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*Assisting Food Entrepreneurs Meeting Safety and Regulatory Requirements:
Food Safety Outreach and Technical Assistance in Antigua, Guatemala*

Trip Report (April 7, 2021)

Aliyar Fouladkhah, PhD, MPH, CFS

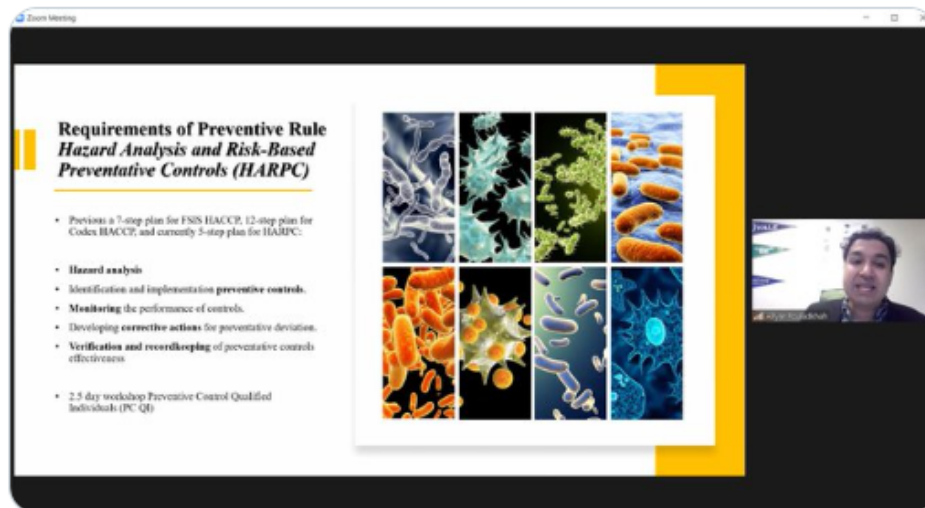
Faculty Director, Public Health Microbiology Laboratory

Tennessee State University, Nashville, TN



Partners of the Americas @PartnersAmerica · Nov 25

Dr. Aliyar Fouladkhah is volunteering with @farmertofarmer in #Guatemala to support Yogi Super Foods with a Preventive Control Qualified Individual (PCQI) certification to help them create a food safety plan to meet the standards to export their products to the US market.



Summary:

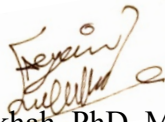
It was a great pleasure for me to serve as a volunteer for USAID/F2F program in Guatemala again from November 13 to 30, 2021. This was my second program in Guatemala- based on recommendation of the host institution, I had a great pleasure to return for the second assignment with Yogi's Super Foods, great folks in the Guatemala F2F office, and talented and enthusiastic students of Rafael Landover University.

In a previous assignment, I had a chance to visit the company and spend two weeks in their operation in 2017. I was very pleased to see great improvement in the company since my last visit and elated to know that the company is now selling their products to the mainland of the United States via Amazon and has also hired a few new individuals thanks to their recent success. This follow-up assignment was done remotely due to the ongoing global respiratory pandemic/endemic. Nevertheless, we were able to hold very vivid, impactful, and enthusiastic training and discussions for further building capacity in the host company. The two-week workshops were attended by several members from the F2F office of Guatemala, employees of Yogi's Superfood, and students from Rafael Landivar University. Specifically, 11 individuals received very valuable food safety certifications during a multiday workshop of the program. This certification granted the 11 individuals the status of Preventive Control Qualified Individuals or PC QI. At the current time, any company that intends to sell products to the United States would need to have at least one PC QI in their operation. I have attached the certifications of the individuals, excerpts of presentations, and also the evaluations provided by the individuals about the workshops and presentations. At current times, the certification costs \$500 to \$700 per participant. These 11 individuals were able to receive the certification and course textbook at no cost to them thanks to sponsorship from the Public Health Microbiology program of TSU. Upon completion of the program, individuals returned to the operation in Yogi's Superfood and implemented the discussed information. We then had a chance to have a group meeting and discuss any questions that individuals have during implementing the content of the workshop in the company. Based on these discussions, I prepared the recommendations for individuals involved in this program to assure further capacity building and food safety improvement in their operation. It was additionally very gratifying to know that one of the students who attended the certification program was able to secure a position in Yogi's

Superfood to further assist them in meeting the food safety and regulatory requirements of national and international commerce. The host company and the Guatemala F2F office could further benefit by hosting a similar assignment, in harmony with provided recommendations, in the future. Since many of the great staff in the F2F office in Guatemala are also certified for food safety training via these two assignments, they could be part of the teaching team of future efforts in this area.

I would like to thank the colleagues in Washington and Guatemala USAID/F2F offices for the outstanding work they are doing, for harmonizing the events of the program, and for conducting impactful and important training event during the unknown and stressful global respiratory pandemic/endemic times. Am pleased and excited about the capacity-building endeavors in this assignment and hope the host company and the F2F office in Guatemala continue to flourish in future years to come.

Sincere regards,



Aliyar Fouladkhah, PhD, MPH, CFS

Assistant Professor, Tennessee State University

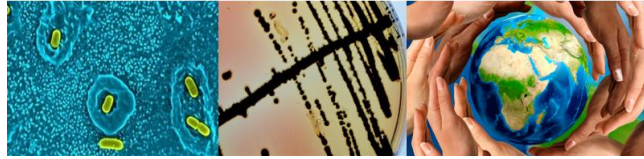
Faculty Director, Public Health Microbiology Laboratory

Yale School of Public Health Alumnus

Highlights of Pre-workshop Presentations

Aliyar Cyrus Fouladkhah





Foodborne Diseases of Public Health Importance

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- Microbiology and Food Safety, PhD
- Applied Statistics and Data Analysis, Graduate Certificate
- Food Science & Human Nutrition, MS



Yale SCHOOL OF PUBLIC HEALTH

- Biostatistics and Epidemiology, Advanced Professional MPH
- Food and Drug Regulatory Affairs, Graduate Certificate
- Climate Change and Health, Graduate Certificate

Advanced Professional MPH Program



Website: <https://publichealth.yale.edu/advanced/>
 Video: <https://www.youtube.com/watch?v=IGVN9Jfolt8>



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Public Health Microbiology Laboratory

Tennessee State University

MPH Curriculum Food Safety and Applied Epidemiology



United States Department of Agriculture
National Institute of Food and Agriculture

PBI Pressure BioSciences Inc.

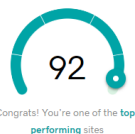
- ❖ **Stablihed in 2015:**
- ❖ Currently \$7,000/year from Cooperative Extension Program

❖ Extramural Funding

- ❖ National Institute of Health: **\$33,680** (PD of Sub-award, 2020-21)*
- ❖ Pressure BioScience Inc.: **\$35,000** (Role: PD, 2019-2024)
- ❖ USDA-NIFA CBG: **\$350,000** (Role: PD, 2018-2022)
- ❖ USDA-NIFA HEC: **\$50,000** (Role: PD, 2018-2021)
- ❖ USDA-NIFA FSOP: **\$165,000** (Role: PD, 2018-2021)
- ❖ Pressure BioScience Inc.: **\$23,500** (Role: PD, 2017-2019)
- ❖ USDA-NIFA FSOP: **\$59,750** (Role: PD, 2016-2019)
- ❖ Pressure BioScience Inc.: **\$9,400** (Role: PD, 2017-2019)
- ❖ USDA-NIFA FSOP: **\$880,000** (Role: CO-PD, 2019-2023)**
- ❖ USDA-NIFA FSOP: **\$1,197,751** (Role: CO-PD, 2015-2020)**
- ❖ USDA-NIFA CBG.: **\$300,000** (Role: CO-PD, 2018-2022)

*Pending account setting and internal administrative approval.
** Sub-awardee of Southern Center Main Awards.

Website: <https://publichealthmicrobiology.education/>



Website performance: 4/22/2020

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Public Health Microbiology Laboratory Current Members

- **Current Graduate Students** (Primary Advisor/Degree Chair: A. Fouladkhah):
 - Sadiye Aras (2018-), Graduate Research Assistant, (PhD candidate, Biological Sciences c. Food Microbiology)
 - Lyothi George (2019-), Graduate Research Assistant (PhD student, Biological Sciences c. Food Microbiology)
 - Sabrina Wadood (2020-), Graduate Research Assistant (MS student, c. Food Microbiology)
- **Current Research Technician, Associates, and Interns** (Primary Supervisor: A. Fouladkhah):
 - Shahid Chowdhury, BS. Research Technician (2016-present)
 - Niamul Kabir, PhD, Post-doctoral Research Associate (2018-present).
 - Amir Kashipazha, MS, Data Visualization Intern and Web Editor (2018-present).
 - Dr. Bagheri, PhD, MSPH, Visiting Scholar (2020-present).
- **Current Graduate Student Committee:**
 - -Shreya Singh Hamal, PhD candidate, Biological Sciences con. Food Microbiology (Committee member).
 - Yun Tian, PhD student, Biological Sciences con. Genomics & Immunology (Committee member).
 - Zedonia Williams, MS student, M.S. degree in Food and Animal Sciences (Committee member).



