assessment to identify the unique risks within the building. For example, establishing positive air pressure zones is an important aspect of air flow design in a lab, but older buildings tend to have multiple exhaust fans, and exhaust fans create negative pressure zones.
- Hygienic design of air handling units (AHUs) and ducts is imperative to food safety. Employ an HVAC engineer to design a system with the appropriate number of air turns

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per hour to fit the facility and its operations.

- Standard ventilation filters could be blowing contaminants in the lab. The level of food micro-sensitivity will dictate the level of filter standards and the type of filter needed.
- Air sampling can help to determine if the air within a lab space has high levels of microbiological activity.

### 3. Maintain a Tidy Workspace

While this may sound as if it goes without saying, workspaces that aren't carefully cleaned can harbor microorganisms, bacteria, and allergens. This can endanger employees within the lab and increase the risk of cross contamination.

- Labs should be organized so that expectations are crystal clear. A good rule to follow is the "5-S" process: sort, set in order, shine, standardize, and sustain.
- Dispose of expired products promptly and ensure that they don't come into contact with lab equipment or samples.
- Use only designated cleaning tools, solutions, and products, and create timetables to regularly switch them out.
- Clean the lab area in the moment and/or at regular intervals throughout the day (whichever comes first).
- Mandate and provide gloves and other personal protective equipment for all personnel to protect against cross contamination and contain lab testing within smaller areas.
- Utilize designated disposal bins for different testing waste, keeping bio-hazard waste and chemicals separate from non-biohazard waste.
- Design storage with safety in mind. Designated safety cabinets help workspaces stay organized, but they can also increase safety levels in a lab.

### 4. Keep Equipment in Pristine Condition

Faulty equipment escalates multiple risk factors—namely, biohazard risk, food safety risk, and personal safety risk. Even if equipment is perfectly clean, it can leak or create other messes that contribute to an unsafe lab if it's not in top condition.

- Document and communicate regular maintenance and inspection sched-

ules. Equipment needs to be regularly tested and proactively inspected to verify its condition.

- Implement a robust system of checks and balances to ensure that maintenance activities are not isolated.
- Clean equipment according to the operator's manual. For example, distilled water and specialized cleaning agents may be required to keep equipment operational and prevent corrosion.
- Keep equipment free of dust, dirt, grease, and of course bacteria to improve performance and increase safety.
- Focus on preventative maintenance to extend the life of equipment productivity.

### 5. Test, Test, and Re-Test Within Your Lab Setting

Even the cleanest facilities need to ensure that their cleaning procedures are effective.

- Perform regular environmental testing to check the lab environment.
- An environmental monitoring program (EMP) can determine whether or not an environment is sanitary and verify if pathogen controls are working.
- Utilize negative control plates when using microbiological samples to check for cross contamination.
- Enlist food safety partners to assess tests within the lab (additional checks/balances).

### The Cleaning Supply Chain

As in the distribution supply chain, one weak link in a laboratory can affect the entire chain. A lab may have extensive protocols in place to keep equipment clean and fully operable, but if a new employee is unfamiliar with the equipment, the process can start to break down.

### Training at All Levels

Food labs and production facilities can amp up the level of safety by seeking supply chain partners that offer training on the equipment they provide, including usage, maintenance, and cleaning. At the other end of the chain, a food distributor, wholesaler, or retailer needs training to continue the chain of safety.

### A Culture of Safety

Another important aspect to be aware of in a supply chain partner is company culture. While this can be harder to discern at first glance, there are red flags that can indicate that an organization's values may inadvertently affect the level of safety. For example, a focus on speed over all else may lead to shortcuts or hasty cleaning protocols that increase safety risk all the way across the chain.

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### Consumer Safety

Both contract and in-house labs help prevent contamination and foodborne illnesses. As time goes on, their role in analyzing and mediating safety issues at a larger scale is increasing. In other words, food labs are equipped with the tools and expertise to perform analytical and preventive work that can support the entire food system, not just its direct partners.

### A Look to the Future

Labs that are efficient, productive, and clean enable vendors and suppliers to provide safe food to the growing populations of consumers across the globe. Impeccable cleaning protocols can protect public safety and also allow food companies to channel resources toward growth initiatives, rather than using those same resources to cover the damaging expenses of recalls. With safety as a foundation, food labs play a central role in the future of our food systems. ■

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