

FOOD SAFETY

EU REGULATION 2024/2895

UV-C TECHNOLOGY

HACCP COMPLIANCE

UV-C Technology & *Listeria* Control: Preparing for EU Regulation 2024/2895

A practical briefing for food safety, QA, and regulatory professionals

The tightening of European food safety requirements is redefining how manufacturers approach *Listeria monocytogenes* control. With EU Regulation 2024/2895 reinforcing the obligation to ensure compliance **throughout the entire shelf life** of ready-to-eat (RTE) products, the industry is moving beyond end-product testing toward continuous, validated environmental control. In this context, hygiene is no longer a periodic activity — it becomes an **engineered system**, where every critical point must be managed with measurable effectiveness.



A Regulatory Turning Point

From **1 July 2026**, the European food industry faces its most significant update to *Listeria monocytogenes* control in nearly two decades.


Commission Regulation (EU) 2024/2895 (published 20 November 2024) amends the long-standing **Regulation (EC) No 2073/2005** on microbiological criteria for foodstuffs — **changing the rules in a way that touches almost every operator producing ready-to-eat (RTE) food in Europe.**

Before

The "not detected in 25 g" criterion applied only while the product remained under the manufacturer's direct control — typically at the factory gate.

Now — From 1 July 2026

That same standard must be demonstrated across the **entire shelf life**, all the way to the use-by date — unless operators can scientifically prove via validated challenge testing that contamination won't exceed **100 CFU/g** throughout storage.

 Where scientific evidence for the 100 CFU/g exception is absent, strict **zero-tolerance (non-detection in 25 g)** applies for the full commercial life of the product: from food process to shelf.

How the Change Cascades Through the Value Chain

This single regulatory shift implicates **distributors, retailers, and transporters** — not just producers.

The European Commission frames this as consistent public health protection **"from production to distribution."**

Revise HACCP Plans

Build **intermediate control limits** into HACCP plans that account for the full shelf life, not just conditions at the point of manufacture.



Validate Monitoring Systems

Periodically validate that environmental monitoring and control measures remain effective under realistic distribution and storage conditions — including foreseeable cold-chain breaks.



Prove Shelf-Life Claims

Use **validated challenge testing** or accepted **predictive microbiology models** to demonstrate that *Listeria monocytogenes* will not exceed **100 CFU/g** across the product's entire shelf life.

Why Now: The Public Health Picture

The timing of Regulation 2024/2895 is not arbitrary. The most recent **EU One Health Zoonoses Report** (EFSA & ECDC) found that in 2024, *Listeria* caused the **highest proportion of hospitalisations and deaths** among all foodborne infections reported in the EU.

~7/10

Hospitalisation Rate

Confirmed cases requiring hospital care — the highest among EU foodborne infections.

~1/12

Case Fatality

Confirmed listeriosis cases that resulted in death.

2023

Record Year

Highest number of confirmed listeriosis cases since EU/EEA monitoring began — concentrated in Germany, France, and Spain.

⊗ Greatest burden falls on the **elderly, pregnant women, newborns, and immunocompromised individuals** — populations with the least capacity to withstand severe infection.

From Cleaning to Continuous Control

Traditional sanitation remains essential, but it is intermittent by design. Cleaning and chemical disinfection happen at set intervals, leaving windows for recontamination. In food environments with temperature, humidity, and complex surfaces, those gaps create real microbiological risk — especially for *Listeria monocytogenes*, which is well adapted to survive and proliferate in production settings.

Why is *Listeria* so Uniquely Challenging?

Unlike most foodborne pathogens, *Listeria monocytogenes* grows at refrigeration temperatures as low as 0°C, turning cold storage and chilled processing into risk zones rather than barriers.

Drains, conveyor joints, gaskets, and equipment crevices create sheltered microenvironments where *Listeria* can persist beyond standard cleaning.

LISTERIA: The Persistent Pathogen.

A resilient bacterium causing Listeriosis, a serious foodborne illness.

INFE INFECTION CYCLE

- 1. Ingestion**
 Soft cheeses, deli meats, produce, unwashed produce
- 2. Invasion**
 Bacteria enters and crosses the intestinal barrier
- 3. Dissemination**
 Enters lymph nodes, then into the bloodstream
- 4. Systemic Reach**

Who is Most at Risk?

Pregnant
(risk of miscarriage/)

Newborns
 and Infants

Adults
 aged 65+

Immunocompromised

Listeria monocytogenes
 Flagella, Cell Wall, Cytoplasm, Nucleoid, Plasma membrane

RESILIENCE FACTORS

Cold Growth
(below 4°C)

Biofilms

Salt Tolerance

Silent Transit

SYMPTOMS

Mild Symptoms

Fever, Muscle aches, Nausea

Severe/Invasive Symptoms

Headache, Stiff neck, Confusion, Loss of balance, Convulsions

PREVENTION FOOTER

Heat deli meats to steaming;

Use only pasteurized dairy;

Keep fridge below 4°C;

Prevent cross-contamination.