Fall 2019 Graduates

Abimbola Allison, PhD

Tyler Keene, MS

Monica Henry-Smith, MS

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Public Health Microbiology Laboratory Success Story- AGSC Food Policies and Regulations Student

- **Fall 2019 Graduates**
- Abimbola Allison, PhD
- Tyler Keene, MS
- Monica Henry-Smith, MS



Tennessee Leaders
of Tomorrow Internship

9/12/2019

Monica Smith
1282 Vantage Pointe Rd – Apt. 304
Ashland City, TN 37015

Dear Monica,

Congratulations! You have been selected for an internship with Tennessee State Government. Being selected for this internship is very competitive and is a great honor. So, be proud of your accomplishment! We are excited to have you as a member of our customer focused team. We hope that this opportunity provides you with the professional development experience that you are seeking.

Below are the details of your internship offer

Job Title: Tennessee Department of Agriculture - Intern

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Students Awards Adviser: A. Fouladkhal

Students Success Available at:
<https://publichealthmicrobiology.education/students-awards>

Public Health Microbiology Laboratory



- *1st Place, Oral Competitions, Health and Medical Sciences section, 2019 Tennessee Academy of Sciences. The 129th annual meeting, Columbia State Community College, Columbia, TN. Student: A. Allison.*
- *2nd Place, Oral Competitions, Health and Medical Sciences section, 2019 Tennessee Academy of Sciences. The 129th annual meeting, Columbia State Community College, Columbia, TN. Student: S. Aras.*
- *1st Place (Tied), Poster Competitions, Health and Medical Sciences section, 2019 Tennessee Academy of Sciences. The 129th annual meeting, Columbia State Community College, Columbia, TN. 2019 Summer Intern: A. Chowdhury*
- *2nd Place, Poster Competitions, Health and Medical Sciences section, 2019 Tennessee Academy of Sciences. The 129th annual meeting, Columbia State Community College, Columbia, TN. Student: S. Aras.*
- *2nd Place, Oral Graduate Competitions, 2019 Annual State-wide Competition for Food Safety Modernization Act, Food Safety, and Food Science Students. Tennessee (Volunteer) section Institute of Food Technologists. Student: A. Allison*
- *1st Place, Oral Graduate Competitions, 2019 Annual State-wide Competition for Food Safety Modernization Act, Food Safety, and Food Science Students. Tennessee (Volunteer) section Institute of Food Technologists. Student: M. Henry*
- *1st Place, Oral Competitions, Health and Medical Sciences section, 2018 Tennessee Academy of Sciences. The 128th annual meeting, Austin Peay State University, Clarksville, TN. Student: M. Henry*
- *2nd Place, Oral Competitions, Health and Medical Sciences section, 2018 Tennessee Academy of Sciences. The 128th annual meeting, Austin Peay State University, Clarksville, TN. Student: A. Allison*
- *1st Place (Tied), Graduate Poster Competitions, 2018 Annual State-wide Poster Competition for Food Safety Modernization Act, Food Safety, and Food Science Students. Tennessee (Volunteer) section Institute of Food Technologists. Student: M. Henry*
- *1st Place, Undergraduate Poster Competitions, 2018 Annual State-wide Poster Competition for Food Safety Modernization Act, Food Safety, and Food Science Students. Tennessee (Volunteer) section Institute of Food Technologists. Student: B. Simpson.*
- *2nd Place, Undergraduate Poster Competitions, 2018 Annual State-wide Poster Competition for Food Safety Modernization Act, Food Safety, and Food Science Students. Tennessee (Volunteer) section Institute of Food Technologists. Student: A. Sumlin.*
- *2nd Place, Oral Competitions, Graduate Life and Physical Sciences Oral Division, 40th Annual University-Wide Research Symposium, Tennessee State University, Nashville, TN, 2018. Student: M. Henry*
- *2nd Place, Oral Competitions, Graduate Life and Physical Sciences Division, 40th Annual University-Wide Research Symposium, Tennessee State University, Nashville, TN, 2018. Student: A. Allison.*
- *1st Place, 2017 Tennessee Academy of Science, Health and Medical Sciences Student Oral Competition (Student: K. Sampson). Presentation: Sampson, K., Day, K., Allison, A., Chowdhury, S., Fouladkhal, A. 2017. Fate and Biofilm Formation of Wild-type and rifampicin-resistant *Cronobacter sakazakii* in biotic and abiotic environments. Health and Medical Sciences section, 127th Meeting of Tennessee Academy of Science, November 17, 2017, University of Tennessee at Martin, Martin, Tennessee.*
- *2nd Place, Oral Competitions, Graduate Biological Sciences Division, 39th Annual University-Wide Research Symposium, Tennessee State University, Nashville, TN, 2017. Student: A. Allison, PhD Student*

2019 Tennessee Academy of Science Health and Medical Sciences Division 1st (A. Allison); 2nd (S. Aras); 3rd (M. Henry) Adviser: A. Fouladkhal



2018 Tennessee Academy of Science Health and Medical Sciences Division 1st (M. Henry); 2nd (A. Allison); 3rd (J. Adhikari) Adviser: A. Fouladkhal



A. Allison, Outstanding PhD Student in College of Agriculture, Receiving an Award from Dean Reddy.

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Teaching in Tennessee and Internationally



2019 Evaluation:

- “Dr. Fouladkhah is an excellent professor. He does the absolute best job of making students feel comfortable making discussion in class and is exceptionally knowledgeable in the area of food sciences. The in class exercises are definitely helpful to make sure the lectures are being retained and assists in requiring little to no studying outside of the class meetings.”
- “This course is top notch, one of the best courses I have ever taken. Much gratitude to the lead instructor Dr. Fouladkhah. I learned so much in the class and my knowledge on food policies and regulation has increased a thousandfold.”

2018 Evaluation:

- “This man is so amazing. Learned so much in his class thank you Dr. Fouladkhah.”
- “He is very helpful and always very encouraging. He helped me planned my studies and even future goals.”

International Travel Reports Available at:

<https://publichealthmicrobiology.education/international-programs>



2019, Philippi Township, Cape Town, South Africa: HIV Prevention Training



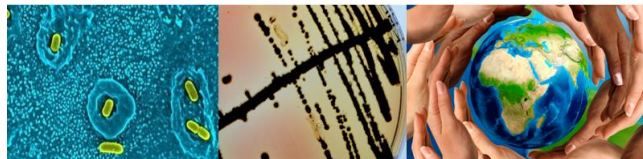
2018, Antigua, Guatemala Food Safety Training for Food Industry Leadership



2017, Santiago, Dominican Republic USAID Public Health and Microbiology Training Faculty and Staff of ISA University

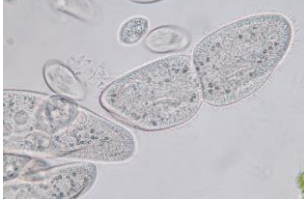


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Foodborne Diseases of Public Health Importance

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Bacteria

- If **conditions are ideal**, bacteria can multiply once every 20 minutes
- It is unlikely you'll ever start with just ONE bacterium
- Some pathogens can make people sick with a dose of **10 cells or less**
- What conditions are **optimal**?
 - **Food source**
 - **Moisture**
 - **Right temperature**

Time	# of Bacteria
20 min	2
40 min	4
1 hour	8
80 min	16
100 min	32
2 hours	64
4 hours	4096
6 hours	262,144
8 hours	16,777,216

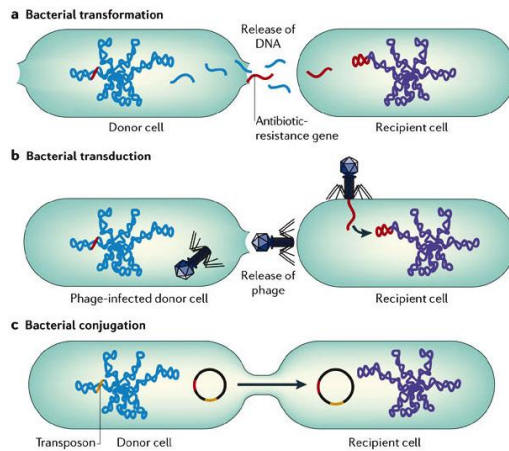
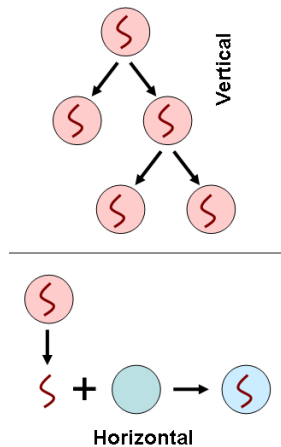
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Emerging pathogens

Diversity, moving towards "fitness" and Emerging Pathogens



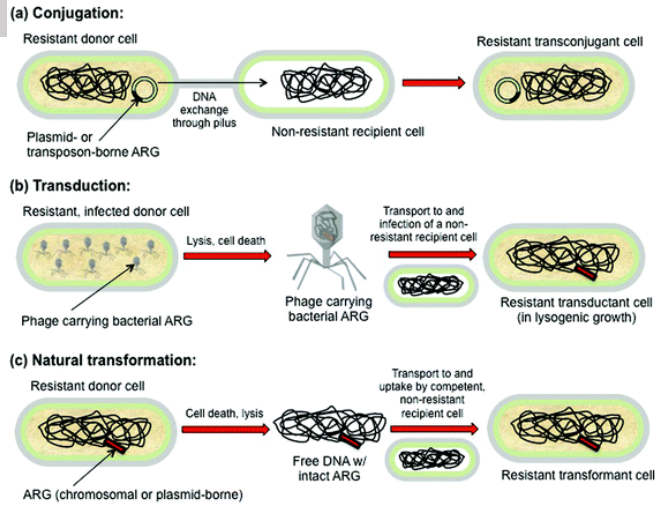
Photo Courtesy: http://www.davidarling.info/encyclopedia/8/binary_fission.html



