MARS
Global Food
Safety Center

The landscape

Each year **1 in 10 people** fall ill after eating contaminated food, and **420,000 people die** as a result, according to statistics from the U.N. Food and Agricultural Organization.

Illness linked to unsafe food overloads health care systems and damages economies, trade and tourism. The World Health Organization (WHO) estimates that unsafe food costs low- and middle-income economies around **$95 billion** in lost productivity each year.

Food safety is not just a problem for developing countries. Even in the world's richest economies the problem persists. The WHO reports that every year **1 in 6** Americans suffer from a foodborne illness, costing the U.S. economy an estimated **$51 billion** to **$77 billion**, with similar estimates for Europe.

Safe food for all

If it's not safe, it's not food

At Mars, we believe everyone has the right to safe food. As a global food manufacturer, we believe we have a clear responsibility to lead in food safety. However, we also believe no one entity can do this alone. That is why we are taking a truly collaborative approach to food safety, one rooted in fostering mutual sharing and collaboration. It is also why, in 2015, we opened the Mars Global Food Safety Center. Today, the facility is committed to sharing research, innovating and improving food safety capabilities, and methodologies. That's because in the world we want tomorrow, there is safe food for all. This report shares more about our mission, purpose and progress to date.

We focus on three key long-term food safety challenges:

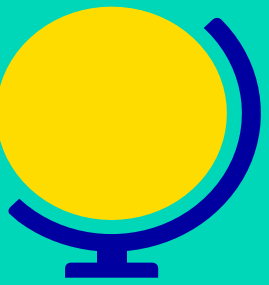
Mycotoxin risk management

Microbial risk management

Food integrity
(including areas such as food fraud)

The Mars Global Food Safety Center 2020 Scorecard

Our scientists use cutting-edge technologies in our world-class laboratories to address the most significant food safety challenges facing people and the planet today. In collaboration with our global partnership network, our team of experts uncover scientific breakthroughs to raise the bar for food safety.



1400+

international visitors from non-governmental organizations (NGOs), academia, industry and government in the last five years

200+

people trained from NGOs, academia, industry and government in the last five years

50+

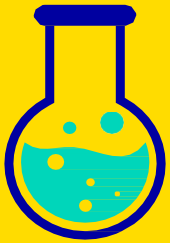
peer-reviewed research publications, conference posters, and presentations shared internationally since 2015

30+

dedicated Mars Associates are based at the center

25+

global partnerships and collaborations



600 m^2 of analytical laboratory

700 m^2 of microbiology laboratory

35+

industry speaking opportunities and conferences attended since 2015

Our research

Our global team conducts original, collaborative research using cutting-edge approaches. We share our studies openly through scientific publications and forums to raise the bar in food safety. Our progress in the last five years includes:

28 peer-reviewed publications

25 research posters and presentations

2 patents

258 citations

Mycotoxin risk management

We're developing strategies to mitigate and ultimately eradicate, mycotoxins from the global food supply chain. Our work starts with aflatoxins because of the serious health threat they pose to human and animal health. We are currently assessing the global cost of aflatoxins.

Microbial risk management

We are investigating innovative, new technologies and methodologies that have the potential to transform the management of microbial risk from reactive to predictive, and ultimately preventative. Next generation sequencing (NGS), whole genome sequencing (WGS), and metagenomics have the potential to revolutionize how we respond to and prevent microbial food contamination.

Food integrity

We investigate cutting-edge tools, methods, and capabilities to help mitigate food integrity challenges across the global food supply chain, helping to protect raw food materials and finished products. For example, we are currently working with partners to develop a multi-dimensional analytical toolbox to assess rice authenticity.

Spotlight:

Improving the speed and accuracy of pathogen detection

There is a critical need for faster, more accurate pathogen identification methods in the fast-moving world of food manufacturing and increasingly complex food supply chains.

A recent study, "Evaluation of Real-Time Nanopore Sequencing for *Salmonella* Serotype Prediction" from the Mars GFSC, along with the University of Georgia and Cornell University, shares a method demonstrating completion of whole- genome sequencing and corresponding genetic serotyping within eight hours — which is much faster than conventional methods.

Further work is needed, but this development could improve the speed and accuracy of pathogen detection which has implications for both the food industry and the global food supply chain.

Spotlight:

Solving complex problems, collaboratively

Chris Elliott, Professor of Food Safety

For over three years, Chris Elliott, OBE, professor and founder of the Institute for Global Food Security at Queen's University Belfast, has worked alongside the Mars GFSC to develop solutions for massive food safety and food waste issues.

One multinational, multipartner research project tapped our scientists to collaborate with a team of experts to develop techniques to prove the authenticity of rice. Over the course of a two-year study, the researchers determined how to deliver practical ways to monitor rice supply chains.

"I am a great supporter of the work that the Mars GFSC undertakes," he says. "Producing safe food has to be a priority for all food businesses and the commitment Mars has made through the establishment of the center is a testament to being front and center of the company's thinking."

The teams are now working together to seek out innovations in how to decontaminate crops from harmful mycotoxins caused by fungal contamination. But there are more food safety threats on the horizon and more research to do. "In the COVID-19 era, our global food system will be facing many daunting challenges," he says. "It is a pleasure to work side by side with a company that understands these Issues and always strives to do the right thing for its employees and customers."

