

SPOILER INVESTIGATION - CONTAMINATION IN UHT CHOCOLATE MILK

How to reduce product scraps by more than 52%

A dairy manufacturer producing UHT chocolate milk detected an increase in mesophilic bacteria during internal testing of its products, which led to quarantine.

Before contacting us, as mesophilic bacteria were involved, they decided to reprocess the batch, hoping that the high temperature of the UHT process would eliminate the bacteria. The problem persisted, resulting in the loss of two complete batches of UHT chocolate milk for the customer.

As the cause was still unclear, the customer contacted us for help.

The contamination appeared sporadic rather than recurrent, and the initial corrective measures proved ineffective.

Leveraging the SMARTBIOME™ platform, bioMérieux supported the client **find the root cause** and implement **targeted corrective and preventive measures**.



METHODOLOGY - POWERED BY SMARTBIOME™

A three-step approach combining metagenomics and risk-based monitoring with 2 weeks for the first phase, 3 months for the second phase, and 9 months for the third one.

1

SPOT: Investigate and understand the (group of) microorganism responsible for the contamination

2

ACT: Analyse root cause and implement corrective actions

3

CHECK: Validate effectiveness of the applied measures and risk monitoring

OUTCOMES

SPOT - Spoilage Identification

The metagenomic analysis, conducted using next-generation DNA sequencing, bioinformatics and data science, performed on finished products, **confirmed the presence** of various *Bacillus* species (all spore formers) and Lactic Acid Bacteria.

ACT - Root Cause Analysis & Actions

SMARTBIOME™ knowledge base provided key insights, including:

- Identification of the microorganisms responsible for batch rejection.
- Traceability of these microorganisms throughout the production flow.
- Validation of changes in the production process.
- Analysis of raw materials and inputs.
- Assessment of cleaning efficiency on equipment;
- Environmental monitoring.

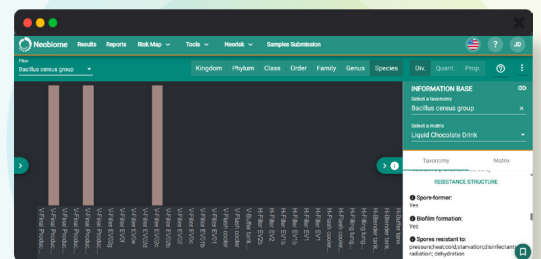


Fig. 1: Illustrative screenshot of the software showing microbiome distribution in the plant.

New sampling were done included spoiled products, clean products, and “in line samples” at targeted critical control points (CCP, HACCP) throughout the process, such as raw materials and semi-finished products.

This new analysis, revealed a correlation between contaminants in raw materials and those found in finished products.

The root cause was identified as a **failure in the thermal processing step, and was corrected** through the implementation of:

- CIP (Clean-in-Place) protocols were reviewed and revamped, as mesophilic bacteria persisted after ultra-high temperature.
- Two major process were implemented:
 - Introduction of a maturation step before heat treatment to expose and eliminate resistant spores.
 - Implementation of shock CIP with new and targeted chemicals.

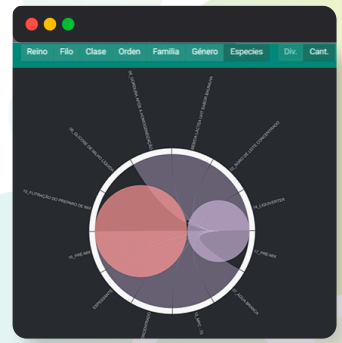


Fig. 2: Illustrative screenshot of the software showing the genetic profile of *B. cereus* dispersion

CHECK - Validation of Measures and Risk Monitoring Over Time

A new round of analysis confirmed the absence of *Bacillus* and LAB in finished products. Over nine months, **no contaminated products were found, validating the effectiveness of the interventions.**

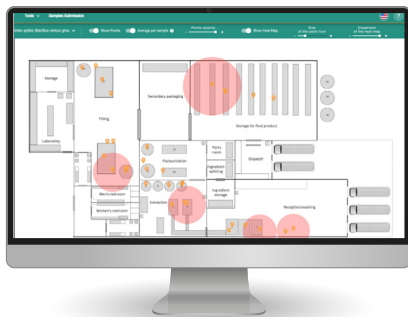


Fig. 3: Illustrative example of the factory map before corrective actions were implemented

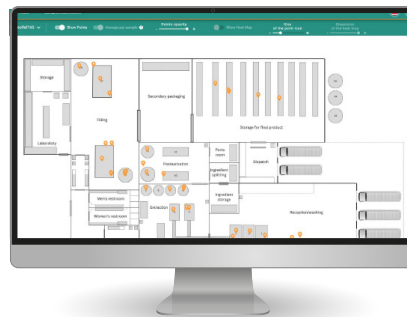


Fig. 4: Illustrative example of the factory map after corrective actions were implemented

CONCLUSION & CREATED VALUE

The precise identification of the group of microorganisms causing the issue in the final product allowed three key insights:

1. **Knowledge at the species level** and the discovery that they were groups of spore-forming mesophiles resistant to high temperatures;
2. **Identification of process failures** (thermal and cleaning at specific points in the process);
3. Use of DNA analysis to **confirm the root cause** of the problem by genetically comparing the origin of the bacteria.

Our Augmented Diagnostics approach enabled this dairy manufacturer to take very assertive action, which quickly resolved the problem. Eliminating the root cause led to the complete eradication of the problem over the following months. This resulted in a 52% reduction in milk waste that year.

WHAT'S NEXT?

With the root cause resolved, the client is now transitioning to a preventive, risk-based analysis model. Advanced computational analysis and DNA sequencing are now used to evaluate microbiological risks at critical control points. Risks are organized into four key indicators: Cleaning/Sanitation Failure, Food Safety, Hygienic-Sanitary Conditions, and Shelf Life.

This empowers the quality team to make strategic, preventive decisions, optimizing time and cost while proactively managing microbiological risks.

In addition, this approach connects directly to our core business for Aseptic industry leaders: daily control through D-COUNT® system for greater performance and speed, combined with risk management to meet market needs while **protecting brand integrity and profitability.**



biomerieux.com
Learn more about our
Augmented Diagnostics Approach