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Nature Reviews | Microbiology

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Horizontal Gene Transfer



Donn, 2012

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Planktonic cells and Biofilm Communities

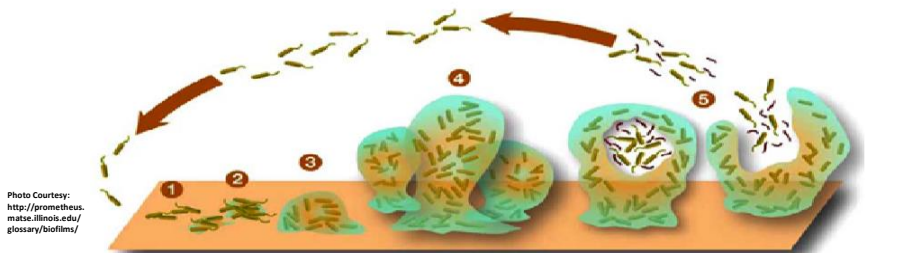


Photo Courtesy: <http://prometheus.mtse.illinois.edu/glossary/biofilms/>

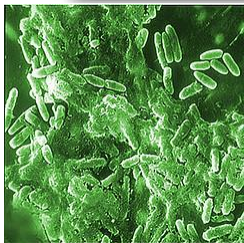


Photo Courtesy: <http://micro-writers.egybio.net/blog/?tag=antibiotic-resistance>

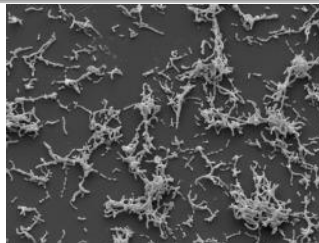


Photo Courtesy: http://www.ifenergy.com/50226711/boosting_microbial_fuel_cells_with_biofilm.php

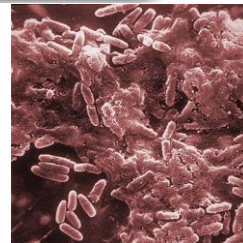


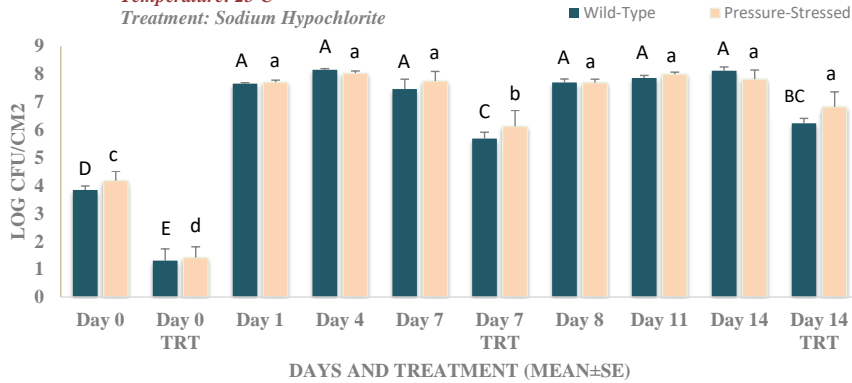
Photo Courtesy: <http://www.microbiologybytes.com/blog/category/biofilms/>

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Cronobacter sakazakii Two outbreaks in Tennessee (1998, Memphis; 2001 Knoxville)

Biofilm Formation and Decontamination of Wild-Type and Pressure-Stressed *Cronobacter Sakazakii*

Temperature: 25°C
Treatment: Sodium Hypochlorite

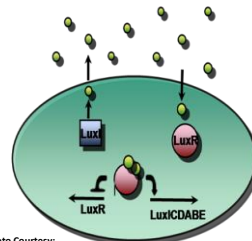
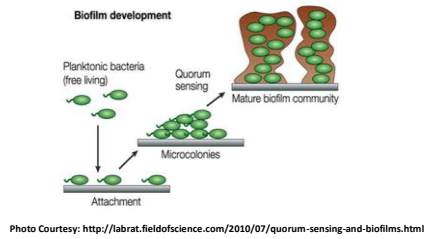
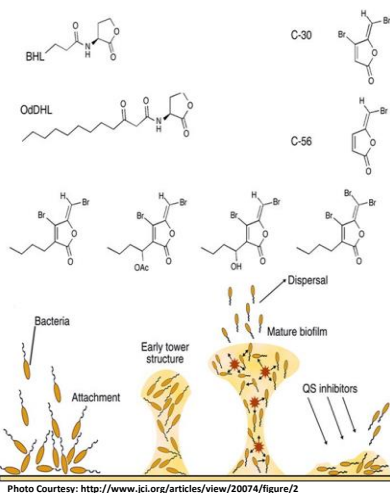


Allison et al., 2020



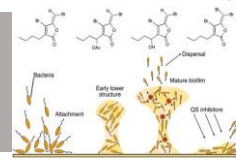
13

Quorum Sensing and Biofilm formation *Shiga toxin-Producing E. coli* and antibiotics treatment



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Infectious Diseases in Animals and Human is a Moving Target...



- It is estimated only 1% of microbial community has been identified.
- Currently **etiological agent** of 80.3% of foodborne illnesses, **56.2% of hospitalization**, and 55.5% of deaths remain unknown.

“Emerging” Pathogens:

- Vertical and horizontal gene transfer spores and biofilm formation
- Quorum sensing and cell to cell communication

“It is the microbes who will have the last word.”

-Louis Pasteur

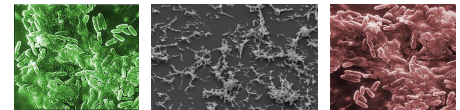
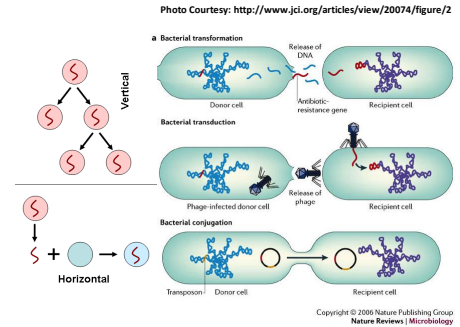


Photo Courtesy: <http://www.microbiologybytes.com/blog/category/biofilms/>
http://www.lfenergy.com/50226711/boosting_microbial_fuel_cells_with_biofilm.php
<http://micro-writers.egybio.net/blog/?tag=antibiotic-resistance>

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A superbug resistant to every available antibiotic in the U.S. kills Nevada woman



BY HELEN BRANSWELL, STAT January 13, 2017 at 10:01 AM EST



August 23, 2019
Multidrug-resistant salmonella outbreak characterized

(HealthDay)—A recent multidrug-resistant (MDR) *Salmonella enterica* serotype Newport outbreak, affecting patients in 32 states, was associated with soft cheese and beef consumption, according to a report published in the Aug. 23 issue of the U.S. Centers for Disease Control and Prevention *Morbidity and Mortality Weekly Report*.

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Rare strain of E. coli strikes across Canada: source unknown

BY NEWS DESK | JANUARY 14, 2017

A dozen cases of E. coli O121 have been confirmed in three Canadian provinces, according to matching genetic fingerprint data, but the source of the outbreak has not yet been identified.

The Public Health Agency of Canada reports four of the rare O121 cases were confirmed in British Columbia, four in Saskatchewan and four in Newfoundland and Labrador. The illness onset dates were in November and December of 2016.

Four of the v... Those indivi... the process o... determine th... coli O121 cor...

The Public H... improper ha... eating raw g... common sou... common sou...



Photo illustration

CDC says outbreak traced to raw clover sprouts has come to an end

By News Desk on April 23, 2020

The Food and Drug Administration's investigation of an outbreak of E. coli O103 in clover sprouts has been completed, and the Centers for Disease Control and Prevention has declared that the outbreak is over.

The FDA, along with CDC and state and local partners, investigated 51 illnesses

Epidemiology of Foodborne Diseases

- **Based on data from 1990s:** (Mead et al., 1999)

76 million illnesses, 323,000 hospitalizations, **5,200 deaths** in the United States.

- **More recent estimates show:** (Scallan et al., 2011)

47.8 million illnesses, 127,839 hospitalizations, and more than **3,037** deaths in the United States.

- 9.4 million illnesses, 55,961 hospitalizations, and 1,351 deaths are caused by 31 known foodborne agents.
- In addition to consumer insecurity, foodborne diseases cause around **\$77.7 billion** for losses in productivity and economical losses.
- Approximately 30% of population are especially “at risk” for foodborne diseases (The **YOPI**’s: The young, the old, Pregnant, and Immunocompromised)

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Significant foodborne pathogens...

based on Mead et al., 1999 and Scallan et al., 2011 studies

- **Leading etiological agents for illnesses:** *Norovirus* (58%), Nontyphoidal *Salmonella* serovars (11%), *Clostridium perfringens* (10%), and *Campylobacter* spp (9%).
- **Leading etiological agents for hospitalization:** Nontyphoidal *Salmonella* serovars (35%), *Norovirus* (26%), *Campylobacter* spp (15%), and *Toxoplasma gondii* (8%).
- **Leading etiological agents for death:** Nontyphoidal *Salmonella* serovars (28%), *T. gondii* (24%), *Listeria monocytogenes* (19%), and *Norovirus* (11%).

