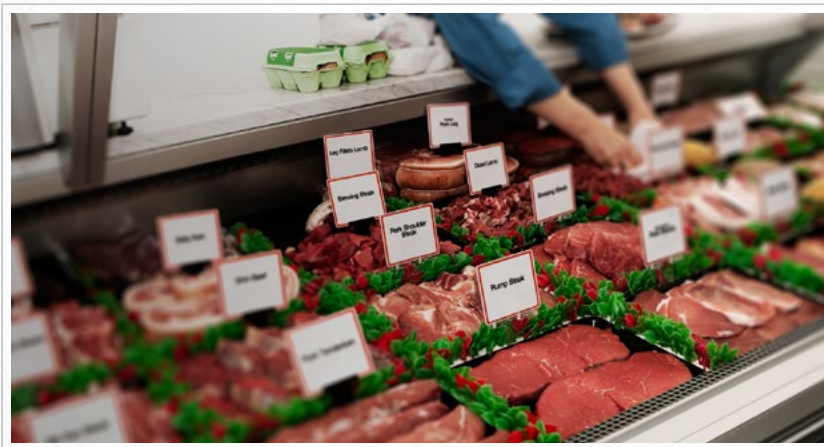


# Providing the World a Safe & Secure Food Supply

> 9 Billion (2050) .....  
7 Billion (2011) .....

*The world's population is projected to grow to nine billion by 2050. Will there be enough food to feed the population? Will the food produced be safe?*



**I**N 1996, the World Food Conference defined food security as existing only when all people, at all times, have access to safe and nutritious food. Worldwide, the United Nations estimates that two billion people and nearly 200 million children under five years old suffer from under nutrition, with more than 3.5 million children dying from under nutrition each year.

Public health concerns also are prevalent, even in countries where food is plentiful. The Centers for Disease Control estimate that 48 million cases and more than 3,000 deaths

occur in the U.S. annually due to foodborne illness. In Mexico, foodborne illness is the leading cause of death in children younger than 5 years old. Working with government agencies, universities and development agencies across the U.S., Central America, the Caribbean and Europe, Texas Tech University researchers are assisting in the development of food production and safety practices and public health education.

Also, Texas Tech researchers are looking at the spread of emerging diseases from domestic animals and wildlife to humans.

With the addition of a biological safety level three laboratory, Texas Tech scientists have the ability to perform both basic and applied research related to biological agents and toxins which have the potential to impact human and animal health.

Texas Tech University researchers, working primarily through the International Center for Food Industry Excellence and The Institute of Environmental and Human Health, are leading interdisciplinary efforts in a number of food security and food safety areas including:

- Using a farm to fork approach to reduce foodborne pathogens such as E. coli and salmonella
- Working to preserve the efficacy of antimicrobial drugs for future generations by mitigating antimicrobial resistance in bacteria carried in food-producing animals
- Working with developing countries to create sustainable food sources, improve public health education and increase economic value
- Examining how contaminants may affect the food chain
- Disrupting the cycle of disease transmission from animals to humans





# REACHING AROUND THE WORLD

The research, outreach and education activities of the International Center for Food Industry Excellence (ICFIE) adapts to the environment and the needs of society. In addition to focusing on disease-causing bacteria in food, the team also focuses on people. In particular, much effort is focused on understanding the food safety culture of workers in food production environments, a critical issue as attitudes toward food safety affect the likelihood of effective and sustained behavior change.

In Honduras, ICFIE is working with the government to utilize local resources to feed cattle as a sustainability project to increase

both the economic value and the amount of meat available to the people of Honduras. The project also puts an emphasis on public education in food safety.

In the Bahamas the team is working with the government to develop a new agriculture school by providing goats, lambs and embryos of each; teaching artificial insemination techniques and food safety. The team also is assisting in developing new food products and there are plans to help build a new slaughter plant.

Texas Tech students are working in a French food safety lab on novel, cutting-edge

molecular work to understand *E. coli* and salmonella. ICFIE also has a relationship with the Roslin Institute in Scotland to better understand the molecular aspects of how salmonella interacts with its host.

Through the Sustaining Our World through Education and Research (SOWER) scholars program, interns and graduate students from developing countries come to Texas Tech to learn the skills needed to help their countries. The students are then expected to return home to apply the knowledge they've gained at Texas Tech to develop and strengthen food resources and improve public food safety education.

