

Leveraging Data Analytics to Enhance Food Safety and Quality Control

“Smarter Food Safety to me means always looking to the future. Our destination – safe food for our families, our children, and our animals – is unchanged. But how do we get there more quickly and effectively using modern tools as the world transforms around us?”

- Stephen Hahn, FDA Commissioner

Introduction

When it comes to food safety, all facilities must have appropriate testing and action plans in place as part of their HACCP requirements. This means each facility must collect testing data, review it for issues and compare testing over time for trend analysis and risk mitigation. Historically, most of this data was stored in separate files, in different locations, or had to be compiled manually, making it difficult, if not impossible, to react quickly in case of concerning results, possibly contamination. This resulted in significant costs to a company to identify and correct the issues to prevent a recurrence.

Recent data suggests that the cost of a single recall can approach \$10 million¹, not including indirect costs or long-term damage caused by liabilities and a loss of confidence in a brand. To mitigate this risk, it is vital to have robust processes in place, including a comprehensive HACCP process control plan. As part

of this plan, a strong data capture and management system is essential. It must combine food safety test results from multiple testing sites (in a facility or among facilities) to obtain a complete picture of your food safety risks. This is often tracked at the zone level where results in zone 1 locations, the highest risk areas, are evaluated more often and responded to more rapidly than those in zones 2 – 4, with zone 4 being the least concerning as it is far removed from the processing areas. It is broken down further into test types, where indicator organisms testing is much more critical than standard protein residue testing, for example. It can even be divided by data source, such as instrument type, when multiple areas in a facility are used for different applications. All these pieces of data, taken collectively, tell the full story when analyzing food safety risks. To quote the former FDA Deputy Commissioner, Frank Yiannas, “Better food safety begins and ends with better data.”

Centralizing and Streamlining Data Management

While data capture is essential for understanding processes within any facility, the huge amounts of data collected can be overwhelming. As mentioned above, data can be captured by zone, test type, instrument type or line used; other variables play a role too, such as cleaning chemicals used in a specific area versus another. Furthermore, finding the best way to organize and store this data can pose problems. Data must also be stored in such a way that it can be easily sorted and analyzed to help facility managers and quality control staff make better decisions. The ideal way to do this is by using a digital system to capture, sort, store and trend data based on a series of variables.

Transforming Raw Test Data into Actionable Insights

Most food processing and manufacturing facilities are designed to have a linear workflow to minimize the transfer of outside contaminants into the final product areas. This means a large area must be monitored and kept under process control. Ideally, these testing areas should be mapped out, numbered and the data collected for analysis over time to identify trends. Furthermore, analyzing thousands of data points weekly means the system must be able to filter out possible hotspots in an easily identifiable manner. This can be achieved most effectively by utilizing a single platform that can not only collect testing data but can also analyze the data results in real-time (or near real-time), so facility managers can take immediate action before problems cause shutdowns, poor audit results or recalls. Only with true complete data visibility can vital decisions be made regarding additional cleaning, testing or identifying a contamination risk.

Enhancing Audit and Compliance Management

Food manufacturers must also address the stricter food safety regulations mandated by the FDA and other regulatory agencies. As part of the New Era of Smarter Food Safety and the Food Safety Modernization Act (FSMA), food manufacturers must find ways to connect the data captured in their facilities for rapid responses if a contamination event occurs. In addition, they must implement solutions to the old paper-based record-keeping processes used as they are not cost-effective and hinder tracking efforts.

Digital transformation can simplify this tracking process, allowing facilities to respond more rapidly to adverse events, stay compliant and simplify audit processes. By moving to digital data platforms, facilities can reduce manual, error-prone tasks, further reducing the risk of making inappropriate food safety decisions. A facility can have confidence in the data being accurate; it can focus on corrective actions and on reporting, rather than reviewing data for mistakes.

In addition, digitizing data makes remediation faster and more reliable since the quality team can access the data in near real-time, no matter where they are located. This is especially important in facilities with multiple sites or buildings where access may be restricted or remote. In fact, all stakeholders can have immediate access to the data as it is generated – so action plans can be quickly developed and include all key departments involved, from quality to the janitorial and even to the lab and production teams. By reducing plant downtime, facility output can be maximized and financial costs can be reduced.

