

STEC CAP News

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

Greetings from Huskerland!

I want to thank all collaborators for their dedication and hard work on the research, education and extension/outreach efforts within the STEC CAP team. Numerous points-on-the-board (POB) were submitted during the last two months by



Harsha Thippareddi

our collaborators confirming we are making significant progress towards our grant's objectives and will be impactful in mitigating the STEC risk from beef. Similar to last year, we had a great turnout for the STEC CAP collaborators breakfast at the International Association for Food Protection Annual Meeting in Charlotte, NC. Each of our collaborating institutions was represented (13 collaborators, 14 graduate students, 2 USDA-ARS scientists) were in attendance. Also in attendance were the SAB/SAP (6 members), and a USDA-FSIS representative, as well as Dr. Isabel Walls who attended to represent the USDA-NIFA on behalf of Dr. Jeanette Thurston.

The STEC CAP Executive Management Team (EMT) will be meeting October 9-10 in suburban Philadelphia, PA, home

of STEC CAP collaborators Dr. John Luchansky and Dr. Anna Porto-Fett. This meeting is being supported in part, by a grant awarded to Drs. Luchansky and Porto-Fett by USDA-ARS Office of Technology Transfer. The STEC CAP Objective 3 researchers (STEC interventions group) will meet concurrently to discuss their STEC CAP interventions-

focused research, review significant contributions from other research groups worldwide and plan our research activities for the coming year. Recently, United Processing, LLC, of New York Mills, NY, recalled approximately 12,600 pounds of boneless veal products due to possible *E. coli* O157:H7, *E. coli* O145 and *E. coli* O45 contamination. These most recent recalls affirm the importance of our STEC CAP veal initiative.

As one example of these efforts, collaborators from our STEC CAP veal safety team visited a medium-sized fed veal processing plant in the Midwest and a small bob veal operation on the west coast to better understand harvesting practices, as well as to observe current interventions being

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Optimizing Energy and Water Use in Beef Processing:

The goal of our research is to perform energy and water analysis in beef industry and evaluate the impact of intervention technologies on energy and water analysis. As a first step, we had two undergraduate students working in a very small and a large beef processing operation in the Midwest to collect the baseline energy and water consumption data. The students worked with facilities and management personnel at the beef packing plants in identifying locations to install instrumentation, acquiring appropriate instrumentation such as hot water meters in their lines, and installing them at their facility. They also set up a by-pass to avoid obstruction of water, if the instrumentation were malfunctioned.

From our initial observations, we made several recommendations to the beef processor on making minor modifications to the existing equipment that can have energy savings over the long run. For example, in a very small beef processing operation, we measured water leaks throughout the plant and recommended that fixing water leaks

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in the processing plant would save approximately 98,000 gallons of water/year, resulting in \$400/year savings. Similarly, properly insulating the boiler feed tank would save \$650/year with a payback of 1.5 months; preventive maintenance on air compressor leaks would save \$2,380/year. These are real savings for the very small beef processors that can be used for other purposes. Further, we are collaborating with a major manufacturer of carcass spray cabinets that are widely used in the beef industry on calculating the energy and water use costs and evaluate means to reduce the energy and water use. Preliminary data on global water and energy estimates include: Three therms of natural gas per head (\$1.29/head) was used for heating water. Approximately 75 kWh of electricity per head (\$4.35/head) was used; 40% was used for refrigeration, 13% was used for vacuum packaging, and 47% was used for running process equipment and lighting. Water use of 450 gallons per head (\$0.61/head) was consumed during processing. Approximately 50% was hot water used for cleaning (\$1.14/head - water plus heating

cost), about 28% was hot water used in the process (\$0.63/head), and about 22% was cold water used throughout the facility (\$0.13/head).

Process flow chart and energy-water audit data will be used to develop the integrated energy-water model using appropriate software. When the new intervention technologies are developed in the lab, water and energy requirements will be estimated at lab-scale. Then, the water and energy requirements at large production scales will be projected. Projections will be validated, by measuring water and energy requirements at the pilot-plant level. The projected requirements for intervention technologies will then be incorporated into the baseline model and the effect of intervention technology on overall water and energy requirement will be simulated using Monte-Carlo simulations.

Ramirez et al. (2006) reported that during the decade of 1996-2006, both energy demand and specific energy consumption has increased (14-32%)

in four countries (United Kingdom, Germany, The Netherlands and France) in the European Union. The authors reported that the increased demand, two-thirds of the decrease in energy efficiency indicator (EEI) can be ascribed to food safety (hygiene) regulations. This trend can be seen in the U.S. subsequent to the implementation of Pathogen Reduction: Hazard Analysis and Critical Control Point Final Rule as well. Increasing numbers of beef processing operations have incorporated numerous antimicrobial interventions such as organic acid washes, chemical sprays, hot water sprays, steam pasteurization and/or steam vacuuming, all resulting in an increased energy consumption and often greater water usage. Thus, study of energy and water use in beef processing and optimizing their use while assuring the safety of the beef products will be critical to minimize the energy and water footprint of the beef industry as well as improve profitability.

The Internship team is pleased to introduce the Summer 2013 STEC-CAP Interns.

