FSIS Best Practices Guidance for Controlling *Listeria monocytogenes* (*Lm*) in Retail Delicatessens

June 2023
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This guidance document provides information for retail firms. The guidance covers:

- Actions retailers can take in the delicatessen (deli) area to decrease the potential for *Listeria monocytogenes* (*Lm*) growth and cross-contamination;
- Steps retailers can take to help ensure that deli products are maintained under sanitary conditions that do not allow *Lm* adulteration of the product;
- Information from the U.S. Food and Drug Administration's (FDA) Food Code, scientific literature, other guidance documents, and lessons learned from meat and poultry establishments that retailers can use to control *Lm*; and
- Helpful tools that retail firms can use to identify potential gaps in current best practice procedures.

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Preface

This is a revised version of the *FSIS Best Practices Guidance for Controlling Listeria monocytogenes* (*Lm*) *in Retail Delicatessens.* It has been updated in response to the USDA-FSIS Retail *Listeria monocytogenes (Lm)* Focus Group Findings and the National Advisory Committee on Meat and Poultry Inspection (NACMPI) recommendations. The guideline also includes changes to improve its readability.

This guideline represents the Food Safety and Inspection Service's (FSIS) current thinking on these topics and should be considered usable upon its issuance.

The information in this guideline is provided to assist retailers in reducing the risk of *Lm* in retail delicatessen (deli) products. The contents of this document do not have the force and effect of law and are not meant to bind the public in any way. This document is intended only to provide recommendations based on the results of a joint FSIS, Food and Drug Administration (FDA), and Centers for Disease Control and Prevention (CDC) 2013 *Listeria monocytogenes* in Retail Delicatessens Interagency Risk Assessment.

This guideline is focused on small firms in support of the Small Business Administration's initiative to provide small businesses with compliance assistance under the Small Business Regulatory Enforcement Fairness Act. However, all meat and poultry retail firms may apply the recommendations in this guideline. It is important that retailers have access to a full range of scientific and technical support, and the assistance needed to establish safe and effective Hazard Analysis and Critical Control Point (HACCP) systems. Focusing the guideline on the needs of small independent operations provides them with assistance that may be otherwise unavailable to them. However, deli departments in large supermarkets can benefit from the information in this guideline as well.

Purpose

This guideline provides recommendations that retailers can take in the deli area to control *Lm* contamination of ready-to-eat (RTE) meat and poultry products. The guideline highlights recommendations that are based on the Interagency Risk Assessment, which summarizes the risks posed by *Lm* from the consumption of RTE foods that are commonly prepared and sold in retail delis, and how these risks may be impacted by changes in practice.

This guideline includes:

- Information on the regulation of meat and poultry, and information from the FDA Food Code;
- Scientific literature and other guidance documents;
- Lessons learned from FSIS verification sampling and review of sanitation programs for *Lm* in meat and poultry processing establishments;
- Sources of *Lm* and risk mitigation;

- Information on how firms can achieve active managerial control; and
- The eight most important recommendations for retail deli operations.

This guidance does not replace the Food Code, state, tribal, local, or FSIS regulations. This document can be used along with the Food Code to help retailers ensure that meat and poultry products are not prepared under insanitary conditions in the retail deli area.

PURPOSE OF THIS GUIDELINE

- Provides recommendations retailers can take in the deli area to control *Lm* contamination of RTE meat and poultry products.
- Highlights the eight most important retail deli recommendations.

Reason for Issuing the Guideline

FSIS developed this guideline to assist retail deli operators in the prevention and control of *Lm* in their operations. FSIS is updating and reissuing this guideline as part of continuing efforts to assess the scientific support and new technologies available to improve the effectiveness of policy documents and recommendations to retailers.

Changes from The Previous Version of the Guideline

This guideline, dated **June 2023**, is final. FSIS will update this guideline as necessary, as new information becomes available.

FSIS made the following changes to this guideline to reflect the comments received on the previous version during the comment period, as well as provide additional scientific information.

This version incorporates the following changes:

- The Interagency Risk Assessment—*Listeria monocytogenes* in Retail Delicatessens findings have been removed, and can be found using the hyperlink on page 3;
- Removed the recommendation that retailers should rotate (change) sanitizers;
- Added the following sections: *Sources of Listeria in Retail Firms, Active Managerial Control,* and *Risk Mitigation of Listeria monocytogenes (Lm) in Retail Firms*;
- Relocated the Deli Self-Assessment Tool to the Appendices; and
- Added a *Glossary* to the Appendices

How to Effectively Use the Guideline

Retailers can use the best practices identified in this guidance to help ensure that RTE meat and poultry products in the deli area are handled under sanitary conditions and are not adulterated, as defined in the Federal Meat Inspection Act (FMIA) and Poultry Products Inspection Act (PPIA). While these practices are designed to control *Lm* specifically, they also may help control other foodborne pathogens that may be introduced into the retail deli environment and other facilities where consumers take possession of food. No single action or practice will control *Lm* contamination. Therefore, by following the best practices in this guidance and the Food Code, retailers can help ensure that RTE products are not adulterated with *Lm*, and that the potential for listeriosis is decreased.

KEY POINT

No single action or practice will control *Lm* contamination of retail foods. There are many steps that retail deli operators, and their suppliers can take to help reduce the risk of listeriosis.

A Deli Self-Assessment Tool is provided in Appendix A of this guidance for deli operators to help them identify the best practices they are using and to assess whether they need to adopt others.

This guideline is divided into five chapters and organized to provide users with current science and recommendations. To use this guideline, FSIS recommends that readers use the navigation headings in the Table of Contents to move efficiently through the document sections of interest. Hyperlinks, where provided, will take you to the correct place in the document electronically, to other complementary documents, or to the Guideline's Glossary for a definition of the word.

The Reference list at the end of the document provides resource materials used in the development and revision of this guidance.

NOTE: Recommendations in this guidance, especially those based on the Food Code, may be regulatory requirements in state, local, or tribal regulations.

Questions Regarding Topics in the Guideline

If after reading this guideline you still have questions, FSIS recommends searching the publicly posted Knowledge Articles ("Public Q&As") in the askFSIS database. If after searching the database, you still have questions, refer them to the Office of Policy and Program Development (OPPD) through askFSIS and select **Sampling** as the Inquiry type or by telephone at 1-800-233-3935.

Documenting these questions helps FSIS to improve and refine present and future versions of the guideline and associated issuances.

