

STEC CAP News

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

Update from the Director

Greetings STEC CAP Colleagues!

I am glad to inform you that the STEC CAP is now well underway, with many of our collaborators actively working on projects, and eight new student interns working in laboratories at several locations. Just last week, we received proposals for several interns to work across Objectives 1-5 during the summer and fall of this year, and we will put a request in early summer for more fall interns. To be better informed and to allow for an exchange of information concerning research progress, accomplishments, and personnel comings and goings, the Executive Management Team (EMT) has initiated rotating weekly conference calls on Thursday mornings with the five Objective leaders and their collaborator teams and staff. At the time of this writing, we have had calls with Objective 1, 2 and 3 members. These calls have already proven beneficial, with ideas being shared and collaborators put into contact with other investigators they had not yet learned about.



Rodney Moxley

I ask that everyone please make a serious effort to submit your achievements (aka, "Points on the Board") each month to STECCAP@k-state.edu, as this is critical to ensure continued funding of our award. Also, I wish to remind you about our upcoming first STEC CAP annual conference, May 28-31, 2013, to be held at the Embassy Suites in Lincoln. If you have not yet made travel plans, please do so. Information on registration will be soon

forthcoming. Also, please note that we will have a poster session for interns (mandatory participation) and would invite other posters from collaborators and their graduate students. Currently, we have room for 30 posters, but will try to expand if needed. As you will read about more in this issue, there are many exciting activities going on among collaborators in the STEC CAP, some of which are new developments. One to note in particular is a Veal Safety STEC initiative that has begun in response to industry/regulatory issues surfacing in this sector. I will enlist your assistance and share more information on our veal initiative as appropriate.

Please utilize both our STEC CAP website (<http://www.stecbeefsafety.org>) and intranet/web portal (<https://drive.google.com/a/stecbeefsafety.org>),

as they are there for your use. Also, as indicated in the first newsletter, you can always reach me at rmoxley@stecbeefsafety.org if you have a need or would like to visit about the STEC CAP.

We hope that you are enjoying the STEC CAP monthly newsletter and that you are sharing it freely with your supervisors, students, stakeholders and friends. Suggestions 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

Unraveling STEC prevalence along the beef chain

Gathering, comparing and generating estimates of prevalence and concentration of STEC along the beef chain can be challenging. Most recent studies reporting STEC prevalence are based on ground samples or carcasses, whereas only few studies investigated cattle feces. Recently, we determined the prevalence of STEC O serogroups and associated virulence genes in feces of cattle from a commercial feedlot operation in central U.S.

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

...Unraveling STEC prevalence along the beef chain (continued from page 1)



Natalia Cernicchiaro

The prevalence of STEC-7 in this population of cattle was 22.3, 24.6 and 0.01% for O26, O103 and O111 serogroups, respectively, based on cultural procedures using IMS-specific beads. However, based on an 11-gene multiplex PCR applied to extracted DNA, O157 (49.9%) was the most prevalent O serogroup followed by O26 (20.3%), O103 (11.8%), O121 (10.7%), O45 (10.4%), O145 (2.8%), and O111 (0.8%). These estimates can differ across populations and studies due to issues such as the existence of diverse feeding programs, housing systems or the effect of other management or demographic characteristics. Perhaps more importantly, apparent prevalence (and concentration) estimates are directly impacted by the accuracy of the diagnostic tests used, and estimates of true prevalence of STEC are still lacking. Hence, development and evaluation of diagnostic methods for non-O157 STEC, being accomplished by the Objective 1 team, is crucial given their impact on estimating these measures. Further generation of field-based data on the link between live animal and carcass contamination as well as identification of factors associated with the presence and persistence of non-O157 STEC are also needed. Thus, as part of Objective 2, we will assess STEC-8 potential exposure risk along the beef chain and identify associated risk factors by conducting prospective studies of feedlot cattle production systems and beef processing plants. Two types of studies will be conducted: 1) a cross-sectional study ("survey") of fed cattle at harvest, which will provide data on the STEC risks

associated with cattle entering the packing plant from different feedlots and during different seasons, a crucial link in the beef chain; and 2) a longitudinal study of feedlot cattle through harvest to determine risk factors ("drivers") that affect prevalence and concentration of STEC in cattle, production environments and beef. Fed cattle production systems have been targeted and identified for 2013 research and strategic sampling of cattle at the feedlot, the feedlot environment and of cattle at harvest will be conducted. We anticipate that the results of these studies will: 1) support research on detection capabilities of STEC by facilitating field validation of developed diagnostic methods, 2) advance our understanding on the biology and ecology of STEC by identifying factors associated with their distribution and persistence within the animal and production environment (microbiome and house flies), and 3) provide point-in-time measures of prevalence and concentration of cattle at peri-harvest to populate the quantitative microbial risk assessment, foundation of the STEC CAP initiative.