Photo by Alejandro Echeverry



## Food Safety, Food Security & Public Health Research

The ICFIE team's public health efforts also focus on reducing cases of *E. coli*, salmonella and listeria, another foodborne illness as well as looking at implications of antimicrobial resistance.

*E. coli* bacteria are transferred through undercooked beef products, unpasteurized dairy and food, such as produce, that may be contaminated with animal feces. Researchers are working to understand the practices and

interventions that may be associated with how this pathogen survives in animals and in food production systems. They have evaluated and developed several interventions that are commonly used today by the food production industry, such as probiotics, vaccines and non-thermal microwave technology.

With more than a decade of experience working on salmonella, researchers have recently reported that salmonella can be harbored within peripheral lymph nodes of cattle, which

may pose a threat to consumers. Texas Tech was the lead institution on the first competitive award from USDA/NIFA to understand this phenomenon in cattle populations and is now focused on reducing the threat to human health.

Listeria, another foodborne illness, causes severe disease and loss of life each year. Texas Tech research is providing food producers with a new understanding of where this pathogen hides in food production environments and how to control it.

Antimicrobial resistance (AMR) is a growing threat to global public health that has the potential to reverse key medical advances in the body's ability to fight infections. Research focuses on exploring factors that may contribute to or mitigate AMR in livestock populations. Researchers at Texas Tech's Institute for Environmental and Human Health (IEHH) are also looking at AMR from the perspective of how runoff and airborne dust particles from feedlots may affect human health.

# THE ANIMAL TO HUMAN CONNECTION

Researchers at TIEHH are focused on public health surveillance for man-made contaminants and biological threats that naturally occur in the environment, as well as various pathogens and toxins that may be intentionally introduced.

Zoonotic diseases, such as anthrax, brucellosis, plague and tularemia, that naturally occur may enter the food supply and infect humans through meat, meat products and dairy products. Another transmission point is through wildlife. Hunting and fishing are big business in the U.S. In Texas more than \$14

billion dollars is generated annually from this business, and those who handle, clean or eat wild game risk exposure to disease.

By understanding the transmission dynamics between animals and humans and how to interrupt that cycle, researchers can break the disease transmission cycle and reduce the number of humans who may be exposed to diseases.

TIEHH is home to a Texas Department of State Health Services Regulatory Milk Lab

that receives and tests dairy product samples from all commercial dairy producers and processors throughout the region, providing a public health resource for early detection of contaminants and pathogens in commercial dairy products.

The biological safety level three laboratory allows Texas Tech to function as a public resource for the identification and confirmation of biological samples for outbreaks of infectious diseases and other public health emergencies.

[WWW.DEPTS.TTU.EDU/ICFIE](http://WWW.DEPTS.TTU.EDU/ICFIE)



## Human Health Concerns

[WWW.TIEHH.TTU.EDU](http://WWW.TIEHH.TTU.EDU)

TIEHH is also bringing its chemical analysis expertise to bear on potential public health concerns through man-made contamination. Researchers are working with Barksdale Air Force Base in Louisiana to look at the impact of perfluorinated compounds (PFCs), which are in foams used to put out fires. Researchers are focused on two bayous near an old fire training area that have detectable levels of PFCs in water, sediment and fish tissue. Although access to the base is controlled, those bayous flow off of base property. Researchers are

looking not only at the ecological impacts of PFCs, but also at the potential for human health risks associated with fish consumption.

TIEHH's chemical analysis work is also playing a role in public health education around Lake Texoma on the Texas-Oklahoma border. The lake is a major tourist destination for the area, with about seven million people visiting annually, more than visit Disneyland. When algal toxins began killing fish and potentially making the water unsafe for recreation, the

U.S. Army Corps of Engineers began posting signs around the lake reporting algal cell counts, causing tourism to drop. Cell counts have no relationship to the actual presence of algal toxins. Through a contract with the health department and local businesses, TIEHH now monitors lake samples monthly, resulting in signs being posted that relate to the health risk rather than just cell counts. TIEHH's more accurate public health data have been used to write the first, and only to date, local ordinance in Texas related to algae in recreational waters.





**International Center for Food  
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