Food and personal care

The converging interest of microbial quality control

Invaluable tools for safer products

Copan
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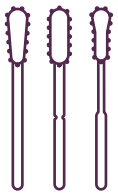

Collection

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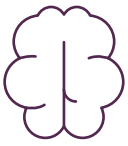


Artificial Intelligence

Our comprehensive approach to preanalytics

Context

A health and business issue

Every year, 1 in 10 people in the world fall ill after consuming products contaminated with dangerous bacteria, viruses, parasites, or chemicals; among them, more than 400.000 die[1]. **The recall of these unsafe products severely hit the profits of food and personal care manufacturers, distributors, and retailers, with a loss of consumer trust and substantial reputational damage.** A fast and accurate microbiological testing plan is an invaluable tool for these producers to detect potential microbial contamination – of raw material, production chain, or end-products – **and take rapid quality and safety decisions.**

What's the Copan solution for Industrial Quality Control?

- ***Surfaces & Equipment testing***

  SRK®

- ***Microbiology lab automation***

  CYCLONE™

Food and raw ingredients

Controlling food from the field to the plate

WHO defines food safety as the **"assurance that food is acceptable for human consumption according to its intended use[1]."** Food producers are in charge of ensuring that the food they produce and sell complies with the definition above[2]; sometimes, they fail inducing massive recalls, loss of consumer confidence and sales, legal issues, and media discredit. Why? By analyzing recent recalls, it is possible to classify the causes of food contamination into a few categories[3]:

- Non-compliance with the latest GMPs and SOPs.
- Inability to track products and ingredients through the supply chain.
- Contamination during the production process caused by operational mistakes.
- Deficiencies in the production monitoring and weaknesses of the HACCP (Hazard Analysis and Critical Control Points) system.

Maintaining adequate infrastructures and implementing a solid HACCP-based monitoring program should be the minimum proactive steps for any business concerned about managing food safety risks along the entire food chain.

Baby food

Babies' needs and vulnerability

The safety of baby food must be evaluated even more meticulously, since a less-developed immune system and a reduced intestinal microflora make infants more susceptible to infections[4]. Particular care should be taken on dry infant food, a rich source of nutrients and an excellent substrate for foodborne pathogens. The 2005 European Regulation on Microbiological Criteria for Foods (EC2073/2005) requests manufacturers to test powdered infant feeds for several microorganisms – such as Enterobacteriaceae and Salmonella.

Cosmetics

Safely on your skin

As baby dry food, most personal care products and cosmetics represent good media for the survival of various microorganisms. That's why, **to extend their shelf-life and protect the consumer, preservatives and antimicrobial formulations are incorporated into these products.** Moreover, despite these products are not required to be sterile, their safety must be assured by preparing, packing, labeling, and storing them in a proper way[5].

If a personal care product is inadequately manufactured or preserved, microbial contamination may occur with the same disastrous health and financial results as food products. Surveillance studies showed that Gram-negative bacteria – mainly Enterobacteriaceae, *P. aeruginosa*, and other Pseudomonas species – caused over half of the incidents resulting in a recall of non-sterile industrial products and that 40% of the non-food product contamination microorganisms were left unidentified (Figure 1)[6].

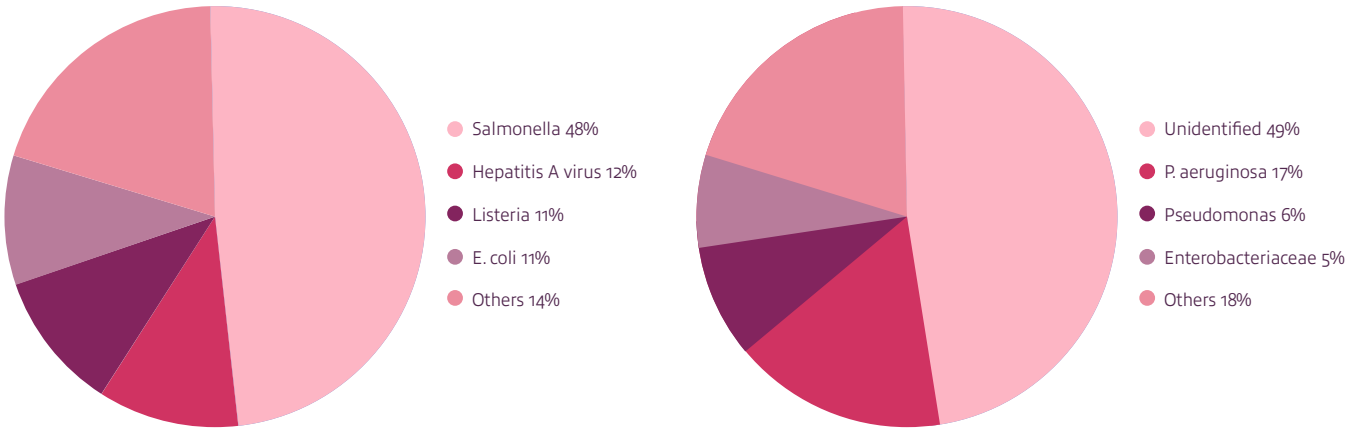


Figure 1: Lack of microbial species identification in non-food product European recalls compared to food products (2005-2018 data).[6]

