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.

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.

...continued page 2
focused on understanding and controlling STEC bacteria throughout 

Student Training and Education (STEC-STEP) externships through 

High school and college students are invited to apply for STEC 

Perhaps a job-shadowing experience would have been beneficial in 

E. coli (STEC)?

even heard of food safety or Shiga toxin-producing 

wanted to major in or what you wanted to do as a career? Had you 

computers, but you had difficulty envisioning what you actually 

assess STEC-8 potential exposure risk along the beef chain 

STEC are also needed. Thus, as part of Objective 2, we will 

on cultural procedures using 

serogroups, respectively, based 

IMS-specific beads. However, 

on bacterial contamination using 

species specific to the feedlot. 

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 16S rRNA gene sequences. 

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 

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 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 feedlot 

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. Feed 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 

students this summer. Exciting, busy times are coming.

Natalia Cernicchiaro, D.V.M., M.S., Ph.D. 

Research Assistant Professor, Diagnostic Medicine and 

Pathobiology, College of Veterinary Medicine, Kansas State 

University, nernicchi@vit.k-state.edu

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 how the food system, and how research 
findings are disseminated to processors, 

producers, 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 
(http://stecbeefsafety.org). We look forward to hosting you at one of our participating STEC CAP laboratories.

T

he 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 


facebook.com/stecbeefsafety.

Dianna Dewsbury, Kansas State University student 

and native of Overland Park, KS, is collaborating 

with David Renter, 

Natalia Cernicchiaro, and Mike Sanderson on surveys 
in peri-harvest live cattle, 

beef processing plants and 

retail/food service ground 

beef. Dianna’s interest in food 
safety is being utilized to 

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, student 
at Ursinus College, will be 

working with Anna Porto- 

Fett evaluating the fate of 

Shiga toxin-producing cells 
of Escherichia coli during 

cooking of chemically-treated 

steaks prepared from veal. 

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 

of interest to me because my dad was 

recently hospitalized with a severe 
case of food poisoning.” Lianna is a 
native of Fairfax, Virginia.

STEC CAP teams expand efforts to include veal 

A s 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 cuts 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 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 
...continued on page 4

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

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

D o you remember those days as a high school junior or 

freshman college student when you knew that you liked 

science 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 

ever 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 

the beef chain.

2013 STEC-STEP extern Anastasia Phebus explores microbial culturing 

procedures with STEC CAP research technician Devon Miller at S-State.
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) 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](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 Masley. 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 Tyson Foods to help inform the risk assessment.