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***Pork Checkoff-funded research for post-harvest pork safety, intervention technology: Final Report Abstract: Optimization of electrolyzed oxidizing water and comparison with other antimicrobial compounds to reduce pathogens on fresh or further processed pork products.***

**Catherine N. Cutter, The Pennsylvania State University**

Electrolyzed oxidizing (EO) water is a newly recognized disinfecting compound that has the potential to be used for inactivation of pathogenic and/or spoilage microorganisms associated with vegetables, fresh meat or further processed meat surfaces. The generation of EO water occurs when a current is passed through a salt-water solution to produce an acidic solution with a high oxidation reduction potential (ORP) of approximately 1150 mV containing dilute hypochlorous acid and 10-80 mg/l chlorine. A basic solution is also produced containing sodium hydroxide and a negative ORP. The antimicrobial activity of EO water does not appear to be due to the type(s) of water generated, the ORP, or presence of chlorine, but the combination of all of these. Studies were performed to evaluate the effectiveness of EO water against pathogens in cell suspensions and associated with fresh and ready-to-eat (RTE) pork surfaces.

In the first study, the stability of EO water was evaluated under different storage temperatures (4° C and 25°C) and its effectiveness was determined for reducing cell suspensions of *Salmonella* Typhimurium and *Listeria monocytogenes* at 0, 1, 5, 10, and 15 min. The results demonstrated that the free chlorine concentration of acidic EO water increased after 24 h when stored at 4°C. “Aged” acidic EO water and acidic EO water made immediately prior to treatment were shown to effectively reduce both cell suspensions of *S. Typhimurium* (> 8 log<sub>10</sub> CFU/ml for both temperatures) and *L. monocytogenes* (8 and 6.5 log<sub>10</sub> CFU/ml for 25°C and 4°C, respectively) when treated up to 15 min.

In the second study, parameters were optimized for reduction of *L. monocytogenes* on RTE meat surfaces (i.e. frankfurters and ham). Preliminary studies indicated that when dipped for 15 min at 25°C with EO water produced at 14 or 19 amperage, the most significant reduction of *L. monocytogenes* was observed with water produced at 19 amperage. Acidic EO water, basic EO water, 2% acetic acid, and 10% TSP sprays were also evaluated for reducing *L. monocytogenes* on frankfurters; none of the treatments significantly reduced the pathogen. Furthermore, a combination of basic EO water spray followed by acidic EO water spray applied to

experimentally inoculated frankfurter surfaces significantly reduced *L. monocytogenes* immediately after treatment 0.6 log<sub>10</sub> CFU/g. However, the reduction was not maintained after 7 days of refrigerated storage (0.25 log<sub>10</sub> CFU/g). Conversely, inoculated ham surfaces treated with acidic and basic EO water alone and in combination resulted in significant reductions of approximately 0.77, 1.04, and 0.7 CFU/g at 0, 3, and 7 days refrigerated storage, respectively. In the final study, the effectiveness of EO water was compared with chlorinated water and lactic acid against populations of *S. Typhimurium*, *L. monocytogenes*, and *Campylobacter coli* on fresh pork surfaces stored up to 7 days at 4°C. Acidic EO water significantly reduced *S. Typhimurium* and *L. monocytogenes* across all three sample days. *C. coli* was significantly reduced immediately following treatment with acidic EO water, but the reduction was not maintained following storage up to 7 days. These studies have demonstrated the effectiveness of EO water against pathogens associated with fresh and RTE pork surfaces. The results from these studies suggest that EO water may provide meat processors with an additional antimicrobial regimen for reducing pathogens associated with meat surfaces.

[Click here for the full report at www.porkboard.org.](http://www.porkboard.org)

### **Special Update**

The FSIS is conducting a survey in U.S. meat and poultry products regarding information on dioxins. As part of the FSIS National Residue Program (NRP), 500 fat samples will be taken at slaughter of meat and poultry at federally inspected plants. Breakdown of this includes 136 samples from market hogs and 136 samples from market cattle, and the remainder from young chickens and turkeys. The Dioxin Survey Oversight Committee includes participants from FSI, EPA, FDA and USDA's Agricultural Research Service (ARS), and the latter will be analyzing samples in their Fargo, N.D. laboratory. FSIS, along with FDA and EPA have developed follow-up actions if unusual results are found. FSIS will be investigating chemically unusual or significantly elevated dioxin levels, should they be detected. Such investigations will include gathering information about the sampled animal and its environment, which will help FSIS determine factors that might contribute to elevated dioxin levels in meat and poultry products. The National Academy of Sciences (NAS) also will be reviewing the issue of dioxins in food. For more information, go to <http://www.fsis.usda.gov/oa/background/dioxins02.htm>. Information is also available from the FDA at <http://www.fda.gov/cvm/index/dioxin/dioxin.html> and the National Institute of Environmental Health Sciences (NIEHS) at <http://www.niehs.nih.gov/oc/factsheets/dioxin.htm>.