FSIS Best Practices Guidance for Controlling *Listeria monocytogenes* (*Lm*) in Retail Delicatessens

Chapter I: Introduction

A. Background

Risk assessments of *Lm* in deli-sliced meat versus pre-packaged deli meats, were used to analyze the risk of listeriosis associated with deli prepared meat and poultry products. The FSIS Comparative Risk Assessment for *Lm* in RTE Meat and Poultry Deli Meats (2010) estimates that of listeriosis cases attributed to deli meat, 83% are associated with deli meat that was sliced and packaged at retail (Endrikat *et al.*, 2010; Pradhan *et al.*, 2011; FDA and USDA-FSIS, 2013). Safe food handling practices, thorough cleaning and sanitation procedures, maintenance of the facility and equipment, and good employee sanitation practices are key components in reducing the likelihood of RTE foods becoming contaminated in retail.

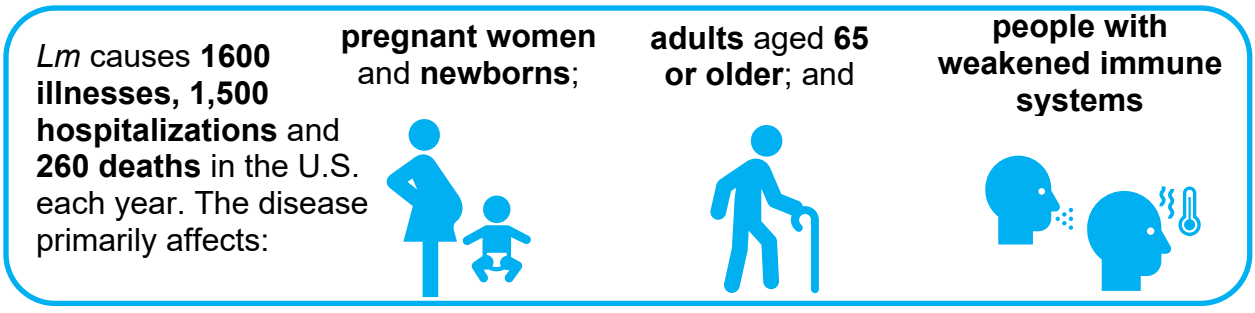
KEY POINT

Of listeriosis illnesses attributed to deli meat, 83% are associated with deli meat that is sliced and packaged at retail.

B. Public Health Relevance

Listeriosis is a serious infection usually caused by eating food contaminated with the bacterium *Lm*. Although rare, it is the third leading cause of death from foodborne illness in the U.S. with a high fatality rate (approximately 21%, compared with 0.5% for either *Salmonella* or *E. coli* O157:H7), and it has the highest hospitalization rate (approximately 90.5%) (Lakicevic *et al.*, 2016; Scallan *et al.*, 2011). The CDC estimates that infection with *Lm* causes about 1,600 illnesses, 1,500 hospitalizations, and 260 deaths in the U.S. each year. The disease primarily affects older adults, pregnant women, newborns, and people with weakened immune systems (CDC, 2022; FDA and USDA-FSIS, 2003).

The minimum infectious dose of *Lm* is unknown, despite significant research on the concentration. In some cases, it is not possible to identify the specific contaminated food. This is usually compounded by the consumers' inability to recall what and where they have eaten over the past several days (Lakicevic *et al.*, 2016).



Lm Survival and Growth Characteristics

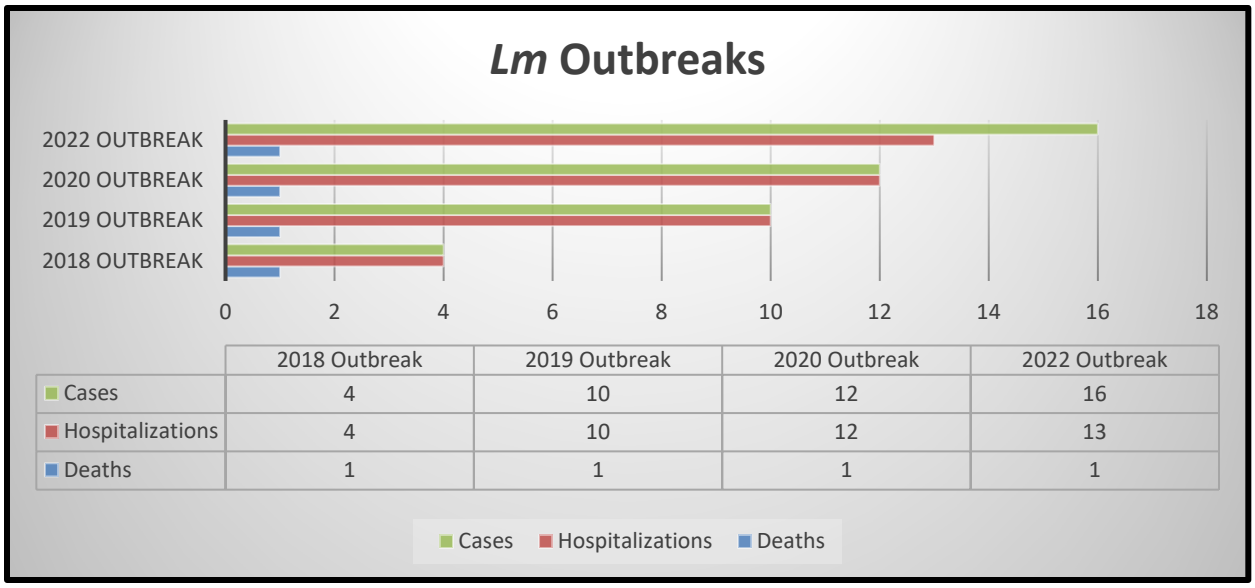
Lm survives and grows at cool temperatures as low as 34°F (1°C). It is found in moist environments, soil, and decaying vegetation and can persist along the food continuum. Because of its growth and survival characteristics, *Lm* usually persists in the environment and is commonly referred to as a harborage organism. It can cross-contaminate food contact surfaces and foods. Transfer of the bacteria from the environment (*e.g.*, deli cases, slicers, and utensils) (Pradhan *et al.*, 2010), employees, or raw food products, is a particular hazard of concern. In addition, improper sanitation, improper product handling, and poor employee practices can lead to the transfer of *Lm* to RTE meat and poultry products, causing them to become adulterated (Lakicevic *et al.*, 2016). RTE meat and poultry products do not require cooking prior to being consumed and are often held at refrigerated temperatures *(*Burnett *et al.,* 2006*)*. However, because *Lm* can survive and grow at cool temperatures, RTE food products may provide an ideal environment for the bacteria to grow once contaminated.

