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STEC CAP News

CONTROLLING SHIGA TOXIN-PRODUCING *E. coli* TO IMPROVE BEEF SAFETY

Update from the Director


Rodney Moxley

Greetings STEC CAP Colleagues! I am pleased to report that STEC CAP collaborators are making excellent progress, actively working on projects with papers submitted and published, along with interns busy in labs, presentations made, meetings attended, and collaborations planned. In the last month, I had the opportunity to give presentations featuring our STEC CAP at two important meetings: the USDA Ag Outlook Forum in Arlington, Virginia, on February 21, and the University of Nebraska Board of Regents on March 15. At both meetings, I focused on the importance and impact of our work and our progress. It was an honor to represent all of you and to highlight the great work you are doing.

Recently, we had our second round of collaborator proposals for internships. I am pleased to report that there will be 22 funded internships for the upcoming summer and fall semesters; to date, this gives us a total of 30 internships funded for 2013. I would like to call your attention in this newsletter to the feature on two of our current interns, and I look forward to seeing the results generated by all of our Spring semester interns during the poster session at our first annual meeting to be held May 28-30 at the Embassy Suites in Lincoln. This is another reminder for you to please register at your earliest convenience for the meeting if you have not done so already. A link for you to register is on our STEC CAP website (**http://www.stecbeefsafety.org**).

As with previous issues of the newsletter, we have featured articles in the March edition. In the present issue, I would like to call your attention to the insightful articles by Drs. Gary Acuff and Randy Phebus. Dr. Acuff's article is on "The Importance of Validation," and the one by Dr. Phebus is titled, "Industry Partners Working with STEC CAP Researchers." In addition, I wish to welcome Dr. Susanne Kaesbauer, our new Lead Evaluator at the Office of Educational Innovation and Evaluation (OEIE) at Kansas State University, who has provided us with an update from OEIE in this issue. Susanne has replaced Dr. Amy Hilgendorf in this role, as Amy and her husband moved back to Wisconsin to be closer to family. I wish to thank Amy for her outstanding work as our Lead Evaluator during the first year of the project.

I hope that you are enjoying the STEC CAP monthly newsletters and that you are sharing it freely with your supervisors, students, stakeholders and friends. Also, please join and share our Facebook page (www.facebook.com/stecbeefsafety) with your friends and colleagues to stay abreast of our many grant activities. Suggestions and contributions are appreciated anytime. I look forward to hearing from you about your many accomplishments and greatly value your efforts on the STEC CAP.

Best Regards,
Rod

The Importance of Validation

All U.S. establishments producing raw beef products are required to utilize HACCP to control contamination with foodborne pathogens such as *Escherichia coli* O157:H7. To meet these requirements, slaughter establishments have implemented a variety of carcass decontamination procedures as CCPs that are essential to the safety of beef. In the last quarter of 2002, the Food Safety and Inspection Service (USDA-FSIS) issued a notice reminding slaughter establishments that all CCPs must be validated to ensure they can successfully prevent, eliminate

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USDA | NIFA

STEC CAP Team
126D VBS
Lincoln, NE 68905
PHONE: 402-472-8564
FAX: 402-472-9690
stecbeefsafety.org

Inside this issue

Register Now! **STEC CAP Annual Meeting, May 28–30, 2013 (See details inside)**

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Gary R. Acuff

or reduce *E. coli* O157:H7. The regulatory agency indicated that until establishments have collected data to demonstrate that CCPs function properly under actual in-plant conditions, the effectiveness of the CCP would be considered theoretical and not validated. FSIS also noted that many establishments have not validated CCPs based upon actual in-plant conditions.

Microbiological testing can play a unique role in validation and verification activities. It is generally agreed that detection of foodborne pathogens is not an effective tool for monitoring critical control points (CCP) within a slaughter/processing HACCP plan. In addition, pathogens are often absent from carcass surfaces and, when present, their uneven distribution makes it difficult to obtain a truly representative sample. In contrast, microbiological testing can be applied within a HACCP plan to validate and verify the effectiveness of carcass decontamination procedures.

Because of the difficulty in consistently finding and documenting reductions of levels of enteric pathogens on carcass surfaces, an ideal solution can be the use of nonpathogenic surrogate bacteria that are capable of indicating the probable reduction of pathogens. Surrogate bacteria are required to have very similar growth and resistance characteristics to the pathogen(s) of concern. After inoculating a known amount of the surrogate to a carcass surface, the effectiveness of a CCP can be validated by comparing surviving levels of the surrogate on the carcass surface following the processing step.