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Signs and Symptoms of Foodborne Diseases

- Mild illness (no medical care sought)
- **Guillain–Barré syndrome** (*Campylobacter* and *Salmonella*)
- **Post-infectious irritable bowel syndrome** (*Campylobacter* and *Salmonella*)
- **Reactive arthritis** (*Campylobacter* and *Salmonella*)
- **Haemolytic uraemic syndrome** (*E. coli* O157)
- **End-stage renal disease** (*E. coli* O157)
- Death

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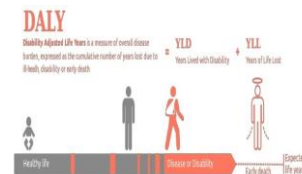
Significant Foodborne Pathogens of Public Health

Concern: Considering DALY and QALY (Scallan et al., 2015)

- **Disability Adjusted Life Year (DALY)**. Loss of life and health due to illness compared with 'perfect' health

- **Non-typhoidal *Salmonella*** (329000)
- *Toxoplasma* (32700)
- *Campylobacter* (22500)
- Norovirus (9900)
- *Listeria monocytogenes* (8800)
- *Clostridium perfringens* (4000)
- *Escherichia coli* O157 (1200)

62% bacterial agents; 29% parasitic agents; 9% viral agents

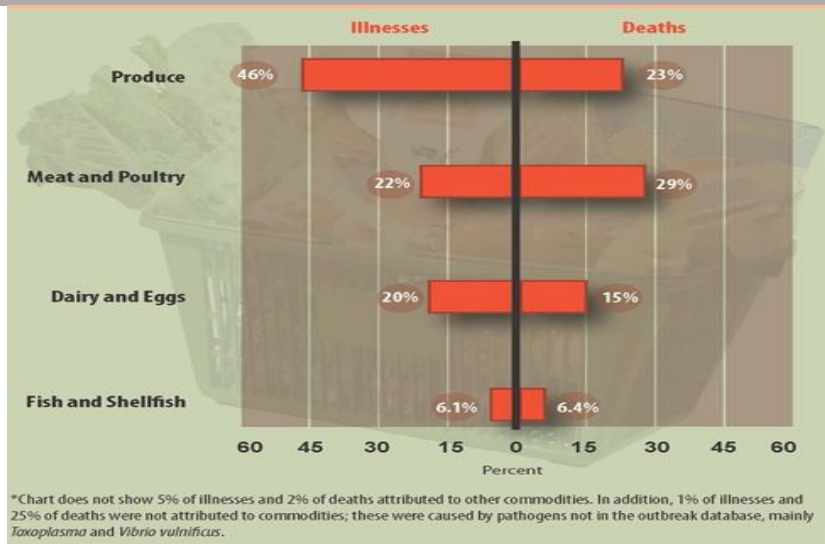


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- **Reactive arthritis** (*Campylobacter* and *Salmonella*)
- **Haemolytic uraemic syndrome** (*E. coli* O157)
- **End-stage renal disease** (*E. coli* O157)
- Death

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CDC Estimates of Food Safety Burden

<http://www.cdc.gov/foodborneburden/attribution-image.html#foodborne-illnesses>



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Are these outbreaks associated with corporates and lager manufactures?

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Prevalence of Pathogens in Medium-sized Poultry Operations

- 200–300 ft houses, 3000 to 5000 birds, conventional operation

(Alali et al., 2010)

	<i>Salmonella</i> serovars
Fecal samples (n=420)	38.8%
Feed (n=140)	27.5%

- Total of 135 sample from commercial free-range chicken producers

(Bailey et al., 2005)

	<i>Salmonella</i> serovars
Chicken Carcasses in Operation 1	64%
Chicken Carcasses in Operation 2	31%

Alali et al., 2010, J Foodborne Pathogens and Diseases; Bailey et al., 2005, J Food Protection

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Prevalence of Pathogens in Small Poultry Farms

- Study of 60 Small poultry slaughterhouses (fewer than 200 birds slaughtered per day)

Sampling sites	<i>Salmonella</i> serovars <i>(Albany, Hadar, Indiana, and Enteritidis sub-species)</i>
Carcasses after slaughter	42%
Utensils	23.1%
Storage freezers and refrigerators	71.4%

- The Study concluded “*The widespread occurrence of Salmonella in small slaughterhouses reinforces the need for implementation of effective control measures...*”

Terumi et al., 2000, Journal of Food Protection

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Climate Change and Public Health Microbiology

Non-typhoidal *Salmonella enterica* serovars

- **Global death:** 50,000 global death in 2010 (WHO, 2020)
- **Public Health Burden in the U.S.:** >1 million annual cases in 2011 (CDC, 2011)

Climate Change:

- **1 °C increase : 5 to 10% increases in Salmonellosis (WHO, 2010)**
- 2500 to 5000 additional global death
- 50,000 to 100,000 U.S. morbidity

At our current rate:

- >1.5 °C by 2040
- >4.8 °C by 2100



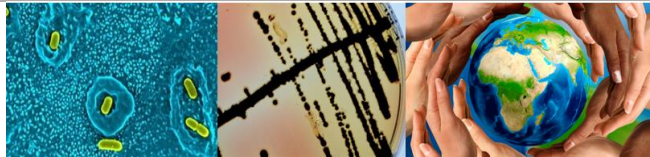
25

Main Bacterial Pathogens Associated with Animal and Human Health Diseases

26

Foodborne Pathogens of Public Health Concerns *>200 foodborne diseases*

- *Salmonella* serovars
- *Staphylococcus aureus*
- *Campylobacter* spp.
- *Bacillus cereus*
- Shiga Toxin-Producing *Escherichia coli* (STEC)
- *Vibrio* spp.
- *Yersinia enterocolitica*
- *Streptococcus* spp.
- *Shigella* spp.
- *Listeria monocytogenes*
- *Mycobacterium bovis*
- *Cronobacter sakazakii*



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Salmonella serovars

- **Annual illness (death): 1,027,561 (378) in American adults and children**
- **Infection** causes nausea, vomiting, diarrhea, fever, headache
- **Primary sources:** Intestinal tract of people and animals
- **Transmitted by** meat, poultry, eggs, raw milk, unpasteurized juice, many other foods (nuts, spices, produce, chocolate, flour) [**Low-moisture environment**]
- **Contributing factors:** cross-contamination, undercooked food, poor agricultural practices

Growth parameters	Minimum	Optimum	Maximum
Temperature	41°F (5.2°C)	95-109°F (35-43°C)	115°F (46.2°C)
pH	3.7	7-7.5	9.5
a _w	0.94	0.99	>0.99
Other	Non-spore former		
Atmosphere	Facultative - grows with or without oxygen		

Sources: ICMSF 1995 and Bad Bug Book 2nd edition, Scallan et al., 2011, and FSPCA

28

Salmonella serovars

- **Carriers: Reptiles** (turtles, lizards, and snakes); **Amphibians** (frogs and toads); **Poultry** (chicks, chickens, ducklings, ducks, geese, and turkeys); **Other birds** (parakeets, parrots, and wild birds); **Rodents** (mice, rats, hamsters, and guinea pigs); Other **small mammals** (hedgehogs); **Farm animals** (goats, calves, cows, sheep, and pigs); **Dogs; Cats; Horses. [Pretty much ubiquitous!]**
- **Dogs and cats** that become ill from *Salmonella* infection generally will have **diarrhea** that may contain blood or mucus
- Some cats do not have diarrhea, but will have a **decreased appetite, fever, and excess salivation.**

Prevention:

- **Minimizing direct contact, washing hands, and cleaning up after the pets** could minimize the risk of transmission from infected animals to human.

29

Staphylococcus aureus

Foodborne Diseases

- Infection
- Intoxication
- Toxico-infection

- **Annual illness (death): 241,148 (6) Americans every year**
- Both causes **infection** and **toxico-infection**
- Produces **heat stable toxins** after extensive growth
- **Primary sources:** Boils, nasal passages and skin (**around 20% positive on nasal passage, >10% hands**)
- **Transmitted** by recontaminated **cooked foods**, and foods with high salt or high sugar (**Gram-positive, poor competitor**)
- **Contributing factors:** Recontamination and **time/temperature abuse**

Growth parameters	Minimum		Optimum		Maximum	
	Growth	Toxin	Growth	Toxin	Growth	Toxin
Temperature	45°F (7°C)	50°F (10°C)	99°F (37°C)	104-113°F (40-45°C)	122°F (50°C)	118°F (48°C)
pH	4	4	6-7	7-8	10	9.8
a _w	0.83	0.85	0.98		>0.99	
Other	Poor competitor , non-sporeformer					
Atmosphere	Facultative – grows with or without oxygen, but slower without					

Sources: ICMSF 1995 and Bad Bug Book 2nd edition, Scallan et al. 2011, and FSPCA

30

Staphylococcus aureus

- **Methicillin-resistant *Staphylococcus aureus* (MRSA)** a major concern for animal and human health.
- Humans working closely in **animal feeding operations** are in elevated risk of exposure to this pathogen particularly the antibiotic resistant phenotypes
- A **contagious bacterium** responsible for vast majority of environmental **Mastitis in dairy** operations.
- Cause of “bumblefoot” in chickens
- A major pathogen of farm rabbits



31

Campylobacter spp.