Lm Outbreaks

FSIS investigates *Lm* outbreaks in coordination with federal and state partners when meat, poultry, or egg products are identified as potential sources of *Listeria* illness. RTE products prepared at retail delis are often sources of the illness during these outbreaks. The following four *Lm* illness investigations conducted by FSIS, state, and other federal partners, identified RTE meat and poultry products that were sold at retail delis as one of the known sources of *Listeria* illness (Table 1).

- A 2022 outbreak in which the majority of ill people reported eating products sliced at the deli counter. The outbreak strain was identified in environmental samples collected at a retail deli and several open packages of meats sliced at the deli.
- A 2020 outbreak where epidemiologic evidence showed that Italian-style deli meats was the likely source. The majority of ill people reported purchasing prepackaged deli meats and meats sliced at deli counters. Shopper records were used to help confirm these deli meats as the suspect vehicle;
- A 2019 outbreak in which the majority of ill people reported eating products sliced at the deli counter. The outbreak strain was identified in environmental samples collected at multiple retail deli locations and in meat sliced at the deli; and
- A 2018 outbreak associated with RTE ham products. Ham products were recalled by the manufacturer because of potential contamination with *Lm*. The products were identified as being sold at retail delis and as the source of *Lm* illness that led to a recall.

Table 1: Four outbreaks involving RTE deli meats since 2018 led to numerous hospitalizations and four deaths.



	2018 Outbreak	2019 Outbreak	2020 Outbreak	2022 Outbreak
Cases	4	10	12	16
Hospitalizations	4	10	12	13
Deaths	1	1	1	1

According to the U.S. Department of Health and Human Services (HSS), Office of Disease Prevention and Health Promotion (ODPHP), the most recent data show 0.27 (27,000) laboratory diagnosed, domestically acquired *Lm* infections per 100,000 population. The national *Listeria* Healthy People 2030 target is to decrease infections to 0.22 (22,000) infections per 100,000 population. It is important that everyone in the food safety community take steps to prevent infection and accomplish this goal.

Chapter II. Regulation of Meat and Poultry Products

FSIS shares jurisdiction with the FDA, state, local, and tribal authorities for meat and poultry products at retail. FDA makes recommendations regarding retail practices through the FDA Food Code. The Food Code assists jurisdictions at all levels of government by providing a technical and legal basis for establishing enforceable regulations for retail and food service industries. Retail firms are required to comply with the conditions of the permit or license under which they operate.

The FMIA and PPIA apply to meat and poultry products that are produced in federally inspected establishments, as well as other entities that produce or handle meat and poultry, including at retail. Although retailers are exempt from FSIS inspection, retailers are not exempt from the adulteration and misbranding requirements of the FMIA and PPIA and are thus required to maintain sanitary conditions and otherwise not produce adulterated or misbranded product per 21 U.S.C. 623(d) of the FMIA, 21 U.S.C. 464(e) of the PPIA, 9 CFR 303.1(f) and 9 CFR 381.10(d)(4).

FSIS provides instructions to its Compliance Investigators for surveillance activities at retail in FSIS Directive 8010.1, *Methodology for Conducting In-Commerce Surveillance Activities*. The purpose of in-commerce surveillance is to verify that;

- Meat and poultry products are wholesome, and not adulterated, and hazard controls are adequate to prevent adulteration;

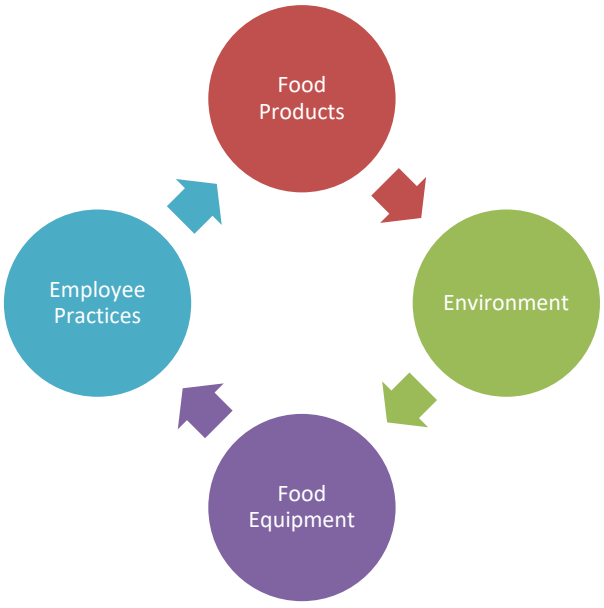
- Sanitary conditions are such that meat and poultry products will not become contaminated with filth or rendered injurious to health, and are secure from threats and intentional acts of contamination (21 U.S.C. 601(m)(4));
- Products are legally imported and exported, and imported products are wholesome, correctly marked and labeled, and are from eligible countries and certified foreign establishments (9 CFR 327);
- Records are kept and maintained, and fully and correctly disclose all transactions involved in the business activity that is subject to the provisions of the FMIA and PPIA (21 U.S.C. 642 of the FMIA; 21 U.S.C. 460 of the PPIA; 21 U.S.C. 1034 and 1040 of the Egg Products Inspection Act (EPIA)); and
- Products not intended for human food, or not fit for human food are properly denatured or otherwise made inedible as prescribed by Federal regulations.

Operations traditionally and usually conducted at retail stores and restaurants are outlined in 9 CFR 303.1(d)(2)(i) and 9 CFR 381.10(d)(2)(i).

Chapter III. Sources of *Lm* in Retail Firms

Practical knowledge of potential *Lm* sources can be useful to establish control measures to prevent *Lm* contamination in food products, in the environment, on equipment, and by employees. FSIS recommends retailers develop and implement programs designed to control and prevent *Lm*.

Figure 1: Food products, the environment (nonfood contact surfaces), food equipment (food contact surfaces), and employee practices are all potential sources of Lm contamination in retail firms.



A. Food Products

Some processing methods, such as heat or chemical treatment, may destroy *Lm* during the lethality step (*i.e.,* cooking). However, processed foods can be contaminated due to inadequate thermal treatment or contamination in the post-processing environment. Once contaminated food enters the retail firm, the potential for other foods to become contaminated significantly increases, and because of the open environment in retail (*i.e.*, open to the public), this may allow *Lm* to be introduced at various points and times of the day. This open environment also has the potential to make *Lm* more difficult to control in retail (CFP, 2004; Cutter *et al.*, 2017).

RTE foods in the deli are usually prepared with no additional lethality treatment to destroy pathogens before they are consumed, and they are generally not held hot ($\geq$135°F ($\geq$ 57°C)). Following safe food handling, refrigeration, and preparation practices, ensures that RTE foods are received, stored, prepared, held, and served safely.