Economic burden

The real cost of product recalls

Food contaminations represent a public health concern and a significant economic issue: only in the US, 6 to 33 million cases of foodborne diseases are reported each year, costing $5-8 Billion on medical care expenses and lost productivity. Notably, these contaminations and subsequent recalls damage the producers themselves in the first place, with an average direct expense of $10M[3]. Of course, based on the severity of the outbreak, incident, the burden on big brands may be significantly higher: according to a Grocery Manufacturers Association (GMA) survey, 5% of companies incurred over $100M in direct and indirect costs.

Yet, **the impact of a product recall extends well beyond financial losses**, and behind these numbers lie even bigger problems: **brand reputation damage, long-term sales reduction, and loss of customer trust.** Another GMA survey found that 15% of consumers would never buy a recalled product again, and 21% of people involved directly in the recall would not buy any product from the same manufacturer.

These are the reasons why producers must make every effort to ensure the safety of their products.

Case studies

Notorious product recalls

Every year, thousands of products are recalled worldwide due to microbiological contamination. Below, some examples of recalls with significant international relevance.

Odwalla apple juice

In 1996, a batch of Odwalla apple juice became contaminated with *Escherichia coli*, causing the death of a 16-month-old and dozens of illness cases. The recall caused the company's stock to tumble, costing the company more than $12 million; this figure doesn't include lost sales, lawsuits, and federal fines. As a result of the outbreak, the company began pasteurizing its apple juice, and the whole fruit juice market became more tightly regulated[7].

Cadbury-Schweppes chocolate

More than a million chocolate bars were recalled by Britain's top chocolate-maker Cadbury-Schweppes in 2006, after fifty-three cases of Salmonella poisoning in the UK and Ireland. In an official report, the Food Standards Agency claimed that one of the possible causes of the outbreak was Cadbury's food safety system, described as unreliable, outdated, and underestimating the level and likelihood of salmonella contamination. The recall cost to Cadbury-Schweppes £20 million and caused a 14 percent drop in its candy sales at the time[8].

Lactalis baby milk

In December 2017, a Salmonella outbreak hit a Lactalis factory in France. The contamination – probably a result of renovations performed in the factory – caused illness in more than 30 French babies and the recall of more than 12 million boxes of powdered baby milk all around the globe. This recall sparked several lawsuits and investigations, also involving the laboratories in charge of Lactalis internal quality assurance. Its cost is expected to reach several hundred million euros.

How to avoid microbial contamination

Good practices and monitoring, in the name of product safety

Complying with the international safety standards and regulatory guidelines - such as SQF, BRC, ISO 2200, FD&C, and EC 1223/2009 - is essential against recalls. Also, personnel training, sanitation processes, and implementation of GMPs throughout all the production chain can help prevent recalls, but can't guarantee that a recall will never happen[3].
For every business concerned about managing the risk of product contamination and recall, monitoring safety flaws throughout the supply and production chain with a robust Quality Control (QC) system is crucial. With an effective HACCP-based program, a company can identify and avert potential sources of safety hazards by establishing control points and monitoring procedures[9].
An investment in product safety is one of the wisest things that businesses can do and is essential to the company's success and customers' health.

SRK®

Surfaces & Equipment microbial testing devices

SRK® is our line of collection and transport systems for the food, personal care, and pharma industries. **Compliant with ISO and International directives**, SRK® kits can be used for routine surface monitoring within manufacturing areas and equipment and are compatible with many laboratory protocols as culture and molecular assays. Compared with contact plates, **these kits include a swab to improve sample recovery and release and ease collection on irregular surfaces.** Sampling probe type and quantity, selective or enrichment broth, filling volume: SRK® are entirely customizable on user request.

Who is in charge of Quality Control?

Internal and service labs duties

Microbiological QC on food or cosmetic products can be performed by the producer itself or delegated to external service labs.
Microbiology QC exposes every lab to specific risks, as repetitive and non-ergonomic tasks induce the staff to errors and reduce the lab efficiency. Moreover, in case of a fast personnel turnover, the lab faces massive recruiting and training costs.
Lab efficiency can benefit from automating some of these repetitive tasks. By reducing errors and enhancing precision and reproducibility 24/7, automation could give more time for the lab staff to focus on essential tasks and reduce lab time-to-results.