- **Annual illness (death): 845,024(76)**
- Infection causes diarrhea, and potential nerve damage
- **Primary sources:** Intestinal tract of animals
- **Transmitted** by **raw poultry**, raw milk products, contaminated water, poultry (**dump tank, nearly 80%**). **Relatively high infective dose**
- **Contributing factor:** cross contamination and undercooking

Growth parameters	Minimum	Optimum	Maximum
Temperature	86°F (30°C)	108-109°F (42-43°C)	113°F (45°C)
pH	4.9	6.5-7.5	9.5
a _w	>0.987	0.997	-
Other	Non-spore former		
Atmosphere	3-5% oxygen optimum		

Sources: ICMSF 1995 and Bad Bug Book 2nd edition and FSPCA

32

Campylobacter spp.

- Bacterium exist in GI track of **many healthy farm and companion** animals.
- **Dogs six week and younger** are prone to Campylobacteriosis with symptoms:
 - Fever
 - Vomiting
 - Loss of appetite
 - Enlarged lymph nodes
- **Staying in kennels** that increases the **exposure to fecal matter** and contact with contaminated food and water are main sources of disease in dogs.

33

Bacillus cereus

- **Annual illness (death): 63,400 (0)**
- Produces **toxins** and extensive growth is required for illness
- **Primary source:** soil and GI track
- **Transmitted** by: rice and starchy foods, meats, vegetables, milk products, sauces
- Contributing factors: **temperature abuse**

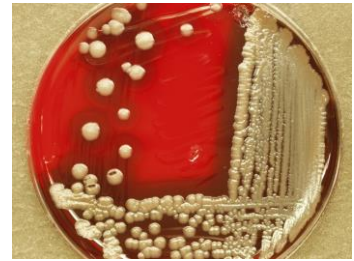
Growth parameters	Minimum	Optimum	Maximum
Temperature	39°F (4°C)	82-95° F (28-35°C)	131°F (55°C)
pH	4.3	6.0-7.0	9.3
a _w	0.92	-	-
Other	Spore former; one toxin is heat stable		
Atmosphere	Facultative – grows with or without oxygen		

Sources: Seafood Hazards Guide, ICMSF 1995, Bad Bug Book, Scallan et al. 2011, and FSOCA

34

Bacillus cereus

- Some studies indicate the bacterium could behave as an agent of mammary gland **infection in cows** and goats thus causing **mastitis**.
- Cases of **food poisoning in dogs and cats** had also been reported, although not very frequent in nature.
- Many agricultural animals carry the **bacterium in their intestinal area** without symptoms.



35

Shiga Toxin-Producing *Escherichia coli* (STEC)

- **Annual illness (death): 176,152 (20)**
- **Notable outbreak:** 1992-1993 outbreak in pacific northwest- Very important **regulatory status (adulterant)**
- **Infection causes** bloody diarrhea, and sometimes kidney failure and death [**HUS in kids**]
- **Primary sources:** Intestinal tract of ruminant animals (e.g., cows, sheep)
- **Transmitted** by raw and undercooked beef, poultry, leafy greens, and unpasteurized milk and juices
- **Contributing factors:** poor GAP, inadequate heating, and person-to-person

Growth parameters	Minimum	Optimum	Maximum
Temperature	44°F (6.5°C)	95-104°F (35-40°C)	121°F (49.4°C)
pH	4	6-7	10
a _w	0.95	0.995	-
Other	Non-spore forming		
Atmosphere	Facultative - grows with or without oxygen		

Sources: ICMSF 1995 and Bad Bug Book 2nd edition, Scallan et al. 2011, and FSPCA

36

Shiga Toxin-Producing *Escherichia coli* (STEC)

- **Animals that can spread *E. coli* O157 to humans include:**
 - cows, especially calves
 - goats
 - sheep
 - deer
- *E. coli* infection very common in **cats and puppies younger than one week.**
- **Colostrum**, plays a pivotal role in protecting a newborn the animal's undeveloped immune system against *E. coli* infection.
- As high as **80% of agricultural animals** could carry various serogroups of shiga-toxigenic *E. coli* without having symptoms

37

Vibrio spp.

- Causing about **80,000 illness and 100 death** annually in the United States.
- **Infection symptoms** vary depending on strain, ranging from diarrhea to high fever
- *Vibrio* is a **halophilic bacterium** and is a major concern in aquaculture industry
- **Primary sources:** Salt water environments and seafood
- Requires salt to reproduce (halophile)

Growth parameters	Minimum	Optimum	Maximum
Temperature	41°F (5°C)	99°F (37°C)	114°F (45.3°C)
pH	4.8	7.8-8.6	11
a _w	0.94	0.98	0.996 (10% NaCl)
Other	Non-sporeformer, requires salt		
Atmosphere	Facultative - grows with or without oxygen		

Sources: Seafood Hazards Guide 2011, ICMSF 1995 and Bad Bug Book 2nd edition

38

Yersinia enterocolitica

- **Not a reportable disease, no statistics available**
- **Infection causes** abdominal pain, fever and diarrhea. May mimic appendicitis.
- **Primary sources:** Raw pork, **raw milk**
- **Contributing factors:** Cross-contamination between raw pork products and RTE foods

Growth parameters	Minimum	Optimum	Maximum
Temperature	30°F (-1.3°C)	77-99°F (25-37°C)	108°F (42°C)
pH	4.2	7.2	10
a _w	0.945	-	-
Other	Non-spore former, raw milk in fridge?		
Atmosphere	Facultative - grows with or without oxygen		

Sources: Seafood Hazards Guide, ICMSF 1995, and Bad Bug Book

39

Foodborne Streptococcus spp.

- **Not a reportable disease, no statistics available (not part of active surveillance data of CDC)**
- **Infection causes** sore throat, tonsillitis and fever
- **Primary sources:** **Infected sites of humans and animals, raw milk**
- **Contributing factors:** Infected **workers handling food** and **consumption of raw milk or meat products.**
- **Symptoms:** meningitis, **sepsis**, and pneumonia (**>200,000 sepsis cases per year, not foodborne**)
- **Found in:** cattle, horses, dogs, rabbits, guinea pigs and mice
- Important cause of mastitis in cows.

Growth parameters	Minimum	Optimum	Maximum
Temperature	50°F (10°C)	99°F (37°C)	<113°F (<45°C)
pH	4.8-5.3	7	>9.3
%NaCl (salt)	-	-	<6.5
Other	Non-sporeformer		
Atmosphere	Facultative - grows with or without oxygen		

Sources: Seafood Hazards Guide, ICMSF 1995, and Bad Bug Book

40

Shigella spp.

- **Infection in humans causes** diarrhea, which may be watery to bloody. The infection is also known as dysentery [Taxonomy similar to *Salmonella* serovars]
- **Primary sources:** Human and Animal intestinal tract
- **Transmitted** by **fecal contamination** from contaminated **water** or **infected food**.
- **Clinical signs are rare in dogs and cats**, mostly mild diarrhea.
- Many species such dogs, cats, rodents and nonhuman primates could **carry the pathogen asymptotically**.

Growth parameters	Minimum	Optimum	Maximum
Temperature	43°F (6.1°C)	-	117°F (47.1°C)
pH	4.8	-	9.3
a _w	0.96	-	-
Other	Non-spore former		
Atmosphere	Facultative - grows with or without oxygen		

Sources: Seafood Hazards Guide 2011, ICMSF 1995 and Bad Bug Book 2nd edition

41

Mycobacterium bovis

- **Infection** causing respiratory symptoms and **tuberculosis**
- **Primary sources:** Cattle and raw milk
- **Other source:** bison, elk, and deer.
- **Contributing factors:** Lack of milk **pasteurization** and exposure to aerosols from infected animals
- **Grows very slowly and under reduced oxygen (microaerophilic)**
- The **US has nearly eliminated** *M. bovis* infection from cattle, over **one million animal is tested for the bacterium** by inspectors. [USDA FSIS]
- *M. bovis* can be found in **wild animals** such as bison, elk, and deer; uninfected cattle that come into contact with these wild animals can become infected.