B. The Environment

In retail firms, *Lm* harborage sites include drains, grease traps, floors, walls, air vents, and areas where pests may enter. To prevent pathogen entry routes, adequate sanitation standard operating procedures that include integrated pest management, regular cleaning, sanitizing, and air filtration should be implemented (Lakicevic *et al.*, 2016).

C. Food Equipment

Lm can hide in equipment that is difficult to clean, such as slicers, wheels of food transport carts, refrigerated display cases and coolers, cracks in the food preparation table, and in the cooling fans inside of cold-holding units (FMI, 2006). Slicers are especially important as they have the potential to serve as a vehicle for cross-contamination of deli products with different foodborne pathogens. Specific locations in slicers that are difficult to clean are the back plate, table, guard, blade, and collection area (Figure 2) (Lakicevic *et al.*, 2016). It is recommended that equipment food contact surfaces used with potentially hazardous (time/temperature control for safety) foods, such as slicers, be cleaned throughout the day at least once every four hours to prevent microorganism growth on surfaces. All food contact surfaces, including utensil and equipment food contact surfaces, must be cleaned and sanitized as frequently as necessary to prevent the creation of insanitary conditions and the adulteration of

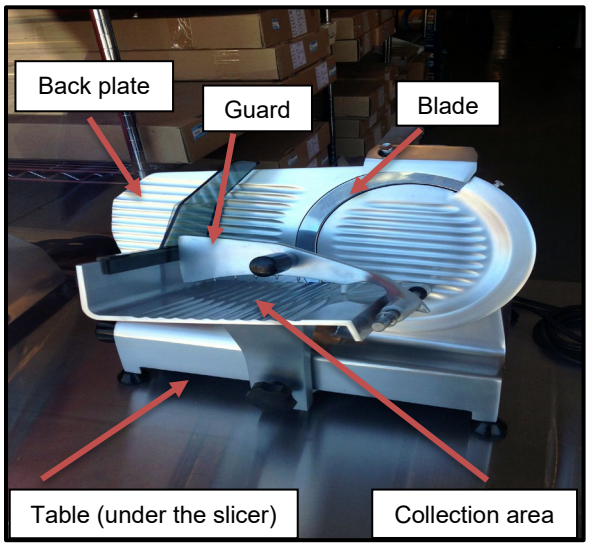


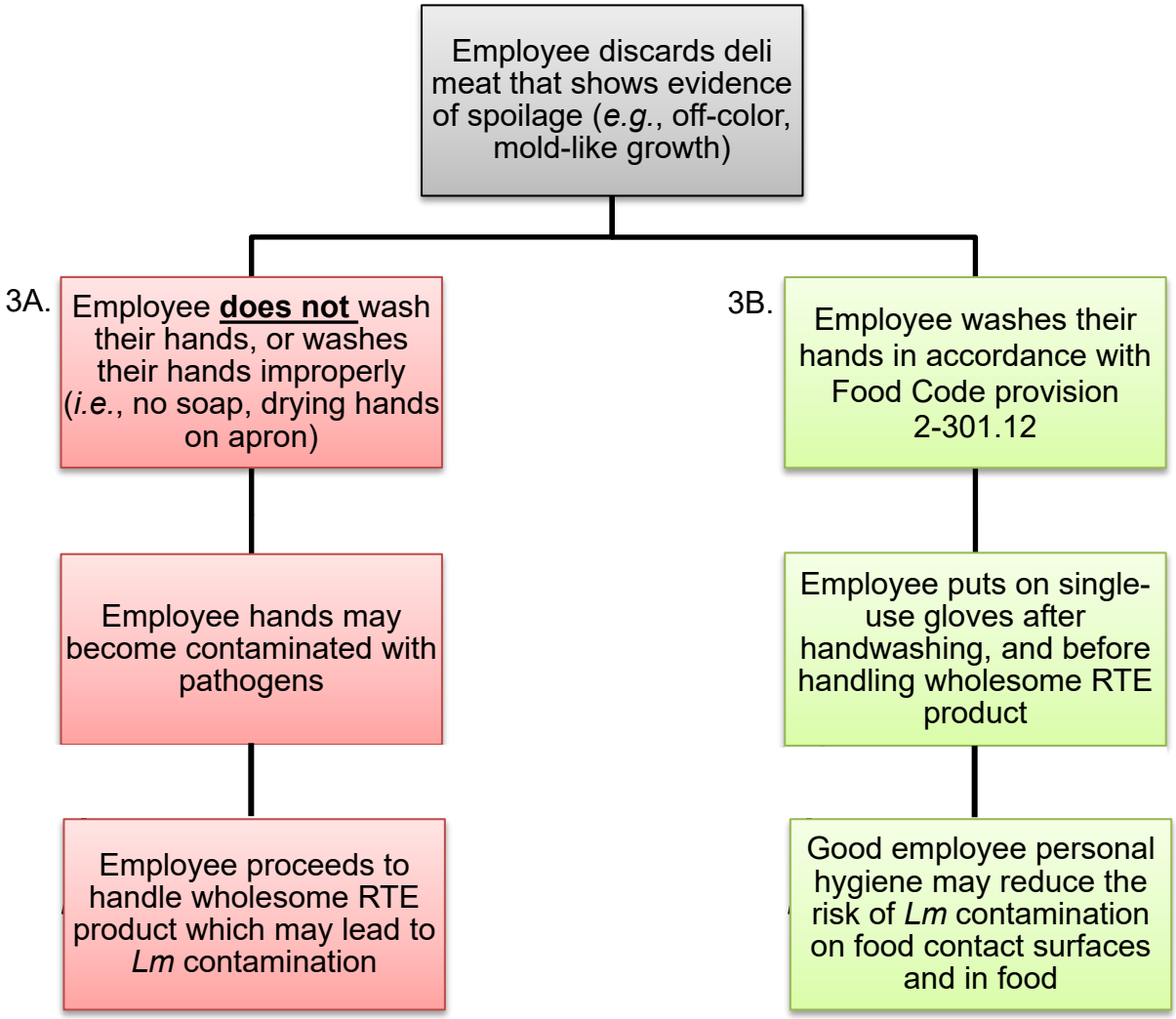
Figure 2 – Locations on slicers that are difficult to clean

product, per 9 CFR 416.4(a). Soiled and improperly cleaned equipment can contaminate otherwise safe food.

