

BACKGROUND

• Foodborne diseases cause 48 million illnesses and 3000 deaths in the US each year (Scallan et al 2011).

• Improving the safety of our food supply requires a well educated and diverse workforce at all levels of training, including B.S., M.S., and Ph.D. degrees for employment by industry, government, and academia.

INTRODUCTION

• Purpose: create and conduct innovative research- and classroom-based K-12, undergraduate, and graduate training activities in the area of food safety in order to build an overall pipeline of students that will be prepared for employment in the area of food safety.

• Target groups: K-12 students, K-12 teachers, undergraduate students, graduate students, underrepresented minorities, students nationwide.

• Participating institutions: Cornell, Texas Tech, Purdue, North Carolina State, Alabama A&M, North Carolina A&T, and Texas Wesleyan.

OBJECTIVES

• The overall goal of this project is to increase the number of qualified food safety professionals. We seek to foster an interest in food safety and increase awareness of food safety careers. These efforts will result in a pipeline of students that are specially prepared for employment in industry, academia, or government in the area of food safety. The supporting objectives are:

Objective 1: Develop and conduct science teachers' workshops that enable the teachers to use food safety lessons in the classroom and advise students on careers in food safety.

Objective 2: Develop and deliver K-12 food safety activities and experiments to be taught by graduate and undergraduate students.

Objective 3: Develop and conduct a multi-institutional undergraduate summer research program in food safety.

Objective 4: Recruit and train undergraduate students through a "food safety track" within existing food science undergraduate programs.

Objective 5: Develop and implement multi-institutional course-based Masters of Professional Studies (M.P.S.), research-based M.S., and Ph.D. training programs in food safety.

ACCOMPLISHMENTS

Objective 1: Science Teachers' Workshops

• Cornell, North Carolina A&T, Texas Wesleyan, North Carolina State, and Alabama A&M held 16 food safety workshops from 2011-2013. Over 310 middle and high school science teachers have participated.

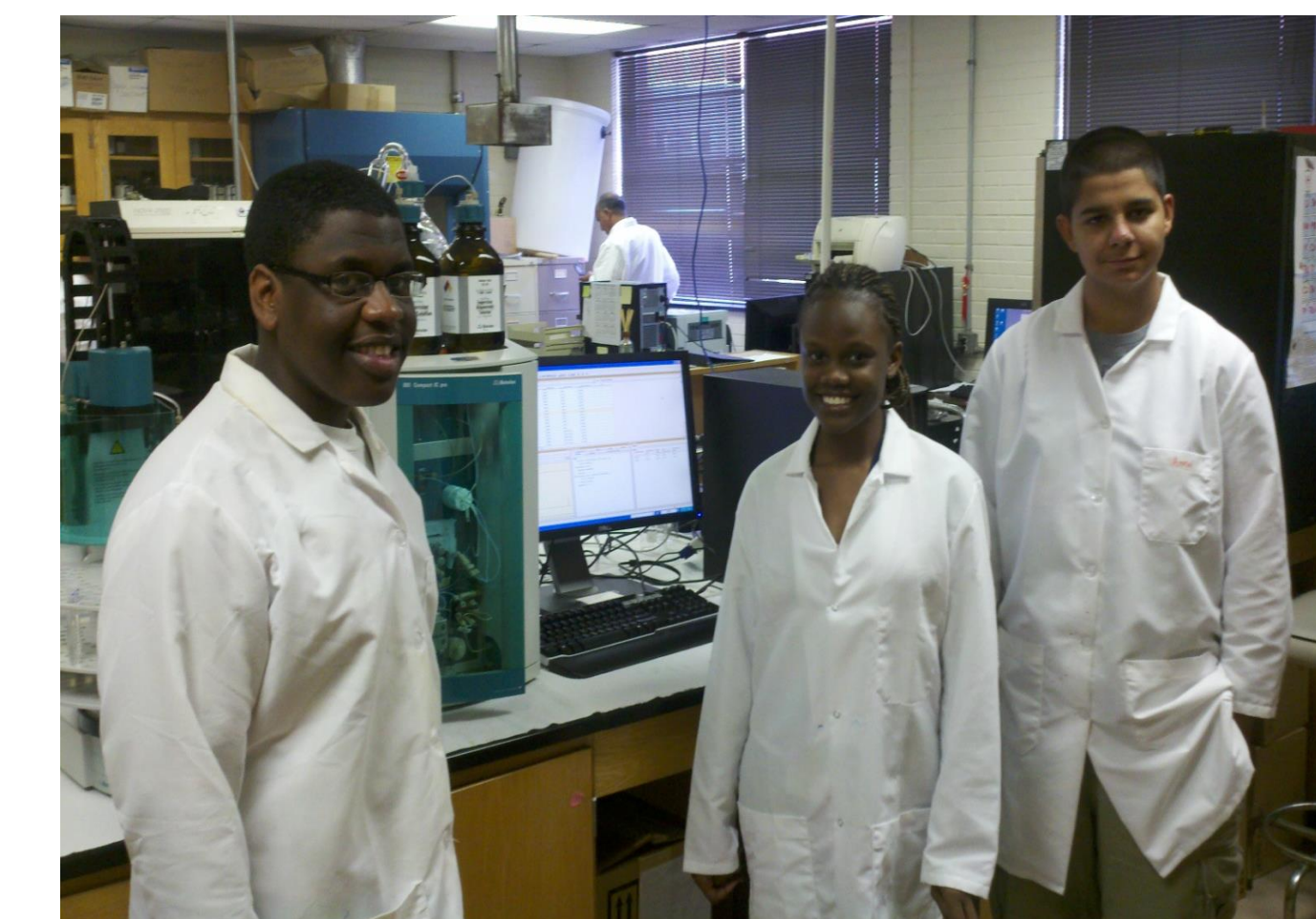
• Workshops demonstrated food safety case-based lessons and provided information on food safety issues, research, and career opportunities.