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## **Consumer Information**

### **Consumer's Choice Pork Awards Winners Announced at Meat Conference**

The winners of the 2003 award contest were featured in a booth at the Annual Meat Conference in Atlanta, Ga. Over 800 attendees sampled the winning products. Additionally, a media kit was presented to the trade media and producer media. Other PR efforts will focus on generating publicity for these products



to consumers. Winners also will receive a trophy, consumer media publicity and the use of a merchandising seal. Please call Becca Hendricks for more details at 515-223-2788.

### **Center of the Plate Training**

The National Pork Board is a partial sponsor of the upcoming Center of the Plate Training workshop that is hosted by North American Meat Processors Association. The focus of this course is to educate foodservice professionals on meat cuts, meat buying and selling, and trends in foodservice. For more information, visit [www.namp.com](http://www.namp.com).

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## **Checkoff News**

### **RMC Post Conference Workshop**

The Pork Checkoff will again sponsor a workshop immediately following the [2003 RMC](#) in Columbia, Mo., on Thursday June 19. The Physiology of the Modern Pig will be the topic for discussion at the day-long workshop to be held immediately following the conclusion of the Reciprocal Meat Conference, the annual meeting of the American Meat Science Association to be held in Columbia, Missouri in June. The tentative schedule is as follows:

- 7:30 a.m.      **Analysis of the current situation: what do downers cost the industry and what can we do about it:** *Dr. Mike Ellis, University of Illinois*
- 8:30 a.m.      **Physiology of our current genetic base: the functionality of heavy muscled, lean hogs:** *Dr. Peter Purslow, University of Guelph*
- 9:30 a.m.      **Break**
- 10:00 a.m.     **On-farm handling of pigs: the concern about animal welfare and what the industry is doing about it:** *Dr. Anna Johnson, National Pork Board*
- 11:00 a.m.     **Nutritional aspects of physiology, stress, and pork quality:** *Dr. John Patience, Prairie Swine Center*
- 12 Noon        **Lunch**
- 1:00 p.m.      **The Effect of Nutrition on the Compositional Growth Model:** *Dr. Allan Schinckel, Purdue University*
- 2:00 p.m.      **Ante-mortem handling of pigs: its impact on the physiology and quality of the meat:** *Dr. Andrzej Sosnicki, PIC*
- 3:00 p.m.      **Wrap up and Adjourn**

### **P.O.R.K. Academy**

Plan to attend the 2003 Pork Academy on June 4, just before World Pork Expo at the Des Moines Marriott. The Pork Checkoff will again sponsor sessions on practical application on key industry areas for producers, managers, veterinarians, educators and allied industry. Topics include air quality, antimicrobial uses and alternatives, closed-herd systems, maximizing sow production, Comprehensive Nutrient Management Plans, herd health, Swine Welfare Assurance Program<sup>SM</sup>, environmental regulations and standards and international marketing needs in pork quality. Attendees will also have the opportunity to hear results Checkoff-funded research programs, as well as other Pork Checkoff efforts at a special poster session held prior to

P.O.R.K. Academy. Registration is \$85 for pre-registration and \$100 at the door. For more information, contact Jami Elliott at 515-223-3525, or go to [www.porkboard.org](http://www.porkboard.org).

### **PORK 101™**

The 2003 PORK 101™ sessions have begun, with a full attendance at Iowa State. Plenty of spots still remain for PORK 101™ in 2003. Anyone interested in the April session at the University of Nebraska or the May session at Texas A&M should contact the [American Meat Science Association](http://www.amsa.org) at 217-356-5368.

### **TQA<sup>SM</sup> Update**

There are currently 5,802 truckers certified in TQA<sup>SM</sup>. The Pork Checkoff hosted a train-the-trainer meeting on March 25, with 17 attendees. The next train-the-trainer session will be on April 2 in Goldsboro, N.C. Contact Sharlotte Peterson for more information at 515-223-2614, or [sharlotte.peterson@porkboard.org](mailto:sharlotte.peterson@porkboard.org).

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### **Mark your Calendar**

#### **TQA<sup>SM</sup> Train-the-Trainer**

April 2, Goldsboro, N.C.

#### **PORK 101**

April 22-24 University of Nebraska

May 19-21 Texas A&M University

August 19-21 Michigan State University

September 8-10 Oklahoma State University

#### **P.O.R.K. Academy**

June 4, Des Moines Marriott

#### **World Pork Expo**

June 5-7, Des Moines, Iowa.

#### **Reciprocal Meats Conference**

June 15-18, University of Missouri, Columbia, Mo.

#### **RMC Post Conference**

June 19, University of Missouri, Columbia, Mo.

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