Grant Miller, College of Journalism and Mass Communications student at University of Nebraska-Lincoln and native of Lincoln, Nebraska, is collaborating with Jill Hochstein on website development for the Controlling Shiga Toxin-Producing *E. coli* to Improve Beef Safety CAP grant (www.stecbeefsafety.org). Grant states "as a large food consumer myself, I think that food safety is something the majority of people overlook. I have always wondered how food safety tips were designed, researched, and implemented. Because a large portion of my family is dependent on the cattle industry's production, this project stood out to me."



Grant Miller

Kaitlyn Krebs will be working with Dr. James Cullor on the inactivation of STEC in ground beef using the Metabolic Stress for Disinfection and Disinfestation non-thermal technology. The second year undergraduate at UC Davis and Anaheim, California native stated, "I have wanted to be a vet since I was a little girl. What most people don't realize, however, is that veterinary medicine overlaps a great deal with food safety. Healthy animals produce better quality food. I didn't take an interest in food safety until I came to UC Davis and realized the importance of balancing animal health and human food consumption." Kaitlyn is pictured with her Jersey cow, Galaxy.



Kaitlyn Krebs

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applied to fed and bob veal during processing. In addition, the team visited scientists at Fresno State University, located in the dairy processing area on the west coast, where greater numbers of bob veal are processed. We are discussing potential collaborations with scientists at Fresno State University and will be conducting research on application of antimicrobial interventions that can be implemented in veal processing operations to reduce the prevalence and the risk of Non-O157 STEC during veal processing.

We will keep you updated on our STEC CAP plans related to veal safety, and anyone with interest and/or relevant contacts should contact me (hthippareddi2@unl.edu).

If you haven't already heard, the tentative dates for the 2014 annual meeting are May 28-30, 2014, in Lincoln, NE.

We are planning to conduct the second STEC CAP Annual Meeting in conjunction with the Nebraska Governors' Conference on *E. coli* O157:H7 and Non-O157 STEC and expand the topics to include the prevalence, control and the risk of Non-O157 STEC in the environment and other industries such as the produce. Please hold these dates on your calendar and EMT will update you as we progress towards finalizing the meeting plans.

We are seeking interested graduate and undergraduate students from MSIs to apply for research, education or extension/outreach-oriented internships at any of the 12 core STEC CAP Institutions, or to work with the principal investigators at MSIs, including those that will be funded under the current RFP. These internships provide students great experiential learning opportunities related to food safety and the beef system, and our experts (approximately 50 associated researchers or education specialists) will mentor each intern in the intricacies associated with sound scientific research to prepare each student for future graduate program responsibilities and/or industry-based employment.

The STEC CAP team has developed several promotional materials, such as images, PowerPoint templates, brochures and hot topics templates, etc. These are available on the STEC CAP website and can be downloaded and used to promote your research and education and extension/outreach efforts. If you are presenting STEC CAP funded or partially-funded research at meetings, conferences or seminars, please use the STEC CAP logos, as well as the images and templates, to highlight the support.



From left, Dr. Anna Port-Fett, Dr. John Luchansky, Josh Hasty, Dr. Dennis Burson, Dr. Gary Acuff, Dr. Harshavardhan Thippareddi.

Hopefully, you will enjoy this month's newsletter and will find it useful as you communicate to others about our goals and accomplishments. I want to remind you to regularly visit our STEC CAP website (www.stecbeefsafety.org), and also ask you to help provide updated content. We have made several upgrades recently to better provide important information and help with navigation based on your feedback at the STEC CAP collaborator meeting in Charlotte, NC. If you have ideas on improving communication among collaborators or between and within the objective areas, please share these with the EMT and we will make every effort to facilitate collaboration within the STEC CAP Nation and with collaborators at other institutions.

On behalf of Dr. Moxley and the rest of the Executive Management Team, I want to encourage you to continue making great strides to complete your Year 1 and 2 work objectives and to aggressively pursue your Year 3 objectives. We must show great productivity during this critical midway point in our five-year grant. Keep us informed of your on-going accomplishments, keep submitting the monthly points-on-the-board, and please let the EMT know of any needs and/or concerns you may have.

Best of wishes and continued success,
Harsha Thippareddi

Minority Serving Institution (MSI) program

In August the support of the educational component of the STEC CAP objectives continued with the partnership of New Mexico State University Career Services and the State of New Mexico Department of Agriculture. An outreach email was completed to 300 Minority Serving Institutions (MSI). The MSI's included Hispanic Serving Institutions and Historically Black Colleges and

Universities all over the United States. The outreach promoted the 2014 request for STEC research proposals and the STEC internship program for MSI institutions. The distribution of the information was coordinated to reach faculty and students as they were returning to colleges and universities for the fall semester. Two 12-month research grants will be awarded to faculty in MSI schools for the 2013-2014 funding

period. The MSI paid internship program is a great opportunity for students across the country to gain research experience in the area of STEC. Continued outreach during the fall semester will be conducted to assist colleges with increased awareness of the STEC CAP grant to faculty and students.

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**

2014 STEC CAP Annual Conference

The second annual STEC CAP Conference will be held May 28 – 30th at the Embassy Suites in Lincoln, NE. Please hold these dates on your calendar; more information will be coming soon!