We look forward to initiating the field work this summer in conjunction with all our collaborators for Objective 2 and related objectives. We also are excited with the opportunity to train a student intern this spring and hopefully, additional student interns this summer. Exciting, busy times are coming...

Natalia Cernicchiaro, D.V.M., M.S., Ph.D.
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Collaborator for Objective 2 (Prevalence within the beef continuum)

the entire beef system, leading to improvements in beef safety and public health. Externs can shadow (typically a half to one day in length) project collaborators and/or their staff personnel conducting laboratory research or with the education and outreach specialists to gain a better understanding of STEC's, how they affect the food system, and how research findings are disseminated to producers, processors, consumers and students.

STEC-STEP externships are non-paid opportunities for you

to briefly visit our collaborators' laboratories (12 institutions and 50 collaborators involved), discuss research activities and opportunities, ask questions regarding beef/food safety or how research is conducted, and make professional contacts. These externships can occur at any time of the year and require only short advance notice to arrange at the STEC CAP institution of your choice. More information and an application form can be found on our STEC CAP website (www.stecbeefsafety.org). We look forward to hosting you at one of our participating STEC CAP laboratories.

STEC-STEP Internship Program Update

The internship program is off to a fantastic start with an excellent group of interns. The Internship team is pleased to introduce the Spring 2013 STEC-CAP Interns. This month we are featuring two of our interns; Dianna Dewsbury at Kansas State University, and Lianna Foster-Bey at Ursinus College. All interns for this semester can be found at <http://stecbeefsafety.org> and on the Facebook page at <https://www.facebook.com/stecbeefsafety>.

Natalia Cernicchiaro, and Mike Sanderson on surveys in peri-harvest live cattle, beef processing plants and retail/food service ground beef. Diana's interest in food safety is being able to utilize the knowledge acquired in her college career in animal sciences to help perfect not only the animal but ultimately producing a safer, high quality animal product in an effort to help feed the world.



Lianna Foster-Bey

and enhanced steaks prepared from non-intact beef. Lianna states, "My interest in food safety began when I took a microbiology course last semester, throughout the course I was

intrigued by the various bacteria and the dangers they pose to food safety. Also, during the semester, we had an interesting guest speaker who touched on the threat that Shiga toxin-producing *E. coli* can have on the food industry. Additionally, food safety is also of interest to me because my dad was recently hospitalized with a severe case of food poisoning." Lianna is a native of Fairfax, Virginia.

Dianna Dewsbury, Kansas State University student and native of Overland Park, KS, is collaborating with David Renter,



Dianna Dewsbury

USDA-funded Beef Safety STEC CAP Project STEC-STEP Externship Program

Do you remember those days as a high school junior or freshman college student when you knew that you liked sciences such as biology or microbiology, or math and computers, but you had difficulty envisioning what you actually wanted to major in or what you wanted to do as a career? Had you even heard of food safety or Shiga toxin-producing *E. coli* (STEC)? Perhaps a job-shadowing experience would have been beneficial in helping you make some important decisions.

High school and college students are invited to apply for STEC Student Training and Education (STEC-STEP) externships through the USDA STEC Coordinated Agricultural Products (CAP) grant. This USDA-National Institute for Food and Agriculture sponsored grant is focused on understanding and controlling STEC bacteria throughout



2013 STEC-STEP extern Anteelah Phebus explores microbial culturing procedures with STEC CAP research technician Donka Milke at K-State.

STEC CAP teams expand efforts to include veal

As Dr. Moxley mentioned in his directors message, in response to industry/regulatory concerns related to a potential higher occurrence of STEC in veal trim compared with beef trim we have channeled our energies and resources into a STEC CAP veal safety initiative. These efforts have already generated some timely and tangible outcomes. As one example, we quantified the fate of STEC in mechanically tenderized veal cutlets following cooking on an electric skillet. This study was supported in part by our STEC CAP and via a grant with a veal processor. The processor also contributed raw materials and several hundred pounds of veal in support of this research. This is a very good example of how funds can be leveraged and resources combined to tackle a hot topic in a timely manner.