D. Employee Practices

FSIS recommends that employees follow proper personal hygiene recommendations (Figure 3B) and take proper steps to receive, store, prepare, and serve food safely. To prevent the contamination of food contact surfaces, development of employee hygiene procedures should be the responsibility of management. The employee should be responsible for preventing the contamination of food products, while the management should be responsible for ensuring that the employee is properly trained and maintains good practices (FSIS, 2014). This is part of active managerial control, discussed in the next chapter. Poor personal hygiene (Figure 3A), such as improper handwashing or soiled work clothes, may lead to contaminated food and equipment.

Figure 3. Employees should follow the recommendations in 3B to reduce the risk of Lm contamination on food contact surfaces and in food.



Chapter IV. Active Managerial Control

FSIS recommends retail deli and food service operators focus their efforts on achieving active managerial control. These are purposeful actions incorporated by firms to develop and implement food safety management systems to prevent, eliminate, or reduce the occurrence of foodborne illness (CFP, 2004).

Per the FDA Food Code Annex 4, *Management of Food Safety Practices, Achieving Active Managerial Control of Foodborne Illness Risk Factors*, active managerial control incorporates preventive approaches to food safety through the implementation of continuous monitoring and verification.

HACCP principles contain many key elements for establishing active managerial control in firms and for implementing an effective food safety management system by identifying, evaluating, and controlling food safety hazards that are likely to cause illness if not properly controlled. The food safety management system involving the Food Preparation with No Cook Step (*i.e.*, no pathogens are destroyed) process focuses on ensuring active managerial control over;

- Cold holding to control the outgrowth of *Lm*;
- Receiving temperatures, per Food Code provision 3-202.11(A); and
- Datemarking of RTE foods to control *Listeria* growth

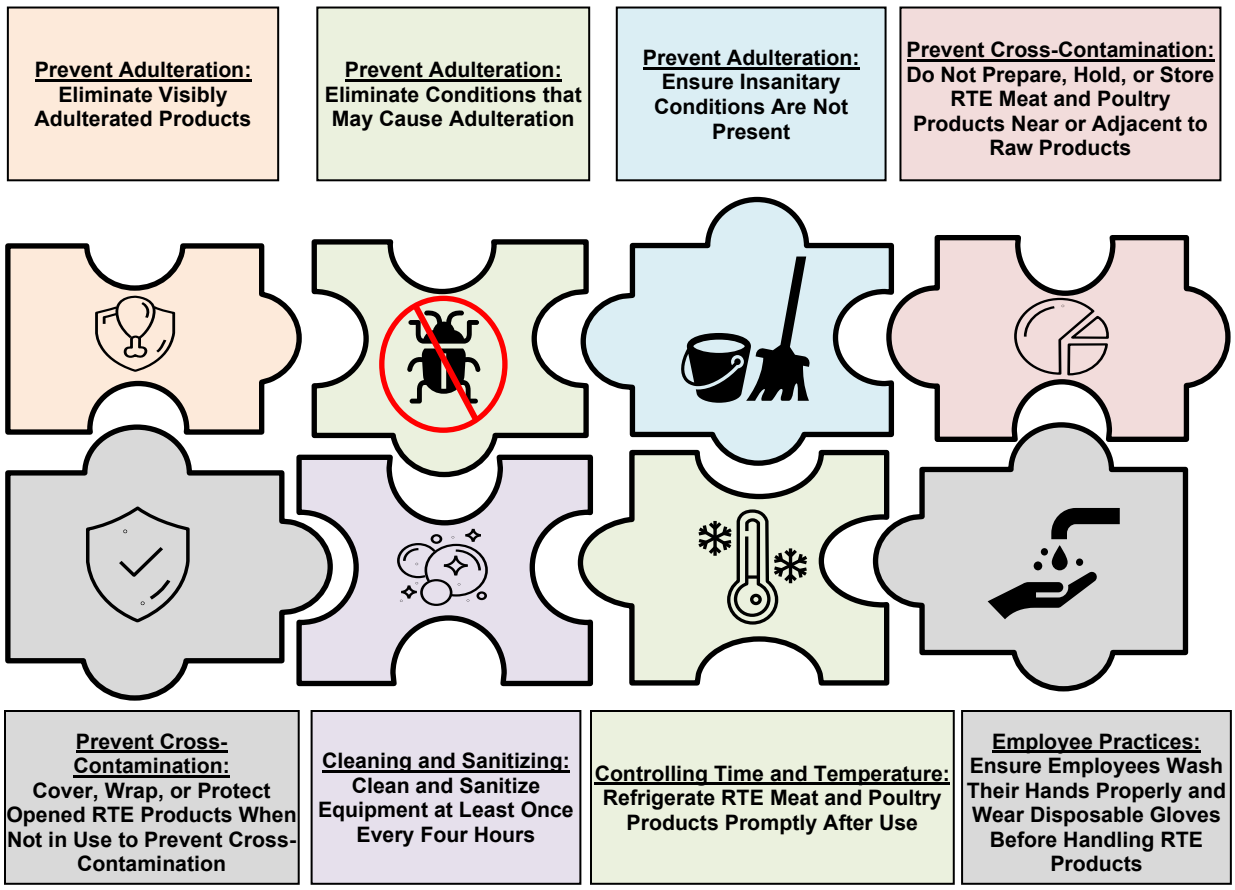
Chapter V. Risk Mitigation of *Lm* in Retail Firms

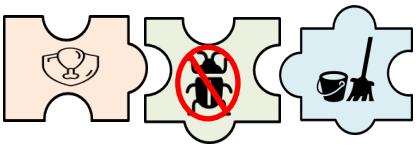
A. The Eight Most Important Retail Deli Recommendations

FSIS recommends firms apply a comprehensive approach to eliminate and prevent the introduction and occurrence of *Lm*. (Simmons *et al.*, 2014). An *Lm* control measure program should be based on scientific evidence that shows the control measure a firm chooses to implement can effectively reduce *Lm* on food contact surfaces and nonfood contact surfaces in retail firms.

FSIS conducted retail deli surveillance from 2016 – 2021 and used these data to develop the eight most important retail deli recommendations that are most likely to prevent contamination of *Lm*, if followed. The results are discussed in FSIS' *Surveillance for Listeria monocytogenes Controls for Ready-to-Eat Meat and Poultry Products in Retail Delicatessens, 2016-2021* and in Figure 4 below.

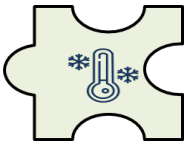
Figure 4: A Comprehensive Approach: Eight most important retail deli recommendations to prevent conditions that may cause adulteration.





