

Food safety risks at all stages in food production

Food safety issues may arise at any stage, from food production to consumption. This includes the farm, the processing facility, the retailer, and in consumers' hands. It occurs when a contaminant enters the food process. Microbial contaminants include bacteria, mould, fungi, viruses or their toxins and by-products.

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Other important contaminants can be classified generally as allergens. As the food safety process is complex, it is unrealistic to have a food supply without ever seeing an occurrence of one of these contaminants. Therefore, it is critical to identify opportunities for improving food safety at each step of the production, processing, distribution, and consumption stages.

Often, the biggest challenge is finding a way to put a systems approach in place to monitor and manage food safety. By studying each of these processes as part of a larger system with inputs, outputs, and processes, you can identify proper testing requirements that can help to pinpoint the risks by tracking food from their source at the farm all the way through processing and distribution.

Farm production

There are a number of ways microbial contaminants can enter the food supply at this stage. These include bacteria present on/in the animals, contaminated water or soil touching fields of fruits and vegetables,



or contaminated water surrounding seafood. On-farm interventions are designed to reduce the risk of microbial contamination. Farms must implement Good Agricultural Practices (GAP) to help ensure food remains safe during pre-production, production, harvest and post-harvest stages. These practices also help protect the environment and the safety of the workers.

Receiving and processing

Facilities that receive food from the farm or from ingredient manufacturers must inspect materials upon shipment receipt. This can be as simple as visual inspection (un-processed 'raw' material) or may require testing for possible contaminants (pathogens, allergens, mould/mycotoxins) if processed before arrival (spices, milled grains, etc).

These tests will ensure the material is safe for further processing or addition to other food ingredients for final product production. It may even mean segregating material into a quarantine area until testing is completed and the product passes this screening step.

Processing of food involves taking the original harvested (raw) materials, processed ingredients, or animals and then transforming them into product goods for consumption.

Various processes are used, depending on the original food type. Meat and poultry can become contaminated during slaughter if faecal matter gets transferred to the meat. Contaminated equipment or personnel clothing can also transfer contamination, if it is not cleaned properly.

Finished product

Contamination at this stage can come from many sources, including the packaging material, the packaging area, improper process control, or workers handling the material.

No matter the source, this final testing and inspection will ensure the product passes a final screening before being warehoused and distributed.

Food safety issues may arise at any stage.



Farm



Processing



Consumer



Continued on page 13

Continued from page 11

Distribution and sales

The biggest concern during distribution and sales is holding the product at the proper temperature during transport. This is especially true during warmer weather periods where food can easily spoil and become contaminated if not kept at a safe temperature or if left on a loading dock or unrefrigerated truck for too long.

There is also the potential for cross-contamination in the case of produce if trucks being used for distribution have not been adequately cleaned. This proper handling also applies once the material reaches its final market. Storage and handling are critical to prevent contamination, cross-contamination or spoilage.

Managing contamination risk

No matter what stages in food production you are concerned about, Hygiena offers testing solutions for every step in your food safety and environmental monitoring programmes.

From raw material testing, in-process control, final processing and packaging or environmental testing, our products ensure your facility is clean per HACCP performance standards and compliance guidelines.

Hygiena solutions

Supporting all steps in the food production process, Hygiena offers cutting-edge technology designed for environmental monitoring. The Hygiena EnSURE Touch monitoring system collects, analyses, and reports data for multiple quality indicators, including ATP and indicator organisms (TVC, coliforms, E. coli and listeria) when paired with our portfolio of easy to use, self-contained swabs.

SureTrend Cloud software safely stores this raw data which can be displayed in report format to provide actionable data to support improved cleaning and sanitation in each monitored area in your facility.

Swab devices for ATP detection include UltraSnap for standard testing, SuperSnap for difficult samples, including harsh sanitisers and environments that require sterile cleaning, and AquaSnap for detection in liquid samples.

All of these devices can be read in the EnSURE Touch luminometer and stored for reporting and trending. Results are obtained in 15 seconds and detection is linear down to 0.1 femtomoles of ATP, making it easy to calculate trends in the cleanliness of any area.

For specialised products, such as dairy and beverages, an alternative ATP detection system, Hygiena's Innovate System, allows



The EnSURE Touch and Innovate Systems for surface and finished product testing, respectively.

rapid detection of the quality of final product inventory within 30 minutes after sample incubation. When paired with our RapiScreen kits, the Innovate System is designed to test up to 96 samples at a time, making it easier to release products quicker and reduce inventory costs. It is ideal for situations where low bioburden is expected, especially in ultra-high temperature and extended shelf-life pasteurised products.

For indicator organism testing, whether in water, during processing or in the final product, Hygiena offers MicroSnap devices, which are designed to also be read using the EnSURE Touch system.

Tests are available for coliforms, E. coli, Enterobacteriaceae, or total viable counts for Gram-negative and Gram-positive organisms including E. coli, listeria, shigella, vibrio, bacillus, staphylococcus and pseudomonas with results in seven hours, before the end of a typical eight-hour shift.

For testing spices and milled ingredients, animal feed or when checking for cross-contamination on production lines, Hygiena offers rapid tests for allergens and mycotoxins. Tests are available in two platforms, lateral flow devices and ELISA tests.

For rapid, reliable, easy testing

For rapid, reliable and easy testing for allergens, GlutenTox and AlerTox sticks are designed to provide results in 10 minutes for 12 key allergens, including peanut, soy, milk and egg.

These lateral flow devices can detect trace contamination in food, liquid or on surfaces with sensitivities of 1-20ppm, depending on the allergen and with no cross-reactivity to other allergens that may be present in trace amounts. For similar applications, Hygiena also offers mycotoxin testing for aflatoxin and other mycotoxins.

Hygiena's MycoTox ELISA kits are designed for the quantitative detection of mycotoxins in a wide range of

food ingredients, feed, and animal urine. MycoTox kits are available for aflatoxin (total, B1 and M1), deoxynivalenol, fumonisin, ochratoxin, T-2 toxin, and zearalenone.

Results can be obtained in 20 minutes for some kits with sensitivity down to 5ppb in many cases, making the test an excellent choice for rapid, sensitive results.

For comprehensive pathogen detection at any step in food production, Hygiena offers the BAX System, which utilises PCR technology to identify pathogens across the complete workflow – in food ingredients, in-process and finished products, and the environment.

With the widest range of matrices tested, the BAX System provides simplified testing methods with specific and sensitive assays and real-time PCR quantification.

Tests are available for salmonella, E. coli (including O157:H7 and STEC screening), listeria (genus and specific tests for L. mono), vibrio, cronobacter, campylobacter, shigella, staphylococcus, and yeast and mould.

The latest technological advancement was the real-time quantification test for salmonella, the BAX System SalQuant assay.

If further analysis is needed, organism differentiation results can be obtained with the RiboPrinter System, an automated system that identifies and characterises genetic 'fingerprints' of bacteria which helps food processors monitor microbial trends in their facility and trace contamination back to its source. ■

The BAX System