While validation and verification of HACCP systems may initially seem intimidating, careful thought and planning can make the process logical, reasonable and extremely helpful. Many tools are available to assist, such as rapid microbiological tests, extensive publication of research results in the scientific literature and numerous HACCP experts. The human tendency is to find a single tool that works and use it to excess; however, successful validation and verification will most likely be attained through the utilization of as many of the tools as possible. Regular challenging of the validity of a HACCP system through verification will only serve to strengthen confidence in the ability of the process to control hazards.

Gary R. Acuff
Director, Texas A&M Center for Food Safety
Professor, Food Microbiology
Texas A&M University
2469 TAMU
College Station, TX 77843-2469

STEC-STEP Internship Program Update

This month we are featuring two of our interns; Cole Phebus at Kanas State University, and Matthew Schaich at the University of Nebraska–Lincoln. All interns for this semester can be found at **http://stecbeefsafety.org** and on the Facebook page at **https://www.facebook.com/stecbeefsafety**.

Cole Phebus (Kansas State University student and Manhattan, KS native) will be collaborating with Randy Phebus investigating the installation completion and validation of an electrostatic spray system (ESS) for beef carcass inoculations and decontamination at the K-State Biosecurity Research Institute. Cole feels food safety in commercial food manufacturing is a very critical field, and being right or wrong can potentially affect the lives and health of thousands of consumers. "I have grown up in a family that stressed food safety, as my father is a professor of food microbiology and my grandfather owns and operates a local supermarket where fresh meats and produce are the focal points of his business. As an avid hunter and game processor, I completely understand the importance of food safety and the cleanliness/hygiene of the food we eat. This STEC-STEP internship will allow me to greatly enhance my understanding of commercial meat processing, sanitation of carcasses and meat processing equipment, microbial risks associated with beef products, and the application of technological interventions during processing to control these pathogen risks. I also look forward as a part of this internship to gaining experience in the beef industry and creating new contacts to use as I continue my food science degree and prepare myself for a career in the food industry."


Cole Phebus

Matthew Schaich will be working with Rod Moxley developing methods for detection of STEC-8 during his Spring 2013 internship. Matt is a native of Omaha, NE and a student

at the University of Nebraska–Lincoln. Matt states "as an active consumer of beef (I consider the Big Mac to be a quintessential centerpiece of the American diet) and a sufferer of food poisoning (once or twice in a lifetime is plenty for me), I find food safety to be a subject which not only holds much content and many scientific techniques for me to learn about, but also a subject which has the potential to impact people's lives by the million. I view especially the microbiological side of food safety to be especially interesting and important, because the science regarding the methods for detection and prevention of contamination of pathogenic organisms that cause food-borne illness (such as STEC), can be built upon and utilized in other fields of microbiology. I see my internship in the field of food safety as an excellent opportunity to gather large amounts of important information that could have an impact on my everyday life, as well as a rare opportunity to grow as a scientist in the process."

Matthew Schaich

OEIE Evaluation Update

As a member of the STEC CAP team, the Office of Educational Innovation and Evaluation (OEIE) at Kansas State University provides evaluation support for the program, tracks program progress, and assists with report writing. To document their work and efforts related to the STEC CAP project, collaborators provide monthly summaries of their achievements to OEIE.

We have recently created an online survey version that will make the achievement submission process more efficient. In place of the Word form attachment, an individual link will be sent in the monthly reminder email. Collaborators may enter up to four achievements at one time and can request additional survey links to record more achievements if need be through the steccap@ksu.edu account. You may also continue to submit your achievement information via email.

We hope the survey link is more user-friendly for entering achievements and proves to be a better method to increase overall reporting capabilities. We encourage you to submit achievements monthly and stress the importance of documenting your progress in the STEC CAP.

oeie
Office of Educational Innovation and Evaluation

We welcome your feedback and questions regarding the new achievement documentation reporting system or evaluation activities in general. Please feel free to contact OEIE at:

Susanne Kaesbauer, Lead Evaluator
785-532-7171
Kate Van Winkle, Evaluation Projects Coordinator
785-532-0640
steccap@ksu.edu

Industry Partners Working with STEC CAP Researchers

Escherichia coli O157:H7 has been a (the) food safety focus of the beef industry for two decades. During this time period, by necessity, beef processors and companies providing technology solutions to beef processors have worked closely with researchers across the nation to develop, validate and implement risk control measures for *E. coli* O157:H7. These researchers come from academia and the USDA Agricultural Research Service primarily. There are important mutual benefits realized as a result of these research collaborations. For researchers, key benefits include having access to processing experts who can provide real-life guidance as to what can and can't be done commercially, in many cases having enhanced funding from industry or provision of other resources, and ability to verify lab-based observations in a commercial setting. For the industry, having academic or government researchers involved brings a high level of food safety and research design expertise, an element of independent "third-party" evaluation, and the ability to evaluate technologies against target pathogens in the researchers' bio-contained labs. Both researchers and industry gain from these collaborations in the undergraduate and graduate students that become trained and enter the workforce.