• Upcoming workshops: North Carolina A&T (July 24, 2013), Texas Wesleyan (July 29, 2013).

Objective 2: K-12 Student Outreach

• Since 2011, over 2,000 K-12 students have participated in food safety workshops, summer camps, high school research programs, and various other food safety outreach activities hosted by Cornell, North Carolina A&T, Alabama A&M, and Purdue.

North Carolina A&T 2013 high school summer researcher Derrick Cotton is studying the effects of Origanox and sodium lactate on the fate and survival of *E. coli* O157:H7.



Above: North Carolina A&T's 2011 high school summer researchers: Dedrick Dunton, Caleb S. Locklear, and Lisa Wamban.

Right: For the past two years Cornell has offered a week long food safety program at 4-H Camp Bristol Hills for students in grades 4-9. Educational activities primarily revolved around the investigation of a simulated outbreak at camp. Campers interviewed the camp nurse, as well as "ill" staff and counselors to identify suspect foods and determine possible causative agents. A GIS-based environmental sampling approach was also employed as part of the root-cause analysis.

Career Explorations Feedback:

• "I loved this program. I learned a lot and felt like a real microbiologist!"

• "It showed more fields of careers to me and showed how narrowing down my interests is a learning experience."

• "It was great and I now might take this as a minor."

• "I like science more now."

• "This program has increased my interest in science."

• "Taught me about the usefulness of genetic science in keeping food healthy...learned things about what college and grad school is like."



At Food Safety Camp, 92% of campers believed they learned more at camp than they would have in a classroom setting.



Above: Cornell hosts a 2.5 day workshop each June in conjunction with the Cornell Cooperative Extension 4-H Career Explorations program for high school students from across New York State and the U.S. 16 students from 9-12 grade worked through a simulated outbreak investigation using epidemiology and molecular biology.

Camp Bristol Hills Feedback:

• My favorite activity was: "the outbreak investigation, since it allowed us to act like genuine food scientists in conducting an experiment."

• The most important thing I learned was: "how to properly diagnose a problem in the field of science."

Objective 3: Undergraduate Summer Research

- Since 2011, undergraduate students interested in food safety have conducted research at Cornell, Purdue, Texas Tech, Texas Wesleyan, North Carolina State, North Carolina A&T, and Alabama A&M.
- Students have been recruited from across the nation to work with faculty and graduate students to carry out a food safety related research project over the summer.
- Current topics: *Listeria* virulence, prevalence, ecology; *Norovirus* ecology.

Above right: Cornell 2013 summer researcher: Paola Mercedes Illas Ortiz, a senior microbiology major (minor: food science and technology) at the University of Puerto Rico at Mayaguez is studying the validation of geographical predictors of *L. monocytogenes* contamination in spinach fields.



Objective 4: Undergraduate Education

- Cornell University has implemented and is now enrolling students in the food safety concentration for undergraduates within the Department of Food Science. The new food safety concentration will provide graduates with relevant knowledge and skills for graduate school and employment.
- Using a modified Delphi approach, North Carolina State University has developed core competencies for undergraduate food safety programs. This study has been submitted to the Journal of Food Safety Education.