Once established, *Listeria* forms biofilms that are so resistant to chemical disinfectants that they require stronger conditions for effective reduction. Environmental spread through aerosols, condensation drip, and drainage backflow means one contamination point can seed multiple areas, making containment difficult without continuous control.

The Gap in Conventional Sanitation

Chemical disinfection leaves intervals of unprotected production time. During those windows, recontamination from drains, condensation, and air movement can quickly re-establish microbes on cleaned surfaces. For RTE products with extended shelf lives, even low-level recontamination has major regulatory and public health consequences.

To close this gap, food processors are increasingly integrating **continuous disinfection technologies** that operate during production without interrupting processes — shifting from reactive cleaning to proactive environmental control.

Where *Listeria* Thrives & High-Risk Products

High-Risk Product Categories

Foods most frequently linked to contamination share one critical trait: **consumed without a final cooking step**, so post-processing contamination reaches the consumer directly.



Deli meats and RTE cooked meats



Cold-smoked fish (e.g. smoked salmon)



Soft and surface-ripened cheeses



Pâtés



Pre-packaged salads and sprouts



Prepared chilled meals with pasta, sauces, cheese...

Preferred Reservoirs in Facilities

Listeria monocytogenes is an **environmental organism** with an unusual ability to survive and even multiply where most bacteria cannot: refrigeration near **0°C**, salt concentrations up to **20%**, and a pH range far wider than most competitors tolerate.

- **Floor drains** — the most common site of long-term persistence in meat plants
- Condensation-prone **ceiling structures**
- **Conveyor belts** and **slicing equipment**
- Any crevice where **moisture** and **organic residue** accumulate



Industry studies report *Listeria* positivity rates in some retail delis ranging from **under 6% to as high as 92%** of environmental samples.

Listeria Outbreaks: A Global Wake-Up Call

USA — 2024

Boar's Head Deli Meats

Product: Liverwurst & deli meats (Jarratt, VA plant)

The largest US listeriosis outbreak in over a decade, traced to liverwurst and deli meats from Boar's Head's Jarratt, Virginia plant.

- **61** infected across **19 states**
- **60** hospitalised
- **10 deaths** — one of the deadliest US listeriosis outbreak
- **7+ million pounds** of product recalled;

Investigators concluded sanitation failures created sustained conditions for *Listeria* to persist.

USA — 2025–2026

Prepared Pasta Meals

Product: Pre-cooked pasta (Nate's Fine Foods / FreshRealm — Walmart & Kroger)

Linked to pre-cooked pasta from **Nate's Fine Foods**, used in RTE meals distributed by **FreshRealm** (Marketside, Home Chef) and sold via **Walmart and Kroger**.

- **28** infected across **19 states**
- **27** hospitalised
- **7 deaths**, including one pregnancy-associated fetal loss

The outbreak strain was confirmed in a routine sample at the supplier's facility **even after recalls began** — underscoring how difficult environmental *Listeria* is to eliminate once established.

ITALY — 2020–2022

Poultry Würstel

Product: Chicken & turkey frankfurters (Verona plant)

- **~90 cases** across 12 Italian regions
- **3 deaths** (late 2021–June 2022); one woman lost her pregnancy
- *Listeria ST155* strain confirmed in both patients and **environmental samples at the plant**
- Product distributed to **~30 countries** across Europe

A precautionary wave of recalls followed — **including salmon-and-mayonnaise sandwiches** — reflecting how aggressively authorities respond once environmental persistence is suspected.

IRELAND — 2025

Ready-to-Heat Meals

Product: Carbonara, lasagne, chicken curry (Ballymaguire Foods) a major Irish ready-meal manufacturer, detected *Listeria* during routine QC and triggered a nationwide recall.

- **141 products** recalled across **Tesco, SuperValu, Centra, and Aldi** (carbonara, lasagne, chicken curry)
- **9 confirmed cases**; one adult death confirmed by Irish authorities
- Precautionary net widened to goats' cheese, hummus, and pre-packaged salad leaves

FRANCE & EU — 2024–2025

Pasteurised Soft Cheese

Product: Pasteurised soft cow's & goat's milk cheese.

Manufacturer **Chavegrand** identified as the source of an outbreak in pasteurised soft cow's and goat's milk cheese, beginning **December 2024** and intensifying through mid-2025.