• Prevent Adulteration

Improper sanitation, improper product handling, and poor employee practices can lead to the transfer of *Lm* to RTE meat and poultry products at retail causing them to become adulterated. It is important for retailers to adopt practices that protect RTE products from contamination with *Lm* and to use strategies to prevent or limit the growth of *Lm* in deli products. Remove products that are filthy, putrid, decomposed, slimy, rancid, or off-colored, which are considered adulterated, from the deli area as soon as possible (21 U.S.C. 601(m)(3) and (4)). Condensation dripping on exposed RTE product, construction dust on RTE product or food contact surfaces, or broken equipment that could harbor *Lm* are conditions that can lead to product adulteration. Furthermore, insanitary conditions such as flies, rodent droppings, mold, or dirty surfaces should not be present in retail areas (FSAI, 2005). Thoroughly clean and sanitize areas that come in contact with affected product to prevent any cross-contamination.



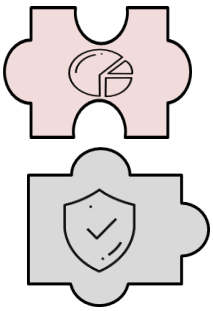
• Controlling Time and Temperature

FSIS recommends refrigerated foods be maintained at or below 41°F (5°C) to slow the growth of *Lm* in the deli. If followed, approximately 9% of predicted listeriosis cases caused by contaminated deli products prepared or sliced in the retail deli could be prevented, decreasing the risk for listeriosis (FMI, 2012). In addition, when RTE products are promptly returned to refrigerated units after handling, it limits the growth of *Lm* (CFP, 2004).

Because *Lm* grows at refrigerated temperatures, it is also important to monitor the shelf-life of RTE products. FSIS recommends RTE foods that are opened, prepared, and held in a retail setting for more than 24 hours be clearly datemarked with the date of opening and the discard date, as recommended by Food Code provision 3-501.17(B) and (D). FSIS also recommends the product be properly identified on the label, and food items that are past their shelf-life be discarded (FDA and USDA-FSIS, 2003).

KEY POINT

If all refrigerated RTE foods are stored at 41˚F/5˚C or below, approximately 9% of predicted listeriosis cases caused by contaminated deli products prepared or sliced in the retail deli could be prevented.



• Prevent Cross-Contamination

The predicted risk of listeriosis dramatically increases in retail delis because of cross-contamination (Lakicevic *et al.*, 2016; Pouillot *et al.*, 2015). Contaminated RTE products that support *Lm* growth and those that do not have been shown to cross-contaminate other RTE foods at retail, which exacerbates the risk of illness. Therefore, FSIS continues to strengthen programs and recommendations to reduce or eliminate *Lm* (FSIS, 2014).

If all cross-contamination points in the deli are eliminated, it decreases the predicted risk of illness from the consumption of RTE products prepared or sliced in the retail deli by approximately 34%. To eliminate or prevent the growth of *Lm* in RTE products, FSIS recommends:

- When possible, use or purchase source materials formulated with antimicrobial agents (*e.g.*, acetic acid, sodium diacetate, lactic acid, citric acid) (Lloyd *et al.*, 2010; Simmons *et al.*, 2014). If all deli products that support *Lm* growth were formulated to include growth inhibitors, approximately 96% of predicted listeriosis illnesses caused by RTE products prepared or sliced in the retail deli could be prevented (Hoelzer *et al.*, 2014). While this finding is significant, the actual benefit is dependent on the concentration of the growth inhibitor used. The concentration may not be used in high enough concentrations due to inhibitors changing the flavor of the product (Pouillot *et al.*, 2015). Retailers should read the list of ingredients on the labels to see whether the products in the deli have antimicrobial agents and contact their suppliers to determine whether products formulated with antimicrobial agents are available.
- Use products that have been processed to reduce pathogens (*e.g.*, through high-pressure processing) (FSAI, 2005; Lakicevic *et al.*, 2016). This information can be determined from certificates of analysis, letters of guarantee, or other information from suppliers (FDA, 2008).
- Storing and handling RTE products in a separate area from raw products. It is recommended that retailers and food service operators separate raw animal foods from RTE foods during storage, preparation, holding, and display. If storage space is limited, wrap RTE products or place in a sealed container, and store above raw and par-cooked products. When wrapping, unwrapping, and

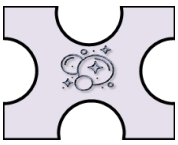
KEY POINTS

If all cross-contamination points in the deli are eliminated, it would decrease the predicted risk of illness from the consumption of RTE products prepared or sliced in the retail deli by approximately 34%.

If all deli products that support *Lm* growth were reformulated to include growth inhibitors, approximately 96% of predicted listeriosis illnesses caused by RTE products prepared or sliced in the retail deli could be prevented.

slicing products, take care to prevent cross-contamination from the outer wrapper, other food products, and unclean surfaces and utensils.

Cross-contamination is particularly difficult to control completely, and raw meat and poultry products prepared in the same area as RTE products can increase the likelihood that RTE products will become contaminated. Proper product handling, cleaning, sanitizing, and good employee personal hygiene should help to prevent cross-contamination (Gibson *et al.*, 2013).



- Cleaning and Sanitizing

Food Contact Surfaces

Proper food contact surface cleaning and sanitizing (*e.g.*, wash, rinse, sanitize, air-dry) reduces predicted *Lm* levels (CFP, 2004). The risk of listeriosis from the consumption of RTE products sliced or prepared in retail deli departments increases by approximately 41% if cleaning, sanitizing, and routine wiping activities are not performed. FSIS recommends the following:

KEY POINT

The risk of listeriosis from the consumption of RTE products sliced or prepared in retail deli departments increases by approximately 41% if cleaning, sanitizing, and routine wiping activities are not performed.

- Develop a procedure for sanitizing cleaning aids (*e.g.*, cleaning cloths, brushes, sponges, mops) or use items that are discarded after each use. Cleaning aids can become contaminated with bacteria and can further spread the bacteria to every surface they contact. Therefore, cleaning aids should be cleaned of visible material and soaked in clean sanitizer between uses (Lakicevic *et al.*, 2016).
- Follow the manufacturer's recommendations for effective sanitizer concentration and appropriate application, and routinely monitor the concentration, while changing the solution, as needed (Lakicevic *et al.*, 2016). Food particles and dirty sanitizer solution can overwhelm the effectiveness of the sanitizer.
- Clean and sanitize surfaces between RTE items when using the same equipment to cut, slice, or reduce the size of large RTE products (*e.g.*, ham, seafood, vegetables).
- Disassemble RTE food-processing equipment when cleaning and sanitizing to ensure that hard to reach areas where *Lm* can hide are addressed (Figure 2) (Vorst *et al.*, 2006). For more information, see the FDA poster: Keep Commercial Deli Slicers Safe.
- Scrub surfaces during cleaning to prevent biofilms from occurring. *Lm* and other bacteria can adapt to the environment over time and form biofilms. Biofilms are difficult to remove and can protect *Lm* from the effects of some sanitizers (Folsom *et al.*, 2006; Lin *et al.*, 2006).
- Clean and sanitize items that employees routinely handle, such as on/off switches, handles of slicers, display cases, coolers, and similar surfaces.

