

# **Environmental Microbial and Food Safety Laboratory**

The mission of the Environmental Microbial and Food Safety Laboratory is to conduct research essential to understanding how food products become contaminated with pathogens affecting human health, to develop methods to detect and characterize those pathogens of national and international concern, and then to mitigate contamination to prevent foodborne illnesses.

**Six Research Projects; 50-60 staff (16 scientists)**

**Base funding of \$7.0 Million (annual appropriation)**

**ca. \$3.0 Million in extramural funds (since 2008)**

- **Produce Contamination** (from field to processing)
- **Surface Proteomics** (fimbria/pili characterization and expression)
- **Dairy Pathogens** (dissemination in farm environment)
- **Zoonotic Parasites** (characterization and attachment)
- **Water Transport** (surface waters and irrigation systems)
- **Sensing Technologies** (rapid imaging for detection of defects)

# Research Scientists

## Sensing Technologies

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## Produce Contamination

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## Parasites

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## Dairy Pathogens

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# Spectral Sensing Technologies for Food Safety and Sanitation

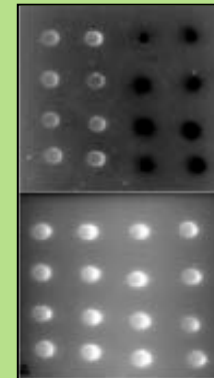


High-speed spectral imaging systems and methods to inspect produce for defects and contamination

Non-destructive techniques to detect adulterants and authenticate ingredients for food processors

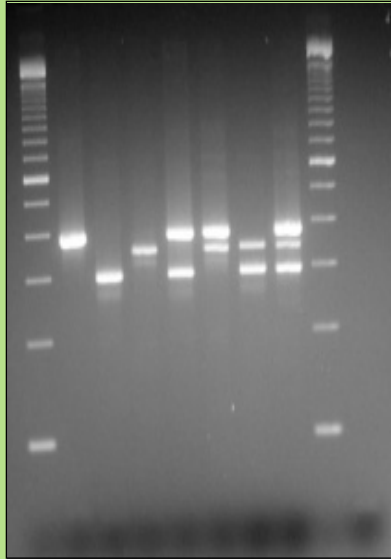


Handheld portable spectral imaging devices to improve sanitation inspection in processing facilities

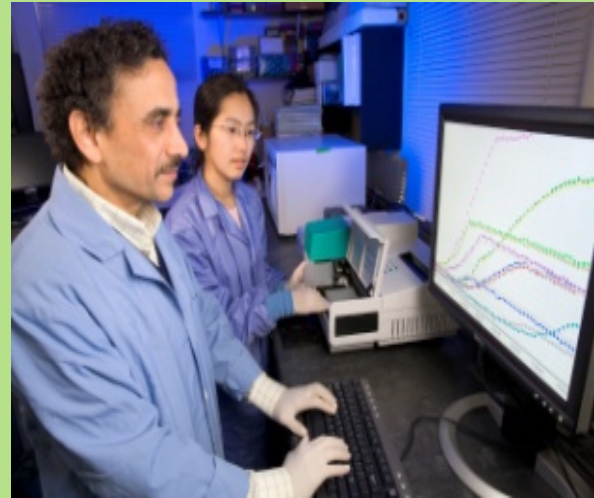


# Molecular Methods for Detection of Pathogens

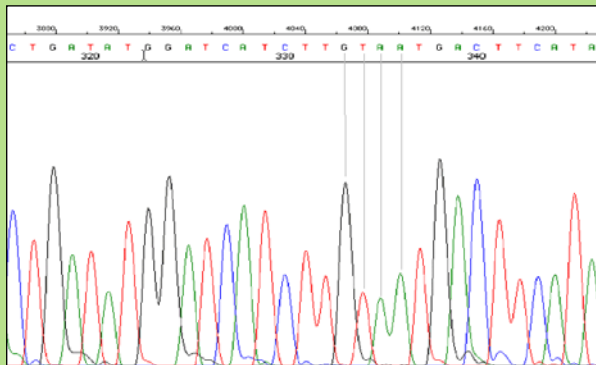
Develop accurate, efficient, low-cost techniques to identify pathogens in biological and environmental samples