Source: CDC at <https://www.cdc.gov/tb/publications/factsheets/general/mbovis.pdf>

42

Listeria monocytogenes

- **Infection causes** severe illness in susceptible people – **mortality 15-30%**
- **Primary sources:** Occurs widely in agriculture (soil, plants and water) –(**Important during pregnancy**)
- **Transmitted by:** Refrigerated **RTE foods** that support growth (**South Africa, Largest in History in 2018**)
- **Contributing factors:** Environmental pathogen spread by environmental contamination, equipment, people, incoming raw ingredients (**ubiquitous in nature**)
- **Common in domesticated ruminates particularly** sheep, poultry, and birds.
- **Could cause sporadic and farm outbreaks in ruminants**
- **Could cause: Encephalitis, late abortion, and GI problems in ruminants.**

Growth parameters	Minimum	Optimum	Maximum
Temperature	31°F (-0.4°C)	99°F (37°C)	113°F (45°C)
pH	4.4	7.0	9.4
a _w	0.92	-	-
Other	Non-sporeformer		
Atmosphere	Facultative - grows with or without oxygen		

Sources: ICMSF 1995 and Bad Bug Book 2nd edition

43



Cronobacter Sakazakii

- **Recently reclassified** bacteria (2006-07), formerly known as *Enterobacter sakazakii*
- The **Genus Cronobacter** was derived from the Greek term "Cronos," a Titans of ancient mythology who swallowed each of his infants as soon as they were born (he was afraid to be replaced by his infants).
- The **species name, sakazakii**, is named in honor of the Japanese microbiologist, Riichi Sakazaki, when the bacterium was first explained in 1980.
- Gram-negative, rod-shaped bacteria.
- Facultative anaerobic
- The growing temperature range is 6°C-45°C
- Primarily associated with **Powered Infant Formula**
- There has been several outbreaks associated with the bacterium and neonatal meningitis and death including two outbreaks in **Tennessee (1998 and 2001)**.

APHA Compendium of Methods, Salfinger and Lou Tortorello, Fifth Edition

44

Cronobacter Sakazakii

Prevention (CDC & WHO guidelines)

- Breastfeed
- Practice careful hygiene
- Clean and sanitize properly
- Prepare Powered Infant Formula as recommended

Symptoms:

- poor feeding response,
- irritability,
- jaundice,
- grunting **respirations**,
- **instability of body temperature**,
- Could lead to: **seizures, brain abscess**, hydrocephalus, and developmental delay, or **death**



One of the student from class published a great article about this pathogen:

<https://www.mdpi.com/2076-2607/7/3/77>

APHA Compendium of Methods, Salfinger and Lou Tortorello, Fifth Edition

45

Thank you



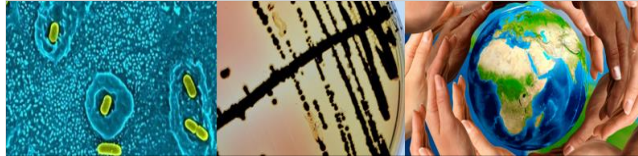
46

**Introduction to Food Safety
Certification Workshop
Aliyar Cyrus Fouladkhah**



Food Safety
Modernization Act
Certification

Week 11 [11-23-2020]



Aliyar Cyrus Fouladkhah
Public Health Microbiology Laboratory
Cooperative Extension Program
Tennessee State University

1



Food Safety Modernization Act (FSMA)

- Signed to law in January of 2011, FSMA is the largest expansion of U.S. food safety authorities since the 1930s.
- Many sectors of agriculture and manufacturing will undergo strict regulations for the **first time in the history of the country**.
- Shifting responses from food safety problems to **proactively prevent** the episodes
- FSMA, a large and comprehensive legislation **broaden FDA's ability to**:
 - **Mandatory recall** of contaminated food products
 - **Enhanced surveillance** to investigate foodborne illness outbreaks
 - Established **new preventive controls** and food safety plans at some food processing facilities and farms
 - Enhanced FDA's **traceability capacity**
 - **Increased inspection** frequencies of high-risk food facilities (both domestic and foreign facilities)
 - Expanded authority and oversight capabilities with regard to **foreign companies**

2

Regulatory Landscape of Food Industry Before FSMA

Very small companies:

Exemption from federal requirements, need to follow state policies

Restaurant operations:

Exemption from federal requirements, need to follow state policies (food code)

Food Safety Inspection Service (FSIS) of USDA:

Meat, Poultry and Egg products, HACCP requirements

Food and Drug Administration of DHHS:

High Risk Foods: Juices, seafood, and shell egg, HACCP requirements

Farmers and other food products:

No federal regulation



3

Mandated by FSMA

- Food manufacturing (processors)
- Farmers and growers (producers)
- Transportation, retailers
- Imported foods
- Third party laboratories
- Local, state, and federal agencies
- Foreign governments



Not mandated by FSMA

- FSMA does not directly address sectors under **pre-existing jurisdictions**. HACCP will remain the dominant regulation for:
- Meat, poultry, and egg products (USDA-FSIS)
- Juices, seafood, and shell eggs (DHHA-FDA)
- Very small producers and processors could receive exception from FSMA requirements (**cottage industry**).
- FSMA does not mandate **GM products, antibiotic resistant organisms, organic production, and pesticide and fertilizer use**.

4

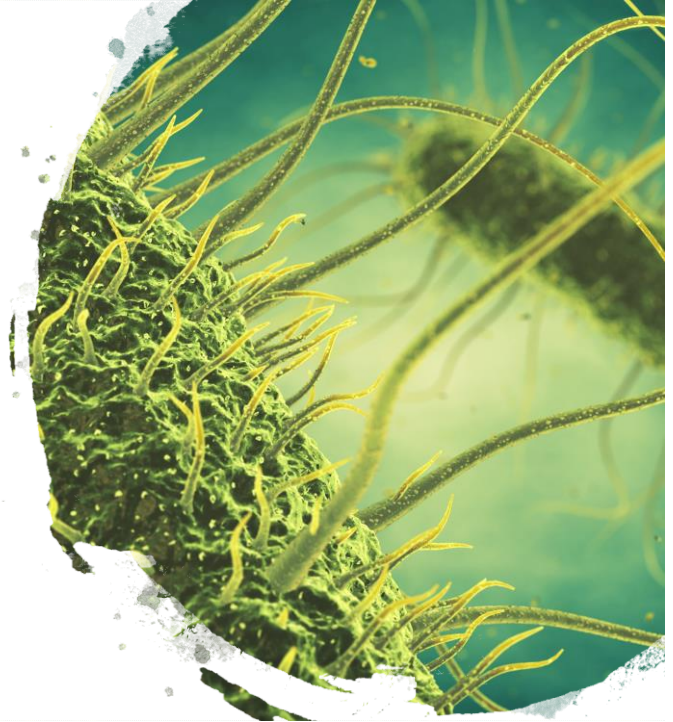
FSMA Implementation Schedule

FSMA was signed into law on **January, 2011**

Regulations were supposed to be finalized within one to two years of enactment (roughly **January 2012 and January 2013**)

Revised implementation dates: (all drafts are currently publically available)

- **Preventative controls:** FSMA §103(a) and(c): [August 30, 2015](#)
- **Foreign supplier verification program:** FSMA §301(a): [October 31, 2015](#)
- **Accreditation of third party auditors:** FSMA §307): [October 31, 2015](#)
- **Produce safety Rule:** FSMA §105(a): [October 31, 2015](#) [Week 11+ Survey]
- **Sanitary transportation practices for food and feed:** FSMA §111: [March 31, 2016](#)
- **Intentional adulteration of food:** FSMA §106(b): [May 31, 2016](#).



5

Produce and Preventive Rules and Land-grant Institutions

- Standards for the Growing, Harvesting, Packing, and Holding of Produce for Human Consumption (**Produce Rule**): **Producers**
- Current Good Manufacturing Practice and Hazard Analysis and Risk-Based Preventive Controls for Human Food (**Preventive Rule**): **Processors**
- Large producers and processors
- Small and medium size producers and processors
- Very small (hobbyists) producers and processors (local and cottage industry)
- Many of small and medium size entrepreneur will require assistance from the nations 75 land-grant institution for **safe and economical access to market**.



6

Preventive Control for Human Food Rule: Overview (PC QI)

- Regulate “processors”
- Under the regulation all “facilities” have to be registered with FDA
- The rule has **two sections**: Hazard Analysis (HARPC) and GMP, facilities obligated to have one or both.
- **Exemptions**: Juice, seafood, and shell egg sectors and businesses that store agricultural commodities. (differs with preventive rule)

Modified Requirements:

- Three-year average sales less than \$500K, AND
 - Direct sales to restaurants and consumers within 275 mile radius, or
 - Within states sales in 275 mile radius.



7

Requirements of Preventive Rule cGMP-Current Good Manufacturing Practices

- Similar to prerequisite program in HACCP
- **Nearly all facilities are required** to follow this section of the rule

Exemption:

- (1) Businesses that store agricultural commodities
- (2) Businesses that selling directly to a manufacturing facility like canning operation (vertically integrated farms)

Main Principles:

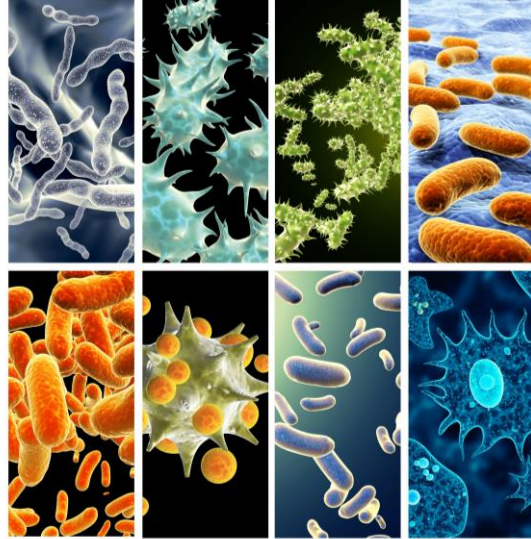
- Sanitation
- Employee training
- Environmental control and training
- Recall contingency plan
- Allergen control
- Supplier verifications
- Sanitary transportation



8

Requirements of Preventive Rule *Hazard Analysis and Risk-Based Preventative Controls (HARPC)*

- Previous a 7-step plan for FSIS HACCP, 12-step plan for Codex HACCP, and currently 5-step plan for HARPC:
- **Hazard analysis**
- Identification and implementation **preventive controls**.
- **Monitoring** the performance of controls.
- Developing **corrective actions** for preventative deviation.
- **Verification and recordkeeping** of preventative controls effectiveness
- 2.5 day workshop Preventive Control Qualified Individuals (PC QI)



9

Preventive Rule: Implementation and compliance dates

- **Implementation date:** August 30, 2015
- **Compliance date:**
 - **Very small facility** (\$2.5*m and below): 3 year
 - **Small facility** (less than 500 employee and does not qualified for exception): 2 years
 - **“Other” facilities:** 1 years
- **Modified Requirements:**
 - Three-year average sales less than \$500K, AND
 - Direct sales to restaurants and consumers within 275 mile radius, or
 - Within states sales in 275 mile radius.