- Wash hands in handwashing sinks only. Sinks used for cleaning equipment and utensils should not also be used for handwashing. Per Food Code provisions 2-301.15 and 4-501.16(A), employees should not clean their hands in a sink used for the preparation of food or warewashing. Handwashing can cause the sink to become contaminated with *Lm* and other pathogens that can be spread to other items cleaned in the sink (Lakicevic *et al.*, 2016).

Many sanitizers, when used as recommended, are effective against *Lm*, including those containing quaternary ammonia compounds, chlorine solutions, and organic acids. Generally, increasing the sanitizer concentration above the recommended levels will not increase the efficacy of the sanitizer and may result in harmful levels of the sanitizer in foods and on food contact surfaces, and cause corrosion of equipment (FSAI, 2005).

The Physical Facility

The physical facility should not contribute to product adulteration or contamination. Dust and particles generated by construction activities can move through the firm by air currents or transferred by people or equipment traveling through the construction area (FSIS, 2014).

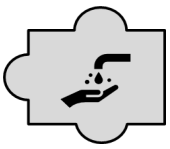
Here are some recommended areas to check and some insanitary issues to avoid in the physical facility:

Recommendations

- Protect product and equipment during construction, and clean and sanitize the deli area after construction and before use.
- Maintain tables, slicers, and other food contact surfaces so they are easily cleanable. Replace worn and missing seals or gaskets because they may become contaminated with *Lm*.
- Document actions performed to ensure sanitation procedures are performed on a regular basis (Lakicevic *et al.*, 2016).
- Maintain floors, walls, and ceilings so they are smooth, durable, easily cleanable, and in good repair.
- Clean overhead items as often as necessary to keep them free of condensation since these items can be *Lm* harborage sites. Prevent condensation, which can lead to contamination of food or food preparation surfaces.
- Use low water pressure (Lakicevic *et al.*, 2016).

Avoid

- Soiled and damaged rubber floor mats and other items used on the floor that may contribute to harborage sites for *Lm* and insanitary conditions.
- Splash and overspray from high-pressure hoses which can aerosolize microorganisms and distribute them into the air and onto nearby surfaces (CFP, 2004).
- Construction when exposed RTE product is present. *Lm* can be harbored behind the walls and carried by dust (FMI, 2006).
- Pooled water on the floor or other surfaces within the deli area. Pooled water increases the likelihood that splash could contaminate food products or food contact surfaces and can serve as a vehicle for *Lm* and other pathogens (CFP, 2004; FMI, 2012).
- Insanitary conditions, such as flies, rodent droppings, mold, and dirty surfaces.
- Rough surfaces created by welds, cracks, and other defects that can be difficult to clean and create areas where bacteria can hide.



- Employee Practices

A key finding of the Interagency Risk Assessment was, employees not wearing gloves while serving customers increases the risk of listeriosis from the consumption of RTE products prepared or sliced in the retail deli by approximately 5%. The Food Code recommends that employees wear gloves or use other suitable utensils to handle RTE foods, per provision 3-301.11(B). The provision also includes recommendations for training, handwashing, employee health and hygiene, and limiting public access in food areas to prevent product contamination. Good employee hygiene practices are critical to prevent cross-contamination and the spread of *Lm* and other pathogens (Gibson *et al.*, 2013). Here are some recommended FSIS best practices that employees should use to minimize cross-contamination.

Recommended Employee Practices

- Ensure that employees wear gloves or use suitable utensils when handling RTE products. Provide single-use gloves so that employees wear and change gloves, as needed, to prevent the contamination of food (Maitland *et al.*, 2013).
- Train employees in sanitation practices and safe food handling procedures.
- Ensure managers have knowledge of food safety practices and procedures.
- Provide adequate facilities, including soap, running water, and proper devices for hand drying for employees to wash and dry their hands. Employees should wash hands after eating or drinking, after using the restroom, after handling soiled equipment and utensils, when switching between handling raw and RTE foods, prior to gloving, and after engaging in other activities that may contaminate the hands (*e.g.*, handling money).
- Implement a written employee illness policy that includes excluding or restricting sick employees. Sick employees should not work in food areas, and should not handle single-service articles, clean equipment, and clean linens, when they exhibit or report signs of foodborne illness, or if a diagnosed foodborne illness is reported.
- Limit employee traffic in the deli area and develop traffic-flow plans for product, employees, and other items to prevent contamination by consumers and employees. The plans should minimize exposure of open RTE foods from raw foods, exterior packaging, and other possibly contaminated materials, such as boxes, trash, and chemicals. If possible, employees should not work in both raw product processing areas and the RTE deli area. If an employee does work in both areas, they should change outer and other soiled clothing, wash hands, and clean and sanitize footwear before moving between both areas. Design facilities and control traffic in the deli area to restrict movement of people and material to reduce the chance of cross-contamination. Nonfood workers should not handle exposed RTE products (CFP, 2004; FMI, 2012).
- Develop practices to prevent outer clothing from spreading contamination and ensure that employees change aprons or outer clothing, such as frocks or smocks, when the clothing is soiled to prevent transfer to food or food contact surfaces. Employees should not hold exposed RTE food products against their aprons or other clothing. Employees should not wear aprons and other food

service clothing into restrooms, in break areas, outside, or outside the deli area, where contamination can occur.

Appendices

Appendix A: Deli Self-Assessment Tool – Good Retail Practices

No single action or practice will control *Lm* contamination of retail foods. Food Code provision 8-401.10(A) instructs the regulatory authority to inspect food establishments at least once every six months. Therefore, FSIS recommends retailers use this tool at least quarterly to ensure ongoing, safe handling of food, proper sanitation, and proper employee hygiene, to reduce the occurrence and reoccurrence of risk factors that contribute to foodborne illness. This tool will help retailers determine whether they have adopted the appropriate procedures to control *Lm* or whether they should adopt new procedures. A "yes" answer means the recommendations in this guidance are being followed. If retailers find that they are not meeting the recommendations, they should consider changing practices to better control *Lm* in the deli area.