- France: **21 infections** (18 since June 2025),
- **two deaths** (patients aged 34–95)
- Cross-border spread: **Belgium, Denmark, Netherlands, Norway**
- Potentially affected product distributed to **~30 countries** worldwide

⚠️ KEY PATTERN

What Every Outbreak Has in Common

Across all these cases, a single pattern emerges: **contamination introduced or persisting within the processing environment itself** — not in raw ingredients, and not caught by conventional cleaning and end-product testing alone.

This is precisely the gap Regulation 2024/2895 is designed to close.

Sources: CDC, FDA, USDA FSIS — 2024–2026 · EFSA, ECDC, Santé Publique France — 2025 · FSAI, ECDC, WHO — 2025

UV-C Technology: A Physical Barrier Against *Listeria* and Key Foodborne Microorganisms

UV-C is a well-established physical method for microbial inactivation. Its mechanism is based on the disruption of DNA and RNA, preventing microorganisms from replicating and rendering them non-viable. Unlike chemical interventions, **UV-C acts instantaneously at the point of exposure**, with no lag time and no requirement for contact surface preparation.

1

No Residues

UV-C leaves zero chemical **residues** on surfaces, equipment, or products — eliminating downstream contamination risk from disinfectant carry-over.

2

No Drying Time

Unlike liquid disinfectants, **UV-C requires no dwell time or surface drying**. Irradiation and inactivation are simultaneous and immediate.

3

Continuous Operation

Systems can operate uninterrupted during active production, providing a persistent antimicrobial barrier without halting workflow or throughput.

4

No Chemical Load

UV-C does not contribute to chemical accumulation in the environment, supporting **cleaner production conditions** and simplifying waste management obligations.

These properties make UV-C particularly suitable for integration into food processing environments where hygiene must be maintained without affecting product quality, organoleptic characteristics, or operational workflow. It is a technology that complements — rather than competes with — existing sanitation programmes.



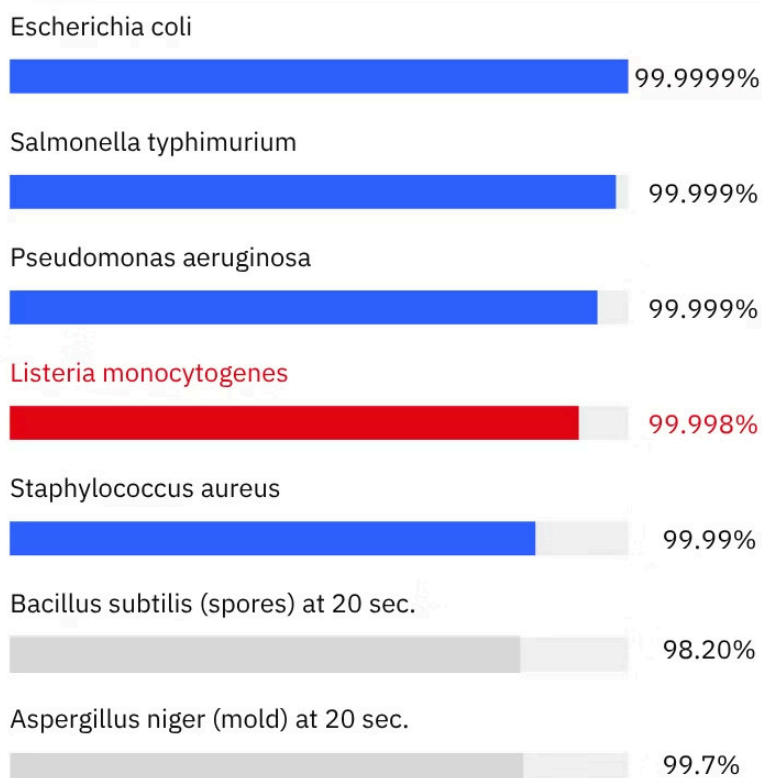
UV-C is already recognised in the United States as an **FDA-approved technology** for decontaminating food surfaces, studied extensively across red meat, poultry, seafood, produce, and food-contact materials including stainless steel, PET, and silicone rubber. Its appeal under the new EU regulation: a **validated, repeatable, documentable** physical intervention strengthens exactly the evidentiary case the regulation demands.

UV-C Bactericidal, Sporicidal, and Fungicidal Efficacy

Validated Percentage Reduction for Foodborne Microorganisms

<p>LISTERIA REDUCTION</p> <p>99.998% at 2.5 seconds</p>	<p>E.COLI REDUCTION</p> <p>99.999% Standard Peak</p>	<p>TEST DISTANCE</p> <p>10 cm</p>	<p>TIME</p> <p>2.5 to 20 sec</p>
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Tested % Reduction (10 cm | 2.5sec)



Engineering Note:

Dose-dependent Efficacy

UV-C effectiveness is a direct function of Fluence (Dose), defined as the product of irradiance intensity and exposure time. The data presented demonstrates exponential microbial reduction kinetics following first-order decay principles.