*Total annual sale; the categories differ in preventive and produce rules.

10

COURSE TYPE	LEAD INSTRUCTOR	COURSE START	4 WEB ADDRESS TO REGISTER	COST	CONTACT EMAIL	ADDRESS	LANGUAGE	FORMAT
Human Food	Esmeralda Paz Lemus	Dec 3, 2020	Register	USD 818	Contact	Atlix/la Cua/Hermosillo Ciudad de Mexico Mexico	Spanish	In Person - Live
Human Food	Derrick Payne	Dec 1, 2020	Register	USD 400	Contact	Desatur C, United States	English	Virtual - Online, Web Based Live
Human Food	Satoshi (MANARI)	Oct 5, 2020	Register	JPY 108,000	Contact	Live-Virtual Japan	Japanese	Virtual - Online, Web Based Live
Human Food	Donna F. Schaffner	Sep 30, 2020	Register	USD 848	Contact	Bridgeport NJ United States	English	Virtual - Online, Web Based Live
Human Food	Donna F. Schaffner	Dec 6, 2020	Register	USD 898	Contact	Bridgeport NJ United States	English	Virtual - Online, Web Based Live
Human Food	Sonia Akbarzadeh	Dec 18, 2020	Register	USD 988	Contact	Live-Virtual Interactive Live-Virtual Interactive United States	English	Virtual - Online, Web Based Live
Human Food	Heidi Kassenborg	Dec 2, 2020	Register	USD 750	Contact	No Travel No Travel United States	English	Virtual - Online, Web Based Live
Human Food	Heidi Kassenborg	Nov 4, 2020	Register	USD 780	Contact	No Travel No Travel United States	English	Virtual - Online, Web Based Live
Human Food	Heidi Kassenborg	Oct 1, 2020	Register	USD 700	Contact	No Travel No Travel United States	English	Virtual - Online, Web Based Live
Human Food	Barbara Dobak	Nov 4, 2020	Register	USD 899	Contact	Nashville TN United States	English	Virtual - Online, Web Based Live
Human Food	Barbara Dobak	Oct 14, 2020	Register	USD 899	Contact	Marietta Georgia United States	English	In Person - Live
Human Food	Barbara Dobak	Sep 23, 2020	Register	USD 800	Contact	Nashville TN United States	English	In Person - Live

Preventive Control for Human Food: PC QI

- Our course 10-08-2020 to 10-29-2020
- Funded by USDA

- Animal Food PC QI:

https://fspca.force.com/FSPCA/s/courselist?language=en_US



United States Department of Agriculture
National Institute of Food and Agriculture







Participant Manual

COURSE TYPE	LEAD INSTRUCTOR	COURSE START	WEB ADDRESS TO REGISTER	COST	CONTACT EMAIL	ADDRESS	LANGUAGE	FORMAT
Animal Food	Kimberly Baker	Apr 13, 2021	Register	USD 495	Contact	Pendleton SC United States	English	In Person - Live
Animal Food	RACHEL MONTGOMERY	Dec 7, 2020	Register	USD 850	Contact	COST INCLUDES CERT., CONVENIENT PARTIAL DAYS NO TRAVEL, EARLY- BIRD & GROUP DISCOUNTS United States	English	Virtual - Online, Web Based Live
Animal Food	Dr. Jayne Stratton	May 24, 2021	Register	USD 599	Contact	Lincoln NE United States	English	Virtual - Online, Web Based Live
Animal Food	Bitu Saidi	Feb 10, 2021	Register	USD 695	Contact	Live-Virtual Interactive Live-Virtual Interactive Canada	English	Virtual - Online, Web Based Live
Animal Food	Dr. Tamia Blunt	Dec 16, 2020	Register	USD 795	Contact	Fresno CA United States	English	In Person - Live
Animal Food	RACHEL MONTGOMERY	Nov 2, 2020	Register	USD 850	Contact	COST INCLUDES CERT., CONVENIENT PARTIAL DAYS, NO TRAVEL, EARLY- BIRD & GROUP DISCOUNTS United States	English	Virtual - Online, Web Based Live
Animal Food	Bitu Saidi	Nov 18, 2020	Register	USD 695	Contact	Live-Virtual Interactive Live-Virtual Interactive Canada	English	Virtual - Online, Web Based Live
Animal Food	Charles Mike Nolan	Nov 4, 2020	Register	USD 850	Contact	Virtual Virtual Virtual	English	Virtual - Online, Web Based Live
Animal Food	Leslie Smith	Nov 16, 2020	Register	USD 600	Contact	Self-Study Flexible Schedule United States	English	Virtual - Online, Web Based Live

Animal Food PC QI:

https://fspca.force.com/FSPCA/s/courselist?language=en_US

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Photos courtesy: Adobe Stock, royalty (standard license) purchased by public health microbiology laboratory

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Workshop Evaluations

Aliyar Cyrus Fouladkhah

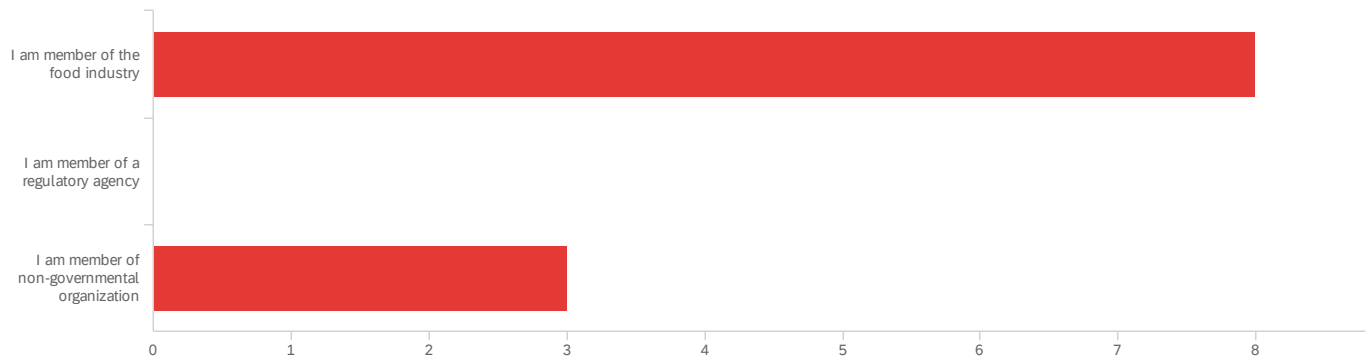


Default Report

2020 FSPCA Certification: Lead Instructor: Dr. Aliyar Cyrus Fouladkhah (11-23 to 25-2020)

December 16, 2020 3:24 PM MST

Q1 - What is your primary career association?

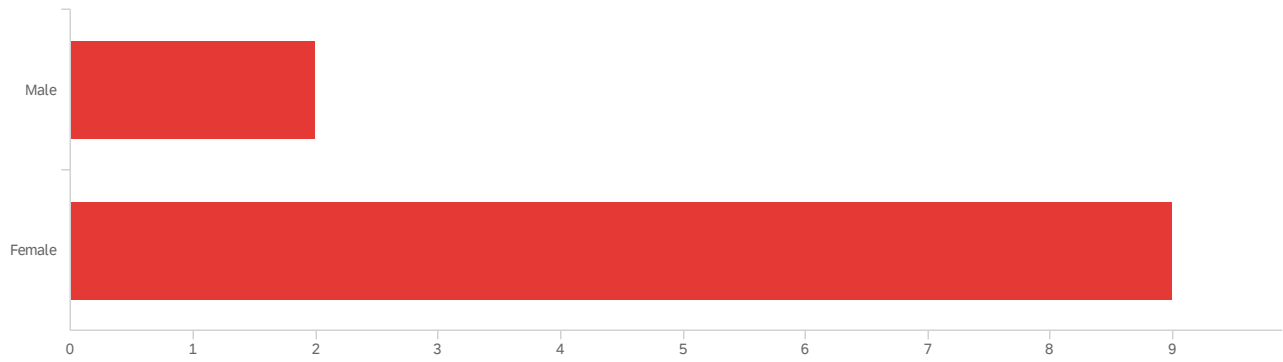


#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	What is your primary career association?	1.00	3.00	1.55	0.89	0.79	11

#	Field	Choice Count
1	I am member of the food industry	72.73% 8
2	I am member of a regulatory agency	0.00% 0
3	I am member of non-governmental organization	27.27% 3
		11

Showing rows 1 - 4 of 4

Q2 - What is your gender?