Our partnerships & collaborations

The Mars GFSC works with partner organizations and academic institutions across North and South America, Asia, Europe and Africa to share knowledge, generate new insights and help improve the resilience of supply chains in vulnerable countries around the world.

1400+

visitors

25+

strategic partnerships and active research collaborations

Our impact

Leveraging key collaborations and partnerships, alongside breakthroughs in science and technology, we are helping to address the most significant food safety challenges.

Sustainable in a Generation Plan MARS

The Mars Sustainable in a Generation Plan addresses key areas of the U.N.'s Sustainable Development Goals and features ambitious targets informed by science and rooted in The Five Principles. Our plan focuses on **three key areas: Healthy Planet, Thriving People and Nourishing Wellbeing.**

The Mars GFSC contributes to our targets through research, training and operations.

Healthy Planet

The Mars GFSC was designed with reduced greenhouse gas emissions in mind. Since 2015 we have saved

6000 TONS

The equivalent of

1M+ trees

through our energy-saving operations.

Nourishing Wellbeing

New threats are emerging in developing nations as the population swells, but the bottom line is this:

If it's not safe, it's not food.

The Mars GFSC raises food safety awareness through education, training and sharing knowledge.

200+ people trained and 20+ training events hosted in the last five years

Spotlight:

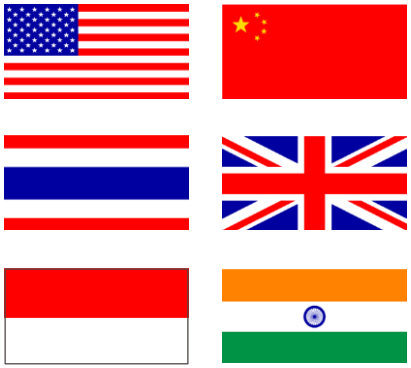
Tackling mycotoxins together to protect Nepal's future

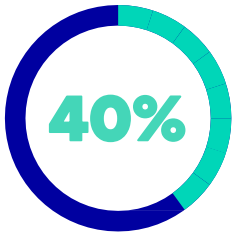
Chronic malnutrition and stunting among children is a serious concern in Nepal, affecting five of every six children (Bhurtel and Ali). Evidence suggests foods contaminated with aflatoxin are culprits. About 4.5 billion people are exposed to aflatoxins, known to contaminate 25% of the world's crop area. This is why the Mars GFSC joined Dr. Jagger Harvey and the Feed the Future Innovation Lab for the Reduction of Post-Harvest Loss, Kansas State University, the U.S. Agency for International Development, the Nepal Development Research Institute, the University of Nebraska-Lincoln and the Nepal Academy of Science and Technology to establish a mycotoxin laboratory in Lalitpur, Nepal. "The global food safety community is becoming increasingly involved in working together to investigate causes and seeking innovative solutions to help eradicate them," Dr. Jagger Harvey, PHLIL Director, said. The teams want to identify causes of aflatoxin contamination in the Nepalese diet and mitigate and eradicate mycotoxins from the food supply chain. Early results are promising, revealing that contaminated maize and groundnuts are among the biggest aflatoxin contributors. The Mars GFSC team helped design the new facility, based on its research center experience, and trained Nepalese lab employees. This collaboration serves as a blueprint for new labs and empowers local experts to train researchers.

Our team

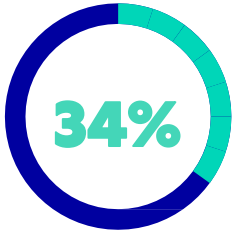
The diversity of our team and the way we work together with our partners enables us to take a truly multidisciplinary approach to addressing complex food safety challenges.

We have a truly global team





of our GFSC Associates hold a Ph.D.



of our GFSC Associates hold M.Sc. degrees, all from world-renowned institutions

9 awards

Our Associates and work have been recognized over the last five years

8 scientific advisory board seats held by GFSC Associates to date

Spotlight:
Ensuring safe food for all

Zhiqiang Gao, Head of Operations, Mars GFSC

In 2014, as the Mars Global Food Safety Center was being built, Zhiqiang Gao joined the Mars GFSC as Operations Manager and is now the Head of Operations. Prior to joining the Mars GFSC, he spent four years as a Project Engineer in Mars Petcare China and three years as a Mechanical Engineer.

Zhiqiang's enthusiasm for efficiency and organization while raising awareness about food safety has only grown during his time with the team. "The purpose of the Mars GFSC is safe food for all. The Chinese character 'food' means 'people with consciousness can make food,'" says Zhiqiang. "The GFSC is raising the food safety consciousness of society while building capability."

Zhiqiang is especially proud of keeping the Center "as new as day one", adding that the Mars GFSC has been mentioned as "the most-organized site ever" at Mars R&D meetings.

He looks forward to and appreciates his daily interaction and collaboration with GFSC Associates. "This is thereason I am always happy to go to work," says Zhiqiang, who is responsible for ensuring effective site operations across the Mars GFSC while leading a team of 10 Associates.

When he's not sharing his passion for food safety, he enjoys improving and developing his own processes and tools in time management, knowledge management and project management.