Furthermore, digital data analysis simplifies learnings about related past events. By digitally tracking and trending problem areas, corrective actions taken at one location may apply to other areas within the facility or across multiple sites. By comparing similar deviations, root causes can be easily identified and the proper corrective actions selected for implementation. Of course, the digitalization of the data can't replace human intervention, but it assists in the thought processes necessary to overcome these challenges by organizing the data in a way that enables it to be used faster and more reliably.

Optimizing Food Safety Programs with Future Plans in Mind

As the food industry evolves, the push is towards data-driven digitization as part of streamlining processes, growth and profitability. Implementing food safety improvements is part of this plan. With the food industry market estimated to be in the trillions (in the US alone) and a global supply chain, the risk of exposure to contamination along the supply chain is significant. Therefore, having current and accurate information is essential to ensuring food safety. This is where digital technology can provide an effective solution. From food manufacturers to food processors to reference labs, digitization of data is the wave of the future. Instead of waiting for the lab to send results (whether internal or from a reference lab), data can be securely shared in real-time across and within facilities, and in addition, be analyzed to determine the next actions.

The Future of Data Analytics in Food Safety and Quality Control

As the world rapidly becomes more digital, new digital technologies will be essential to maintain a competitive edge while improving business processes overall. In addition, the complex, dynamic global supply chain will demand it as it continues to expand and evolve.

This change means that data digitization, especially in food safety testing, has the potential to predict and prevent problems; but at least it will be better at detecting and responding to contamination issues when they do occur. Ultimately, the best digital technology would be low-cost and applicable for food operations of all sizes, while being able to prevent food poisoning outbreaks or at least minimize them.

Conclusion / Summary

In summary, data digitization is the way of the future. In order to continue driving growth, profitability and customer retention, data must be easily accessible, visible in real-time, and actionable based on analytics, whether descriptive, predictive or prescriptive. Data digitization must also be flexible enough to allow for customization to align with each organization's testing variables (test type, zone, etc.) and SOP requirements. With ever-growing complexity in the supply chain, new product development and product quality/packaging, the risks for non-conformance and contamination increase dramatically.

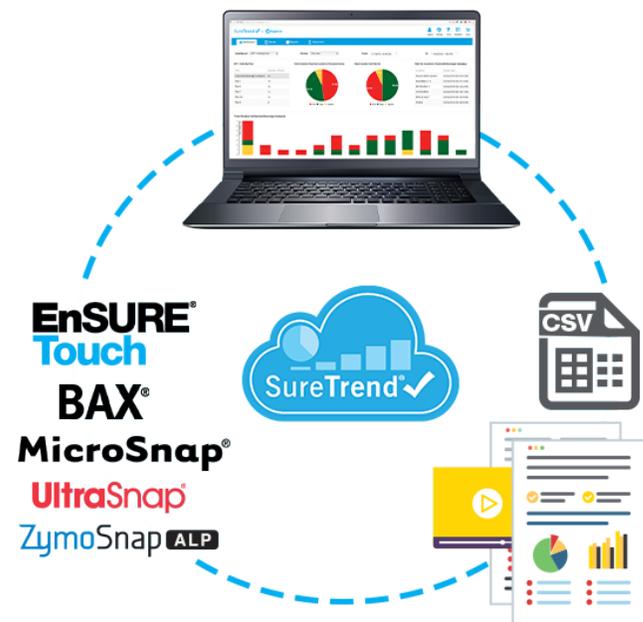
To address these challenges, the only option is to adopt a program that can readily capture and filter large amounts of data, reduce the risk of error and analyze results rapidly for quick decision-making within the facility. This means digitizing data. Digitized data is critical not only for efficient recalls but also for root cause analysis of foodborne illness events. Product movement, performance and environmental data sets—when aggregated and analyzed—have the power to generate valuable trend insights and inform continuous improvement initiatives in food safety.

The Solution

SureTrend® software can help move food manufacturers and processors to the next level, helping them advance in the digital world of food safety testing. The software can help any facility integrate testing data into a single, digitized system, improving operational efficiency and driving overall cost savings. This is achieved since a consolidated data solution creates a digital food safety and quality ecosystem, simplifying data collection and storage, analyzing data for trending, and streamlining decision-making. In turn, the compiled, analyzed data makes it easy to conduct risk assessments by allowing the identification of trends as soon as they occur. Collectively, this means faster responses to reduce contamination risks, saving money across the organization.