DELI SELF-ASSESSMENT TOOL
GOOD RETAIL PRACTICES

PART I (1-5) **PRODUCT HANDLING**	**YES**	**NO**	**N/A**
1. **Preventing Adulteration**			
a. Is visibly adulterated product absent in the area (*e.g.*, filthy, putrid, decomposed, slimy, rancid, off-color)?	☐	☐	☐
b. Are RTE products prepared, held, or stored away from raw product in the deli case and elsewhere in the deli area?	☐	☐	☐
c. Are opened RTE products covered, wrapped, or otherwise protected to prevent cross-contamination when not in use in the deli case and elsewhere in the deli area?	☐	☐	☐
2. **Controlling Time and Temperature**			
a. Are the deli cases and other refrigerated units maintained at or below 41°F (5°C)?	☐	☐	☐
b. Are RTE meat or poultry products refrigerated promptly after use?	☐	☐	☐
3. **Datemarking**			
a. Are RTE products that are stored in the deli case properly identified and labeled?	☐	☐	☐
b. Are RTE products datemarked within 24 hours of being opened?	☐	☐	☐
c. Are RTE products in the deli case within the firm's and manufacturer's datemark period?	☐	☐	☐
4. Are deli products formulated with antimicrobial agents?	☐	☐	☐

5. Are separate sinks identified and used for handwashing and warewashing, food preparation, and wastewater (*i.e.*, mop water)?	☐	☐	☐
PART II (6-11) CLEANING AND SANITIZING	**YES**	**NO**	**N/A**
6. **Food Contact Surfaces** a. Are RTE product food contact surfaces cleaned and sanitized prior to using the surface for another product to avoid cross-contamination of products? b. Are surfaces scrubbed during cleaning to prevent biofilms? c. If deli salads are prepared, are there controls in place to ensure that grinders, dicers, and other equipment is maintained in sanitary condition? d. Are food contact surfaces of RTE equipment (including slicers) cleaned and sanitized at least once every 4 hours? e. During cleaning and sanitizing, is RTE equipment disassembled? f. Are product food contact surfaces (*e.g.*, slicers and mixers) in good condition for proper cleaning and sanitizing (*e.g.*, non-porous surfaces, free from cracks, pits, and rough welds, free from broken, missing, or unattached parts, and seals and gaskets are not worn, degraded, or missing)?	☐ ☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐ ☐
7. Is the deli area free of insanitary conditions (*e.g.*, flies, rodent droppings, mold, or dirty surfaces) including where meat and poultry products are prepared, packed, or held?	☐	☐	☐
8. **Sanitizers** a. Are sanitizers used at the proper concentration, per manufacturer's instructions? b. Are cleaning cloths and other cleaning aids soaked or rinsed in sanitizer between uses?	☐ ☐	☐ ☐	☐ ☐
9. Is low water pressure used to prevent splashing and overspray?	☐	☐	☐
10. Is the deli area free of materials that make cleaning difficult (*e.g.*, pallets, milk cartons, cardboard boxes, or push carts)?	☐	☐	☐
11. **The Physical Facility** a. Is the facility free of conditions that could cause the product to become adulterated (*e.g.*, condensation dripping on exposed product, construction dust on product, broken equipment, or pests)? b. Are overhead structures and other structures over RTE product free of condensation?	☐ ☐	☐ ☐	☐ ☐

c. Are the walls, floors, and ceilings sanitary and in good repair?	☐	☐	☐
d. Are surfaces free of standing water?	☐	☐	☐
PART III (12-14) EMPLOYEE PRACTICES	**YES**	**NO**	**N/A**
12. **Employee Health** a. Are visibly ill employees excluded from working in food preparation areas where product could become contaminated (*e.g.*, by coughing or sneezing)?	☐	☐	☐
b. Are employees with symptoms of foodborne illness (*i.e.*, diarrhea, vomiting, sore throat with fever, jaundice, or infected wound or pustular boil) excluded or restricted in accordance with Food Code provision 2-201.12?	☐	☐	☐
13. **Employee Hygiene** a. Are employees washing their hands prior to handling exposed RTE product?	☐	☐	☐
b. Do employees wear single-use gloves when handling exposed RTE product?	☐	☐	☐
c. Do employees change single-use gloves as often as necessary to avoid cross-contamination of RTE product?	☐	☐	☐
d. Do employees change outer clothing (*e.g.*, frocks, aprons, or smocks) as often as necessary to avoid contamination of RTE product?	☐	☐	☐
14. Is foot traffic limited to necessary employees in areas where RTE product is handled?	☐	☐	☐

Appendix B: Glossary

Active Managerial Control
The purposeful incorporation of specific actions or procedures by industry management into the operation of their business to attain control over foodborne illness risk factors.

Antimicrobial Agent(s)
A substance in, or added to, an RTE product that has the effect of reducing or eliminating a microorganism, including a pathogen such as *Lm*, or that has the effect of suppressing or limiting growth of a pathogen, such as *Lm*, in the product throughout the shelf-life of the product. Examples: potassium lactate and sodium diacetate, which limit the growth of *Lm* (9 CFR 430.1).

Biofilm(s)
Thin layers of microorganisms that adhere to product contact surfaces. Biofilms are difficult to remove, and they may protect *Lm* from the effects of sanitizers.

Food Contact Surface(s)
A surface in the post-lethality processing environment that comes in direct contact with RTE product (9 CFR 430.1).

Harborage Organism
An organism that can form niches and grow to high numbers in the environment. Niches provide an ideal place for *Lm* to establish and multiply.

High-Pressure Processing (HPP)
A technology that subjects food to elevated pressures, with or without the addition of heat, to inactivate microorganisms and extend microbiological shelf-life.

***Listeria monocytogenes* (*Lm*)**
A pathogen that can contaminate ready-to-eat (RTE) meat and poultry products and causes the disease listeriosis.

Listeriosis
A foodborne illness caused by eating food contaminated with *Lm* bacteria.

Post-processing Environment
The area of an establishment into which product is routed after having been subjected to an initial lethality (*e.g.*, cooking) treatment. The product may be exposed to the environment in this area as a result of slicing, re-bagging, cooling, or other procedures (9 CFR 430.1).

Ready-to-Eat (RTE)
A meat or poultry product that is in a form that is edible without additional preparation to achieve food safety and may receive additional preparation for palatability or aesthetic, epicurean, gastronomic, or culinary purposes (9 CFR 430.1).

Retailer
A facility that sells meat, poultry, shell eggs, and/or egg products directly to consumers for consumption off-premises (9 CFR 303(d)(2)(iii) and 9 CFR 381.10(d)(2)(iii)).

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