The automated solution for microbiological quality control

CYCLONE™

Give your staff more time to spend on advanced tasks by automating basic procedures! Pour-plating, spreading, streaking, and spiral plating: **CYCLONE™ unlocks the full automation of microbiological testing plates' preparation.** This flexible platform allows the complete plating protocol customization, including container type, inoculation volumes, sample mixing, dilution set, and agar type. The synergy between the barcode system and the bidirectional communication with LIMS secure a rapid identification and tracking of samples and plates, guiding them to the proper testing procedure.
CYCLONE™ can handle high throughput sample dilutions and multiple molten agars simultaneously; plus, the Smart Incubation and Imaging Modules ensure total plate incubation management and optimized growth conditions.

Collect

Dilute

Plate

Analyze

Secure your analysis

Is your lab ready?

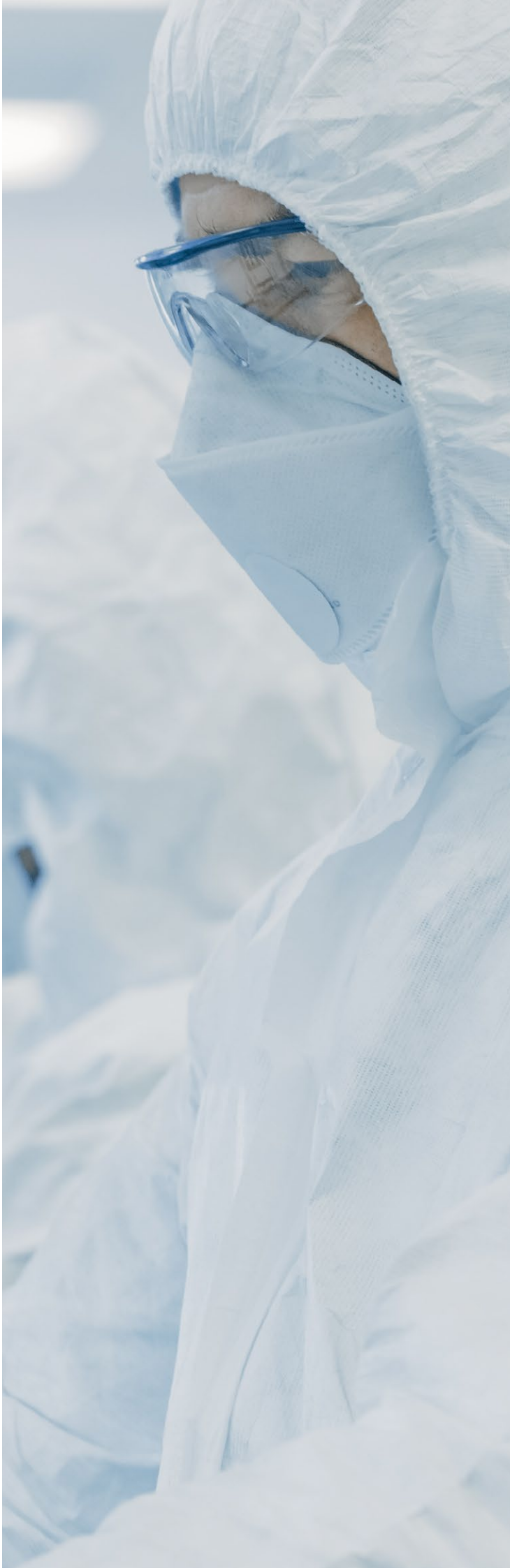
CYCLONE™ offers smooth integration with your lab's current processes, ensuring full compliance with ISO standards. Maximized efficiency, reproducibility, and standardization are the resulting advantages!

- **Maximized efficiency**
  Requires minimal intervention for sample processing and reduces repetitive tasks
- **Reduced operational costs**
  CYCLONE™ allows decreasing the operational costs by reducing the manual labor
- **Maintained traceability**
  Keeps full traceability of a sample's journey with a software that integrates with any LIMS
- **Modular design**
  A wide range of modules to quickly adapt to lab workflows and needs as they change

Closing remarks

A smart move

Studies report that most of the food and non-food recalls are due to operational mistakes an monitoring deficiencies. At the same time, they demonstrate that correct quality control procedures can help prevent these recalls from happening. An effective product control strategy is not simply a requirement to comply with current regulations, but is a successful strategy to isolate problematic organisms (such as Antibiotic Resistant Bacteria), protect consumers, and **prevent the potential for exorbitant direct costs and market's losses caused by product recalls.**



Scientific references

All the independent studies we cited in this product focus are listed here.

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