Since the SureTrend platform stores data, it is easy to review historical trending, using this information to implement changes to improve existing food safety programs. The analytical results can then be re-examined to demonstrate quality improvements or identify areas that need to be addressed for improved quality and safety while reducing risk and overall costs. Lastly, since all data is cloud-based, authorized personnel can quickly access secure data for audits and other compliance needs. Users can also create dynamic dashboards to visualize and report environmental monitoring, quality and food safety data across multiple facilities. Collectively, this means that all the information is in one location, simplifying your audit preparation process and identifying critical cleaning points that could be trending out of control, improving response (being proactive) and minimizing errors and consumer risk.

SureTrend offers an advanced analytics feature that allows users to rapidly identify potential food safety risks, whether from environmental monitoring or pathogen testing. Data can be uploaded from a single data source, whether from testing files (real-time PCR results) or direct capture to SureTrend Cloud via the



hand-held testing instrument, EnSURE® Touch (EM, protein, enzyme and indicator testing). The platform allows result visualization, making it easy to understand and interpret complex data and gain process intelligence for making educated, immediate decisions on potential risks or identifying areas needing improvement (in cleaning, testing or monitoring cadence). By streamlining these quality control processes, facilities can achieve significant cost savings and reduce the risk of recalls.

As noted by the FMSA, food facilities must have smarter tools for prevention and outbreak responses, rapidly getting to the root cause of any non-conformance event. The goal is to use these predictive analytics tools to identify when and where contamination might be likely to occur, to prevent contaminated products from entering the food supply and target efforts to remove a potentially contaminated product from the market. SureTrend supports these activities by taking rapidly captured data and incorporating trend analysis into its platform; it will make processes and communication more efficient and effective within any food operation facility as well as with regulatory agencies and auditors.

In addition, with the SureTrend facility layout feature, users can map test results by location and overlay various test results – ATP monitoring, indicator organism screening, allergen detection, PCR pathogen data – to identify correlations between results. The drag-and-drop interface allows easy placement of data locations and available filters can be used to view only specific data of concern. As a result, this software can pinpoint areas of concern for further monitoring or immediate action – such as in the case when insufficient cleaning has left a location with higher than expected residue levels (ATP, allergen, protein) or microbial load (indicator organisms). Immediately, the testing history of this location can be accessed and decisions can be made as to the immediate action needed. This trend analysis can also be used to pinpoint areas requiring extra monitoring as well as those that pose little threat of contamination, allowing the facility managers to focus on critical areas that impact the final product.

As one example, a food manufacturer had to overcome *Listeria* contamination which resulted in a product recall. Even after implementing new cleaning procedures in three plants for better compliance and operational efficiency, there still were issues with contamination. By applying SureTrend capabilities to the issue, the manufacturer was able to analyze two years of historical data, identify gaps and opportunities for improving cleaning procedures and implement key operational changes to mitigate the risk. As a result, there was a 23% increase in EM compliance, an 8% decrease in post-cleaning residue, a 19% cost saving (in cleaning chemicals) and a one-week gain in average product shelf life.

Having one cloud-based system for digital data storage and access also allows various teams to understand the current state of facility operations – if there are red flags in specific testing areas, not only can the cleaning team be notified, but production, quality and management can see what is happening based on the data captured in the platform. By increasing visibility in near real-time, recalls can be prevented and action can be taken before any violations can be incurred.

In summary, SureTrend is an efficient, information software-based solution that enables you to:

- Consolidate all testing data with a single centralized data management system, streamlining compliance and the audit process.
- Gain actionable insights via data visualization.
- Assess risks in real-time, reducing unwanted consequences.
- Communicate effectively with management, operations, key stakeholders, as well as auditors.
- Digitize food quality programs with minimal effort using an intuitive user interface and world-class support.

References

¹ https://globalfoodsafetyresource.com/wp-content/uploads/2014/08/www.gmaonline.org_file-manager_images_gmapublications_Capturing_Recall_Costs_GMA_Whitepaper_FINAL.pdf