Objective 5: Graduate Education

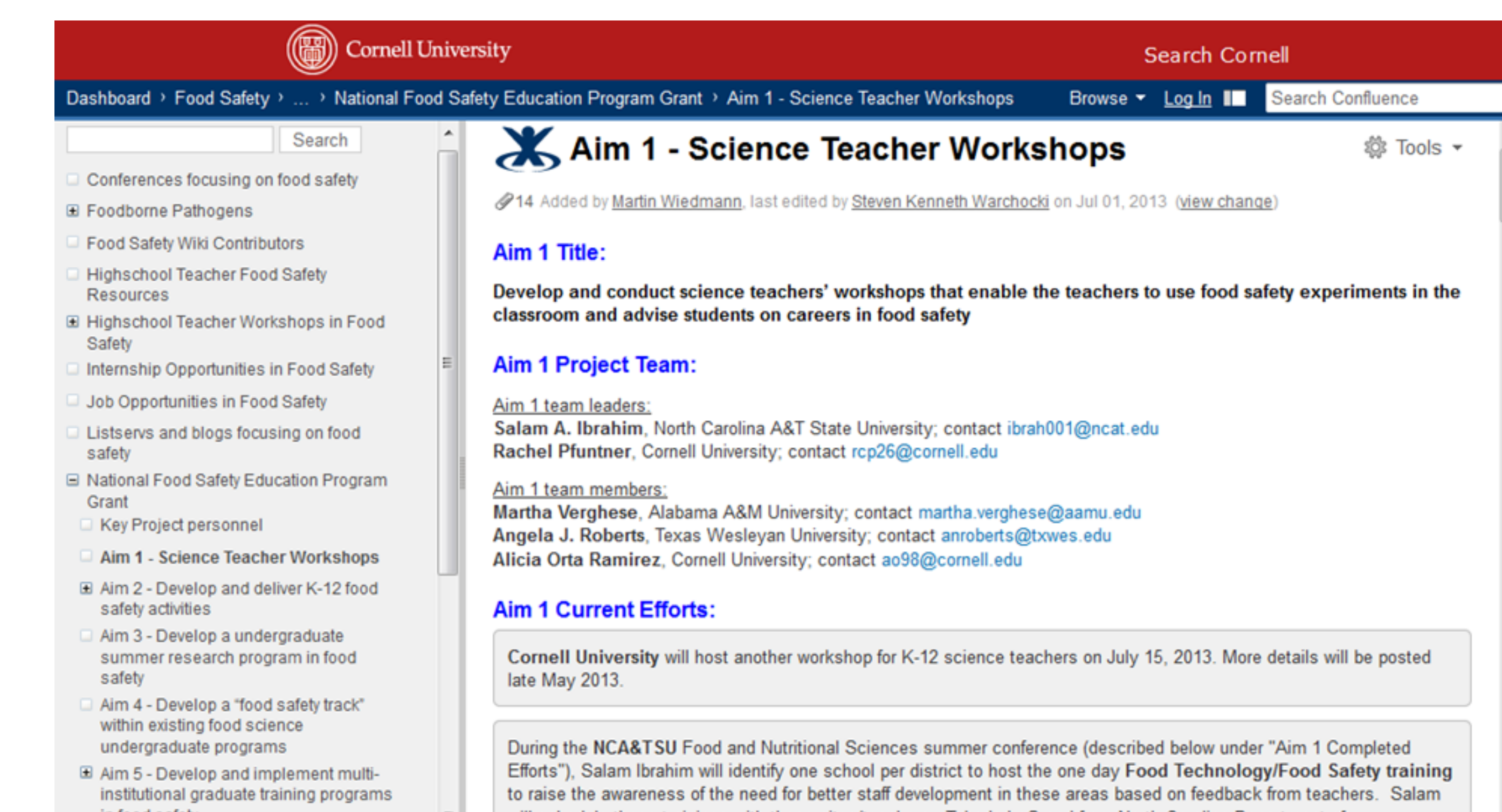
- A multi-institutional graduate level case study-based food safety course was developed and offered for the first time in spring 2013 with 25 students from Cornell, Texas Tech, and Purdue. Instructors and students used video conferencing and social media to work through food safety case studies and share the latest issues in food safety.

2013 FDSC 6940 Feedback:

- "This class was much more interactive and stimulating than other lecture-based classes. It encouraged everyone to participate, and that way I learned more from other people as well."
- "I highly recommend offering this course again, and I would also be open to other classes being offered in this format, given that they were equally as challenging and interactive."
- "This has undoubtedly been my favorite graduate level course and was more like that which I expected during my graduate school experience."

INFORMATION DISSEMINATION

Information on completion of project objectives, as well as materials and methods, are being made publicly available via the Food Safety Wiki at: <https://confluence.cornell.edu/display/FOODSAFETY/>



The screenshot shows a web browser displaying the Cornell University Food Safety Wiki page for 'Aim 1 - Science Teacher Workshops'. The page includes a search bar, navigation tabs, and a list of project goals and team members. The main content area lists the aim title, project team, and current efforts. A comment from a user is visible at the bottom of the page.

ACKNOWLEDGEMENTS

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References

¹Scallan E, Hoekstra RM, Angulo FJ, Tauxe RV, Widdowson M-A, Roy SL, et al. Foodborne illness acquired in the United States – major pathogens. *Emerg Infect Dis.* 17:7-15.