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	What is your gender?	1.00	2.00	1.82	0.39	0.15	11

#	Field	Choice Count
1	Male	18.18% 2
2	Female	81.82% 9

11

Showing rows 1 - 3 of 3

Q3 - How satisfied are you for attending this workshop: 0=Not satisfied at all;

100=extremely satisfied

#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	My instructor is knowledgeable of the subject matter.	83.00	100.00	98.45	4.89	23.88	11
2	My instructor communicated effectively.	90.00	100.00	96.73	4.39	19.29	11
3	My instructor stimulated my interest in the subject.	81.00	100.00	96.45	6.33	40.07	11
4	My instructor answered questions thoroughly.	83.00	100.00	97.64	5.30	28.05	11
5	My instructor treated all students with respect.	81.00	100.00	98.27	5.46	29.83	11
6	I would recommend this instructor to my friends.	86.00	100.00	98.73	4.02	16.20	11
7	My knowledge of the subject increased as a result of this workshop.	85.00	100.00	98.00	4.57	20.91	11
8	This workshop made a significant contribution to my career.	90.00	100.00	99.09	2.87	8.26	11

Q4 - Please share any information or feedback you would like with the instructor about your experience in this workshop:

Please share any information or feedback you would like with the instructor...

i'm so grateful with this experience and oportunnity in my profesion because is a new learn.

Excelent experience

Not-so-long sessions

thanks for sharing knowledge, they were excellent presentations

Your commitment with food safety and communication skills encouraged me to join the session. I am equipped to contribute to food safety.

Congratulations to Dr. Aliyar. It was an excellent workshop.

End of Report

Certificants





FOOD SAFETY PREVENTIVE CONTROLS ALLIANCE

CERTIFICATE OF TRAINING

is awarded to

Amanda María Ramos Castillo

**in recognition for having successfully completed
the Food Safety Preventive Controls Alliance course:**

FSPCA Preventive Controls for Human Food

delivered by Lead Instructor

Dr. Aliyar Cyrus Fouladkhah

**completed on
11/27/2020**

A handwritten signature in black ink that reads 'Robert Brackett'.

Robert Brackett, VP and Director
Institute for Food Safety and Health

A handwritten signature in black ink that reads 'Gerald Wojtala'.

Gerald Wojtala, Executive Director
International Food Protection Training Institute

A handwritten signature in black ink that reads 'Steve Mandernach'.

Steve Mandernach, Executive Director
Association of Food and Drug Officials



Certificate #6eeb3b76





FOOD SAFETY PREVENTIVE CONTROLS ALLIANCE

CERTIFICATE OF TRAINING

is awarded to

Ana Belén García de León

in recognition for having successfully completed
the Food Safety Preventive Controls Alliance course:

FSPCA Preventive Controls for Human Food

delivered by **Lead Instructor**

Dr. Aliyar Cyrus Fouladkhah

completed on
11/27/2020

A handwritten signature in black ink that reads 'Robert Brackett'.

Robert Brackett, VP and Director
Institute for Food Safety and Health

A handwritten signature in black ink that reads 'Gerald Wojtal'.

Gerald Wojtal, Executive Director
International Food Protection Training Institute

A handwritten signature in black ink that reads 'Steve Mandernach'.

Steve Mandernach, Executive Director
Association of Food and Drug Officials



Certificate # 50be1262





FOOD SAFETY PREVENTIVE CONTROLS ALLIANCE

CERTIFICATE OF TRAINING

is awarded to

Bibiana Estefanía Guzmán Tello

in recognition for having successfully completed
the Food Safety Preventive Controls Alliance course:

FSPCA Preventive Controls for Human Food

delivered by Lead Instructor

Dr. Aliyar Cyrus Fouladkhah

completed on
11/27/2020

Robert Brackett, VP and Director
Institute for Food Safety and Health

Gerald Wojtala, Executive Director
International Food Protection Training Institute

Steve Mandernach, Executive Director
Association of Food and Drug Officials



Certificate #4f1f73fd



FOOD SAFETY PREVENTIVE CONTROLS ALLIANCE

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is awarded to

Claudia Regina Bethancourt Rodríguez

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**completed on
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Certificate # 0f569a71



FOOD SAFETY PREVENTIVE CONTROLS ALLIANCE

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Elena del Carmen Orozco y Orózco

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ILLINOIS INSTITUTE OF TECHNOLOGY



Certificate # d6fcbde8





FOOD SAFETY PREVENTIVE CONTROLS ALLIANCE

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Elza Manuela Tziquin Pur

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completed on
11/27/2020

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Robert Brackett, VP and Director
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Gerald Wojtala, Executive Director
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Steve Mandernach, Executive Director
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Certificate # **c27b2478**



FOOD SAFETY PREVENTIVE CONTROLS ALLIANCE

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Lifny Judith Ramos Ajtún

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Certificate #f461186a





FOOD SAFETY PREVENTIVE CONTROLS ALLIANCE

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Luisa María Gómez Rodas

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the Food Safety Preventive Controls Alliance course:

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Certificate #576a9975





FOOD SAFETY PREVENTIVE CONTROLS ALLIANCE

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Ana Raquel López Robles

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the Food Safety Preventive Controls Alliance course:

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Certificate # e93756f0





FOOD SAFETY PREVENTIVE CONTROLS ALLIANCE

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Margareth Andrea Cancinos Alvarado

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Dr. Aliyar Cyrus Fouladkhah

completed on
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Steve Mandernach, Executive Director
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Certificate #841d2a7e



FOOD SAFETY PREVENTIVE CONTROLS ALLIANCE

CERTIFICATE OF TRAINING

is awarded to

Pedro Antonio Rodas Marín

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the Food Safety Preventive Controls Alliance course:**

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**completed on
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ILLINOIS INSTITUTE OF TECHNOLOGY



Certificate # ab295c71



Recommendations

Aliyar Cyrus Fouladkhah





John Ogonowski and Doug Bereuter Farmer-to-Farmer Program
Volunteer Recommendations Form

Name of Volunteer: Aliyar Cyrus Fouladkhah, PhD, MPH
Country of Service: Guatemala Dates of Trip: November 16 to 30, 2021

# of Persons <i>Formally</i> Trained ¹ – male:	2	
# of Persons <i>Formally</i> Trained – female:	9	
# of Persons <i>Formally</i> Trained – Non-Binary:		
# of Persons <i>Formally</i> Trained who are Youth:		
# of Persons <i>Formally</i> Trained – total:		

****Please review footnotes for definitions of “persons trained” and “persons directly assisted”****

Recommendations Made by the Volunteer:²

Please summarize the recommendations you made to the people/groups/organizations you assisted. Details of the recommendations should be included in the trip report – this is a summary table only.

Recommendation	Category*	Host	Time frame to implement change
Development of Food Safety Plan for products of Yogi’s super foods based on the provided information in the food safety certification workshop.	1	Yogi’s Super Food.	Within one year
Developing a recall plan for the products that are sold nationally and internationally via Amazon based on information provided in Chapter 15 of the workshop	2	Yogi’s Super Food.	Within one year
Develop and implementation of sanitation standard operating procedures to assure prevention of biological hazards.	3	Yogi’s Super Food.	Within one year
Improving record keeping procedures including suppliers’ verification program for assuring control of chemical, physical, and biological hazards in operation.	1,4	Yogi’s Super Food.	Within one year
Development and implementation allergen preventive control procedures to avoid allergen cross contact in operation.	2,3,4	Yogi’s Super Food.	Within six months

¹ **Persons Formally Trained:** number of persons who received technical/instructional training in a “formal” setting: classroom, workshop, institute/university or on-the-job setting with specific learning objectives and outcomes

² **Recommendations Made by the Volunteer:** The definition of “recommendation” is quite subjective, but might include an improved procedure, a technological or management innovation, a useful product or marketing tool, etc. Volunteers might make numerous detailed recommendations to a variety of hosts. Recommendations should be written in a way that is clear and measurable. *Please try to limit recommendations to no more than six per host.*



Expanding and further documenting the current good manufacturing practices in the production area based on provided information in certification workshop.	1,3	Yogi's Super Food.	Within one year
Conduct of hazard analyses for determining viable physical, chemical, and microbiological hazards of their operation based on information provided in the workshop.	3,4	Yogi's Super Food.	Within one year
Development of hygienic zones and environmental monitoring for preventing cross-contamination and cross-contact with pathogens and allergens in their operation.	2,3	Yogi's Super Food.	Within one year
Incorporating food safety and regulatory affairs training as part of the curriculum of undergraduate and graduate students based on provided information in certification workshop.	1	Rafael Landivar University	Within three years
Conduct of food safety and food policies elated events in the region based on the training and certification provided to the staff of F2F office in Guatemala.	1,2	F2F Filed Office in Guatemala	Within one year

* All recommendations should fall under one of four categories:

1. Economic: improvement of profitability of the farm, business, or enterprise
2. Organizational: improvement to organizational effectiveness, management, and sustainability
3. Environmental: improvement of environmental management and natural resource conservation
4. Financial: improvement in the provision of financial services