Critical Parameters:

Distance Factor: The data reflects testing at a 10 cm working distance. Since fluence decreases proportionally to the inverse square of the distance from the source, this must be accounted for in system design.

Engineering Requirements: Exposure time and source positioning must be engineered for specific surface geometries, material reflectivity, and target pathogen resistance profiles.

Light Progress proprietary software simulates expected results through our advanced dose calculator.



Pictures above represent comparative analysis of microbial growth: Unirradiated control plates (left) versus UV-C irradiated plates (right) for Escherichia coli ATCC 25922 and Aspergillus brasiliensis (formerly A. niger) and Staphylococcus Aureus ATCC 13150.



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EpidMol: Department of Physiopathology, Experimental Medicine and Public Health.

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Application Areas in Food Processing

In the context of *Listeria* control, UV-C can be strategically applied across several critical points within the food production environment.



Surface Disinfection

Continuous UV-C irradiation of conveyor belts, equipment surfaces, and packaging areas helps prevent the formation and spread of biofilms.

Applied during production intervals or between shifts, it maintains low surface counts and reduces the risk of cross-contamination onto RTE product contact surfaces.



Air Disinfection

Airborne contamination plays a significant role in cross-contamination within open processing environments.

UV-C systems integrated into air handling units, or positioned as upper-air fixtures in production areas, reduce airborne microbial load continuously — addressing a contamination route that conventional surface cleaning cannot intercept.



Cold and storage Rooms

Low temperatures and elevated humidity create conditions highly favourable to *Listeria monocytogenes* persistence and growth.

UV-C provides an additional, continuous layer of control in cold storage and high-risk processing zones, complementing temperature management and periodic chemical disinfection.



Post-Cleaning Reinforcement

UV-C can complement traditional sanitation programmes by maintaining low microbial levels during the intervals between scheduled cleaning cycles.

This significantly reduces the potential for recontamination events during continuous production, particularly in overnight or extended production runs.



UV-TEAM-A-CL

Supporting Compliance with EU 2024/2895 and other regulatory

The shift toward shelf-life compliance under EU Regulation 2024/2895 requires food manufacturers to demonstrate that *Listeria monocytogenes* remains under control not only at the point of production, but throughout the product's commercial life.

This obligation places significantly greater demands on environmental control programmes, moving beyond snapshot end-product testing to a systemic, validated approach to contamination prevention.

Across both EU and US regulatory frameworks — including EU Regulation 2024/2895, the FDA Food Safety Modernization Act (FSMA), 21 CFR Part 117 Preventive Controls for Human Food, and USDA-FSIS performance standards for ready-to-eat products — **there is a converging expectation for stronger environmental monitoring programmes, better-documented control of recontamination routes, and validated preventive measures capable of withstanding scrutiny from competent authorities and third-party auditors alike.**



Food Safety Managers (EU & US)

Demonstrates microbial control was achieved, maintained, and verifiably documented — satisfying both EU and US regulatory scrutiny.



HACCP & QA Specialists

Establishes critical process parameters (CPPs), monitoring procedures, and corrective action protocols within the existing food safety management system.



Regulatory Auditors

Quantitative, dose-response data provides measurable, reproducible evidence that withstands third-party and competent authority review.



Plant & Operations Managers

Integrates into existing environmental monitoring programmes without disrupting production flow — a validated, continuous control layer.



Legal & Compliance Teams

Aligns with EU Regulation 2024/2895, FDA FSMA (21 CFR Part 117), and USDA-FSIS standards — one solution, multiple jurisdictions covered.

Conclusion: A Prerequisite for Compliance, Safety, and Continuity

The control of *Listeria monocytogenes* in modern food production is no longer achieved through isolated interventions. It requires a combination of rigorous sanitation, evidence-based monitoring, and **continuous environmental control** – a systemic approach that reflects both the biological characteristics of the pathogen and the requirements of the evolving European regulatory framework.

UV-C technology, when correctly engineered and applied, offers a reliable, measurable, and operationally compatible tool to support this objective. Laboratory data from independent third-party testing confirm its ability to achieve rapid and significant microbial reduction – including against *Listeria monocytogenes* – while real-world effectiveness is contingent on proper system design, validated positioning, and integration into the broader hygiene management system.

Under the evolving European regulatory framework, adopting a structured and validated approach to environmental hygiene is no longer optional. It is a prerequisite for compliance, product safety, and operational continuity.

This article is intended for general information purposes for food safety and quality professionals. It does not constitute legal or regulatory advice. Food business operators should consult the official text of Regulation (EU) 2024/2895 and qualified regulatory counsel when developing compliance strategies.

