

Ready-to-Eat Sanitation

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Many RTE processes involve handling the product after it has been subjected to an initial lethality treatment, an event we refer to as **post-lethality exposure**. When product is directly exposed to the environment, it can become cross-contaminated. **Cross-contamination is the transfer of bacteria, possibly including pathogenic bacteria, to the exposed RTE product after the lethality treatment.** These bacteria can come from the environment, from employees, or from equipment. They can be transferred directly, such as when an exposed RTE product is placed on a tabletop that has bacteria on it. Often, they are transferred indirectly, such as when a pallet placed on the floor in a raw area is subsequently used in the RTE area, or when an employee handles a pallet and then touches exposed product.

RTE establishments are responsible for producing product that is free from pathogens. The pathogen *Listeria monocytogenes* (*Lm*), one species of *Listeria* bacteria, is of particular concern because it has potentially fatal consequences. *Lm* is a biological food safety hazard that an establishment producing post-lethality exposed RTE products must control through its HACCP plan or prevent in the processing environment through Sanitation SOPs or some other prerequisite program. RTE product is considered adulterated if it contains *Lm* or if it comes into direct contact with a food contact surface that is contaminated with *Lm*.

Lm is spread very easily by direct contact with a contaminated surface. ***Lm* can survive and grow in cool, damp environments**, such as those found in processing areas, coolers, or floors. Incomplete removal of product debris can provide nutrients and a place of attachment which allows bacterial growth. Additionally, if not removed by cleaning and sanitizing, *Lm* colonies can secrete a **biofilm**, a thick, protective matrix that is resistant to subsequent application of sanitizers. Biofilms can form on solid surfaces, such as stainless steel and rubber, and can survive adverse conditions on apparently smooth surfaces.

Since *Lm* thrives in damp environments, establishments need to keep equipment dry to reduce its growth. In the course, we discussed a generic sequence that establishments should follow when conduct **pre-operational sanitation procedures**. (Note that establishments may vary their procedures from this model to suit their layout, equipment, and processes):

- Dry cleaning of equipment
- Wash and rinse floor
- Pre-rinse equipment
- Clean, foam, and scrub equipment
- Rinse equipment
- Visually inspect equipment
- Sanitize floor and then equipment
- Dry

****Note that the floor is generally cleaned and sanitized before the equipment. This is to ensure that bacteria on the floor are not aerosolized during spray-down and subsequently land on clean equipment.****

While it is not required, it is good practice for establishments to **rotate their sanitizers** to keep pathogens and other microorganisms “off-balance”. Rotating between acidic and alkaline detergents is a good way to prevent pathogens from developing resistance to sanitizer chemicals. Chlorine (e.g., bleach), peroxyacetic acid (PAA), and quaternary ammonium (“quat”) compounds are examples of different sanitizers establishments may use over the course of time.

We have already discussed SSOPs, but establishments’ compliance with the Sanitation Performance Standards (SPS) is essential to prevent the creation of environmental reservoirs of *Lm* and other pathogens. Establishments should consider the following:

- (1) Air flow – Establishments producing RTE product in a post-lethality environment should consider that pathogens like *Lm* may travel on air currents. Therefore, facilities should be designed so that air does not readily flow from “dirty” areas into the post-lethality processing area.
- (2) Ventilation – Related to air flow, establishments should consider designing ventilation systems to bring clean or purified air into post-lethality processing areas and to readily draw objectionable vapors which may contain contaminants out. Some establishments use positive-pressure ventilation, in which purified air is pumped into post-lethality processing areas at slightly higher than atmospheric pressure and then flows down a pressure gradient to other areas of the establishment.
- (3) Layout – Establishments should design their facilities so that it is difficult—if not impossible—for personnel and equipment to readily move from raw processing areas into RTE processing areas.

One of the environmental aspects addressed should be dust generated by **construction and other disruptive activities**, which can establish contamination on food contact and other environmental surfaces. Removal of walls, ceilings, drains, etc. can release *Lm* into the air, which can subsequently be carried on air currents to RTE processing areas.

Though we discuss sampling in another module, we should address how we use sampling to assess sanitation effectiveness. FSIS’s RTE sampling program **confirms establishment controls are effective and measures the effectiveness of sanitation procedures**.

In addition to the sampling programs, IPP verify that establishments:

- Monitor implementation of their SSOPs
- Observe employee hygiene practices
- Maintain good recordkeeping
- Reevaluate and modify SSOPs as needed

Establishments may develop sampling programs for one or more of the following purposes:

- Measuring the effectiveness of cleaning and sanitation
- Verifying that finished product is free of *Lm*
- Testing for organic residues, spoilage organisms (including yeast and mold), coliform bacteria, non-pathogenic bacteria, or indicator organisms such as *Listeria* spp.

There are a variety of **test types and sampling methods** that establishments may use, such as swabs and sponges used with standard plating methods, prepared plates and other testing kits of various types, and air collection systems. Establishments may also utilize total plate counts (TPC) or ATP bioluminescence testing. The amount of time it takes test results to be available also varies from several minutes to several days, depending on the type of method used.

Establishments may test:

- (1) Environmental surfaces – Areas where product does not make direct contact, such as walls, ceilings, floors, table or cart legs, employee shoes, cables, or light switches. Such testing yields information about sources of pathogens, extent of contamination, information about equipment design, and identifies possible cross-contamination sites. A positive test indicates that a pathogen *may* have been transferred to product and should be followed up by cleaning and further testing of food contact surfaces and product.
- (2) Food contact surfaces – Surfaces which may directly contact finished product, such as tabletops, conveyor belts, gloves, aprons, hands, knives, packaging material, and brine solutions. A positive result when testing for an indicator organism (e.g., *Listeria* spp.) indicates that product *may* have been contaminated. A positive result for *Listeria monocytogenes* indicates that product has been **adulterated**.
- (3) Product – Establishments may test actual product after it has undergone the lethality step, thus assessing the effectiveness of the lethality treatment(s) applied. A positive result for *Lm* indicates that the product has been **adulterated** and supports the idea that *Lm* must be considered as an RLTO hazard.

In all cases, it is essential that the establishment maintain comprehensive records of sampling results.

Finally, remember the important **connection between sanitation and HACCP systems** in RTE processing establishments. In most cases, the lethality step is established as a critical control point (CCP); however, establishments may also need to develop one or more CCPs to address the risk of post-lethality contamination (exposure), or to address deficiencies not covered by the sanitation program.