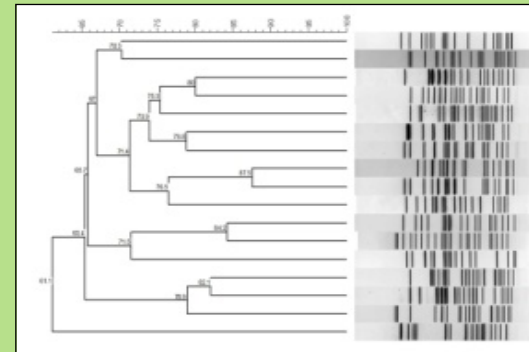
**Multiplex PCR to identify mixed infections**



**Real time growth measurements of foodborne pathogens**



**DNA sequencing for pathogen species identification**



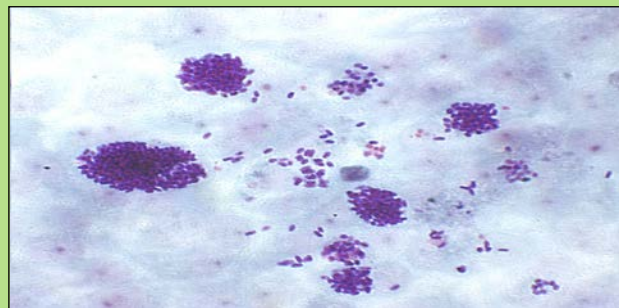
**Relationships between isolates based on pulsed field gel electrophoresis**

# Zoonotic Parasites – Food Safety

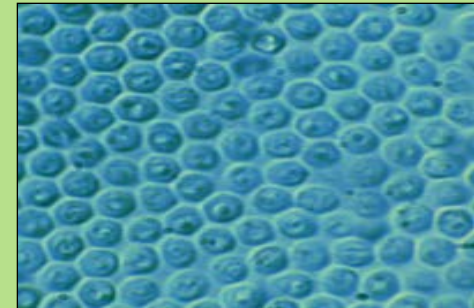
Development and application of new molecularly based technologies enables precise identification of parasites species, potential hosts, and pathways of transmission from animals to humans



*Giardia*



*Microsporidia*

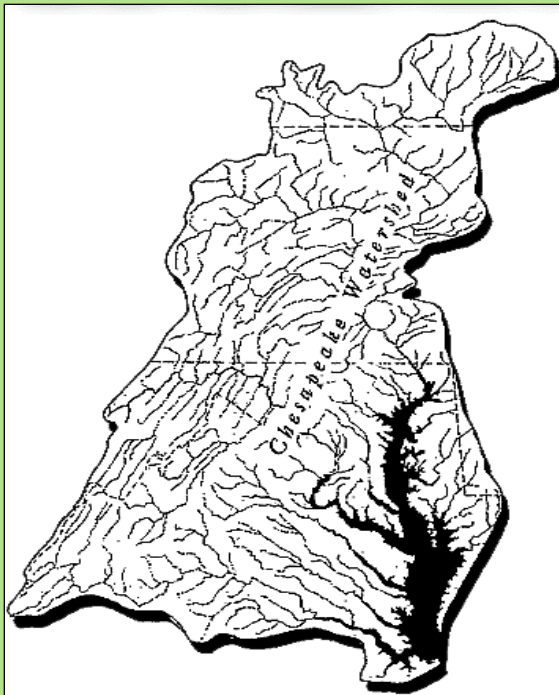


*Cryptosporidium*



# Environmental Fate and Transport

Development and evaluation of best management practices to prevent microbial pathogen transport to irrigation, recreation, and drinking water sources



Predicted modeling of pathogen dissemination via hydrologic pathways

# Fresh Produce Contamination

## During Production

Produce may be contaminated in the field, or in greenhouses/hoop houses during the growing season via overhead or drip irrigation water



Studies are conducted to assess pathogen survival and dissemination within the plant vegetation and root systems

# Fresh Produce Contamination

## During Harvest

Produce may be contaminated during harvest



Studies are conducted to assess the extent of pathogen dissemination by contaminated harvesting equipment



# Fresh Produce Contamination

During Processing



Studies are conducted to optimize disinfection wash steps to reduce pathogen risk from fresh produce, and to develop packaging protocols to extend shelf-life of bagged salad

# Collaborations

EMFSL scientists have extensive collaborations with private industry, state and federal agencies, national and international universities and trade/non-profit organizations. The lab has numerous Cooperative Research and Development Agreements (CRADA) with private industry to co-develop new technologies and instruments. The lab also has several Cooperative Agreements with academic institutions to pursue collaborative research projects.