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...**Industry Partners** (continued from page 3)

Now that there is an added focus of controlling additional shiga toxin-producing *E. coli* (STEC) in the beef industry, it is critical that the industry-academic research partnerships remain strong. Particularly, for our STEC CAP grant to reach our goal of reducing the occurrence of and risk from STEC in the beef supply, having access to and participation by commercial producers, processors and technology providers is crucial. Already in the short life of our STEC CAP grant, we are realizing a great willingness from several industry partners to support our activities. These include access to production and feedlot operations for pre-harvest sample collection, and access to commercial grinding operations and active participation in large-scale commercial beef trim antimicrobial intervention experiments. Industry representatives from multiple companies recently provided guidance to our STEC CAP researchers on semi-dry fermented sausage processing parameters along with ingredients and beef products to conduct STEC-inoculated process validations. Further, we have been granted access to a significant volume of industry microbiological data that will help populate our quantitative microbial risk assessment, the foundation of our STEC CAP grant. We are appreciative of all of our partnerships and look forward to continuing these collaborations as we move ahead with our STEC CAP programs.

By **Randy Phebus**, Ph.D.

STEC-STEP Externship Program

Yes, we have a STEC-STEP externship program associated with our STEC CAP grant and, yes, we need all collaborators' involvement to meet our grant obligations to USDA NIFA. The goal of the STEC-STEP internship/externship program, as stated in our grant proposal, is to provide young students (high school, undergraduates, graduate students and veterinary medicine students) with experiential learning experiences to enhance their awareness of and interest in food safety as college majors and ultimately as careers.

As you have seen this year, we have initiated an aggressive internship program already, with eight interns currently working in STEC CAP laboratories, and another 22 projects approved and currently being recruited for summer and fall 2013 semesters. We are now initiating the externship program. What's the difference in these programs?

According to About.com, externships are unpaid student opportunities that are short in duration (half-day to a few days) and offer participants a bird's eye (job shadowing) view of what it's actually like working in a particular career field, as well as provide professional contacts for future networking. Students may spend the day observing, asking questions, and attending meetings. Sometimes students may also get an opportunity to participate in a project, depending on the type of organization where they are doing

their externship. Many times they will get a tour of the facility and an overview of the host institutions, as well as get a chance to meet with people working in other offices or departments.

It was stated in our proposal that all STEC CAP collaborators across our 12 participating institutions receiving funding would be required to host 2-3 externs per year at their respective institution and provide necessary reporting for evaluation purposes. So, please get involved immediately to help us meet our grant deliverables for externships. More information on the STEC-STEP internship and externship programs is available on our **www.stecbeefsafety.org** website, along with some ideas on how to efficiently recruit and host externs.

By **Randy Phebus**, Ph.D.

Check us out on the Web! Visit us at: **www.stecbeefsafety.org**
Subscribe to the listserv. Send an email to: **listserv@unl.edu** In the message field: **subscribe stecbeefsafety**

STEC CAP Annual Meeting

The STEC CAP Team will kick off the annual meeting May 28–30, 2013, in Lincoln, Nebraska. The meeting will be held at the Embassy Suites in downtown Lincoln. Attendance for all STEC CAP collaborators who receive funding is mandatory. Registration is now open at **http://www.k-state.edu/vet/stec-13/**. Just a reminder that all interns of the program are required to attend the annual meeting and present posters of their research. More information is posted on the STEC CAP website, **www.stecbeefsafety.org.**

STEC
Managing the Risk of Shiga Toxin-Producing *Escherichia coli* in Beef

USDA United States Department of Agriculture
National Institute of Food and Agriculture

THE UNIVERSITY of NEW MEXICO

University of Nebraska Lincoln

New Mexico CONSORTIUM

NM STATE UNIVERSITY

KANSAS STATE UNIVERSITY

TEXAS A&M UNIVERSITY

MISSISSIPPI STATE UNIVERSITY

NC STATE UNIVERSITY

UC DAVIS UNIVERSITY OF CALIFORNIA

UNIVERSITY OF DELAWARE

VirginiaTech

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