FOOD CONTAMINATION: Emerging trends, challenges, and solutions

Food contamination remains a leading cause of preventable illness globally, with 600 million cases of foodborne illness reported every year. The effects can be devastating. Having plentiful, high-quality food is something many of us take for granted. However, securing safe, nutritious food for the world's growing population is an ongoing challenge.

by The Technical Team, Marel.
www.marel.com

Food contamination is not only a problem in developing countries. In the US, for example, food poisoning affects 48 million people every year, leading to 128,000 hospitalisations and 3,000 deaths. Globally, around 420,000 people die from foodborne pathogens such as salmonella and E. coli. Children under five years old account for 40% of these deaths.

These alarming statistics highlight how important it is to ensure safe, high quality, affordable food for everyone.

Food contamination is preventable, and technological advancements offer great opportunities to improve safety and sustainability in the food processing industry. This article outlines the emerging trends, challenges, and solutions to help food producers prepare for a safer, more sustainable future.

Sustainability and food safety go hand-in-hand

Forward-thinking food producers should consider food safety in light of four emerging global trends:

● **Rising meat consumption:**
The global population is expected to grow to almost 10 billion people by 2050, and economic growth will lead to proportionally greater consumption of meat. As demand for animal protein increases, so will the need to implement food safety practices.

● **Sustainability:**
Increasing demand for meat will place further pressure on agricultural and ecological systems. To keep up with demand and reduce strain on the environment, the processing industry must dramatically reduce food waste. Food safety and sustainability are inextricably linked.

● **Increasingly complex food supply chain:**
As the population grows and globalisation accelerates, the food supply chain will continue to grow in scale and complexity. Robust traceability systems will be essential to navigate this development.

● **Covid-19 and concerns over food safety:**
Consumers now consider good hygiene and safety compliance to be the most important factors when shopping, significantly increasing in importance since prior to the pandemic. Strict food safety measures and labelling are necessary to reassure shoppers that food products are safe.

Together, these trends show that food safety and sustainability are inseparable and will become more and more critical with every passing year.

Preventing contamination

Food contaminants can be biological, physical, or chemical, and exist at every point in the supply chain.

Cross-contamination occurs in three main ways: from food to food, from people to food, and from equipment to food. This section explores these challenges and highlights some potential solutions.

● **Food hygiene:**
In food processing, incorrect storage and improper preparation (or cooking, for convenience food) are the most common hygiene risks.

Once food is contaminated, contact with other food can lead to cross-contamination. This is especially concerning in the case of biological pathogens such as salmonella, listeria, campylobacter, and E. coli, which can spread and multiply by millions in just a few hours.

Measures to prevent food-to-food contamination include:
• Purchasing raw materials from reputable suppliers.
• Monitoring processes closely with real-time data insights.
• Using inventory software to streamline storage and logistics of products with limited shelf-life.

● **Staff hygiene:**
Food workers must pay close attention to personal hygiene and follow all preparation, cooking, and storage procedures carefully.

Continued on page 24

Continued from page 23
Education and training can help minimise cross-contamination risks while reducing the contact time between people and food to avoid physical contamination.

Measures to prevent person-to-food contamination include:

- Increasing automation to reduce human contact with food.
- Using software that provides operator guidance, leaving less room for human error.
- Promoting regular and thorough hand-washing.
- Ensuring that staff personal protective equipment (PPE) such as aprons, gloves, head coverings, and masks are high quality and in good condition.

● **Equipment hygiene:**
Unhygienic equipment creates a range of food safety risks, including physical contamination from dirty or damaged parts, biological contamination due to ineffective cleaning, and chemical contamination from cleaning product residue.

Measures to prevent equipment-to-food contamination include:

- Scheduling preventative maintenance to avoid breakdowns and stoppages.
- Following appropriate cleaning procedures.
- Investing in high quality, easy-to-clean equipment.
- Adopting equipment monitoring software that alerts users to maintenance issues.

● **Traceability:**
Food producers must be able to track and trace food products and ingredients through every stage of the supply chain.

Time is also key. The faster a food producer can trace an issue, the faster they can fix it, avoiding consumer harm and minimising the cost of food recalls.

Measures to ensure traceability include the following:

- Using traceability software.
- Using quality control software.

Innovation in practice

By investing heavily in research and development, Marel works to create groundbreaking solutions that support food safety in a sustainable manner.

● **Hygienic, sustainable solutions:**
At their innovation centre in Boxmeer in the Netherlands, they conduct microbiological research as part of their mission to reduce biological contamination in primary and secondary processes.

By designing innovative, easy-to-clean solutions, the Marel engineers seek not only to reduce food contamination and waste, but also to minimise the labour, water, and energy needed for operation and cleaning. In this way, sustainability wins on every front.

● **Advanced X-ray technology:**
Marel set the industry standard in the detection of hard food contaminants such as bone and metal. Their SensorX Magna trim inspection system uses x-ray technology to automatically detect and reject bone fragments and other hard materials in poultry, meat and fish, while also maximising yield to reduce waste and increase profits.

● **Traceability software:**
Innova Traceability software provides a complete overview of the food's journey from source to shelf. Having a reliable traceability system helps to greatly reduce food contamination risks, protect brand reputation, ensure compliance with regulations, and manage inventory effectively.

Future challenges

Although there are considerable challenges to overcome, technological advances in equipment and software mean that food processors are better equipped than ever to face these emerging trends. With their eyes firmly on the future, Marel is committed to helping food processing companies produce food more safely than ever. Preventing food contamination is essential to feed a growing population safely and sustainably. ■