We have submitted these data as an abstract/poster for presentation at the Annual Meeting of the International Association for Food Protection (IAFP). As another example of our efforts to control STEC in veal, our STEC CAP veal safety team will research why the occurrence of STEC may be higher in veal than in beef, as well as determine both pre- and post-harvest factors contributing to the prevalence of STEC in veal and develop and validate interventions to better manage this pathogen in veal. Included in these efforts are a survey we are putting together in collaboration with the North American Meat Association (NAMA) to provide insight on where and how STEC become associated with veal. We have also made arrangements to tour a handful of veal slaughter operations and further processing

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...include veal (continued from page 3)

facilities this spring to learn firsthand what can be done to lower the occurrence and levels of STEC in veal. Sometime this spring or early summer, the team will also validate carcass interventions at the Biosecurity Research Institute (BRI) at KSU that would target applications (i.e., chemicals) that are approved, simple and practical for small veal manufacturers. We have also been invited to serve on a panel of experts at IAFP 2013 to address the emerging

problem of STEC and veal, and we are currently drafting a white paper addressing all things STEC and veal. As you can see, we have been very proactive in responding to the potential public health risk that may be emerging from the elevated occurrence of STEC on veal. Please let us know if you have additional questions that can be addressed and/or if you are interested in contributing to these efforts.

EMT on the Road

The Executive Management Team (EMT) hit the road this past fall and in early January of 2013 for a series of "Think-tank" sessions with collaborators and industry experts. They first met November 17-18, 2012, for "SYNOD III" in Lincoln, NE, to kick off the creation of new marketing materials and to discuss project/investigator evaluations, annual meeting dates, and budgetary reviews. Improvements were made to the internship, and the externship and MSI programs and plans were made to launch the STEC CAP website and Google portal. Discussions were also held on the dissemination and use of a standard set of strains. Representatives from the Kansas State University Office of Educational Innovation and Evaluation (OEIE) were present to review important reporting deadlines and procedures for sending accomplishments to their office. The EMT also met with UNL's Institute of Agriculture and Natural Resources financial office to review the release of sub-awards to partnering institutions.

After a brief holiday break, the EMT and several other STEC CAP members convened again in Nebraska in mid-January for a series of brain-storming sessions and to interact

with various stakeholders and potential collaborators. On January 16, EMT members Phebus, Thippareddi, and Luchansky, along with STEC CAP collaborator Dr. Anna Porto-Fett, spent the afternoon developing a master plan for Objective 3 of our STEC CAP. On January 17th, EMT member Dan Gallagher of Virginia Tech, along with Mike Sanderson of KSU, made an informal presentation to UNL STEC CAP collaborators on Quantitative Microbial Risk Assessment (QMRA), the backbone of our STEC CAP. It also provided an opportunity for STEC CAP partners to participate in an informal discussion of progress and goals for the coming year. Discussions were also held concerning the data needs of the risk assessment and how various research projects fit into the overall risk assessment framework. The conceptual farm-to-fork model for STEC in beef was presented, and attendees made suggested changes and improvements. A Web-based version of the presentation is available <http://liferay.unl.edu/web/stec/pubs-reports>. Just prior to this meeting, Drs. Gallagher and Sanderson met with Dr. Renter at KSU to discuss his upcoming sampling efforts and how this data would help inform the risk assessment.

On the afternoon of January 17, the USDA Meat Animal Research Center (MARC), Meat Safety and Quality Research Unit hosted a team of STEC CAP collaborators at their facilities in Clay Center, NE. This initial meeting was a fact-finding exchange of our STEC CAP team's plans and discussions about potential collaborations between the two entities. Research leader of the Meat Safety and Quality Research Unit, Tommy Wheeler, opened the meeting with introductions followed by an overview of our STEC CAP program and participants by project director, Rodney Moxley. MARC scientists presented their research to the group and discussions were held to garner interest and opportunity for

collaboration. Afterward, a tour was given by Dr. Wheeler of the USDA-MARC facilities.

The EMT along with Drs. Porto-Fett, Sanderson, Cernicchiaro, and Ekong then headed to Lexington, NE, to visit Tyson Foods on January 18. After touring both the slaughter and fabrication components of their operation, food safety professionals from Tyson held informal discussions with our STEC CAP team about the sharing of data and strains and the development of collaborative research opportunities. As one tangible outcome of this visit, our STEC CAP post-harvest interventions team will conduct an in-plant intervention validation study with

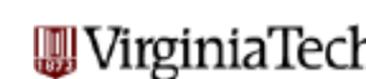
Check us out on the Web! Visit us at: www.stecbeefsafety.org
 Subscribe to the listserv. Send an email to: listserv@unl.edu In the message field: subscribe_stecbeefsafety

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 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.



John Luchansky, Natalia Cernicchiaro, Anna Porto-Fett, Pius Ekong, Rodney Moxley, Harshvardhan Thippareddi, Randy Phebus, Mike Sanderson, and Dan Gallagher



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