

Listeria

Modeling Time to Inactivation of *Listeria monocytogenes* in Response to High Pressure, Sodium Chloride, and Sodium Lactate

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Significance: This model can help manufacturers of refrigerated ready-to-eat meats establish effective processing criteria for the use of high pressure processing as a postlethality treatment for *L. monocytogenes* in accordance with USDA regulations.

A mathematical model was developed to predict time to inactivation (TTI) by high pressure processing of *Listeria monocytogenes* in a broth system (pH 6.3) as a function of pressure (450-700 MPa), inoculum level (2-6 log CFU/ml), sodium chloride (1 or 2%), and sodium lactate (0 or 2.5%) from a 4°C initial temperature. Ten *L. monocytogenes* isolates from various sources were evaluated for pressure resistance, and five most resistant strains were used as a cocktail to determine TTI and for model validation. The TTI increased with increasing inoculum level and decreasing pressure magnitude from 1.5 min at 700 MPa and 2 log CFU/ml to 15 min at 450 MPa and 6 log CFU/ml. The model was validated with ready-to-eat, uncured, Australian retail poultry products, and with product specially made at a USDA Food Safety and Inspection Service (FSIS)-inspected pilot plant in the U.S. Data from the 210 individual product samples used for validation indicate that the model gives “fail-safe” predictions.

Salmonella

Salmonella in Raw Meat and By-Products from Pork and Beef

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Significance: The VIDAS system was shown to be an efficient screening method for the detection of *Salmonella*, with the advantage of a reduced analysis time.

In this study, a total of 4,170 raw meat samples and by-products from beef and pork, obtained from seven different slaughterhouses in Southern Germany, were screened by the VIDAS system for *Salmonella*. Positive results were

confirmed by isolation of the pathogen on selective agars. The overall percentage of *Salmonella*-positive samples was 1.4% by the VIDAS system and 0.7% by culture confirmation. *Salmonella* was detected in 1.8% of pork samples by the VIDAS system and in 1.1% of samples by culture. In beef samples the presence of *Salmonella* was verified in 0.6% of samples by the VIDAS system and in 0.1% by culture on selective agars. The highest contamination rates were found in porcine and bovine tongue samples. *Salmonella* was detected in porcine samples throughout the year, except in samples collected in July, and a slight increase was observed in the colder months.

Differential Phenotypic Diversity among Epidemic-Spanning *Salmonella enterica* Serovar Enteritidis Isolates from Humans or Animals

L. Yim, L. Betancor, A. Martinez, G. Giossa, C. Bryant, D. Maskell

Applied and Environmental Microbiology, Vol. 76, No. 20; pp. 6812-6820, 2010

Link to full text: <http://aem.asm.org/cgi/content/full/76/20/6812>

Significance: This study suggests enhanced fitness among strains that are able to cause intestinal disease in humans.

In a previous study, comparative genomics of 29 epidemic-spanning *Salmonella enterica* serovar Enteritidis field isolates was conducted and, in this study, the pathogenic potential of the same set of isolates using several phenotypic assays was evaluated. The sample included 15 isolates from human gastroenteritis, 5 from invasive disease, and 9 from nonhuman sources. One-third of the isolates were defective in at least one assay; 10 isolates were defective in motility, 8 in invasion of Caco-2 cells, and 10 in survival in egg albumen. Twelve isolates were tested for invasiveness in 3-day-old chickens, and five of these were significantly less invasive than the reference strain. The two oldest preepidemic isolates were reduced in fitness in all assays, providing a plausible explanation for the previous negligible incidence of *S. Enteritidis* in Uruguay and supporting the view that the introduction or emergence of a more virulent strain was responsible for the marked rise of this serovar. Differences in fitness among the isolates, which depended on the source of isolation, were also observed.

E. Coli

Preharvest Internalization of *Escherichia coli* O157:H7 into Lettuce Leaves, as Affected by Insect and Physical Damage

M.C. Erickson, J. Liao, A.S. Payton, D.G. Riley, C.C. Webb, L.E. Davey, et al.

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Significance: Surface-contaminated leaves physically injured through file abrasions had significantly reduced populations of both total and internalized *E. coli* O157:H7 as compared with nonabraded leaves 2 weeks after pathogen exposure.

This study differentiated the degree of tissue internalization of *Escherichia coli* O157:H7 when applied at different populations on the surface of lettuce and spinach leaves, and ascertained whether lettuce-infesting insects or physical injury could influence the fate of either surface or internalized populations of this enteric pathogen. No internalization of *E. coli* O157:H7 occurred when lettuce leaves were inoculated with 4.4 log CFU/leaf, but it did occur when inoculated with 6.4 log CFU/leaf. Internalization was statistically greater when spinach leaves were inoculated on the abaxial (underside) than when inoculated on the adaxial (topside) side, and when the enteric pathogen was spread after surface inoculation. Brief exposure (18 h) of lettuce leaves to insects (5 cabbage loopers, 10 thrips, or 10 aphids) prior to inoculation with *E. coli* O157:H7 resulted in significantly reduced internalized populations of the pathogen within these leaves after approximately 2 weeks, as compared with leaves not exposed to insects.

Identification of *Escherichia coli* O157:H7 Surrogate Organisms To Evaluate Beef Carcass Intervention

Treatment Efficacy

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Significance: Nonpathogenic surrogate organisms can be used to validate beef carcass intervention efficacy.

The survival of potential pathogen surrogates—meat-hygiene indicators (non-*Escherichia coli* coliforms), biotype I *E. coli*, and lactic acid bacteria starter cultures—with survival of an *E. coli* O157:H7 (ECO157:H7) inoculum in beef carcass intervention trials were compared. Survival of one lactic acid bacteria starter culture (Bactoform LHP Dry [*Pediococcus acidilactici* and *Pediococcus pentosaceus*]), a five-isolate biotype I inoculum, and a five-isolate non-*E. coli* coliform inoculum was compared with survival of a 12-isolate ECO157:H7 inoculum in interventions by using beef brisket, cod fat membrane, or neck tissue. Treatments were grouped by abattoir size. All three surrogate inocula were suitable as ECO157 surrogates for dry aging and acid spray plus dry-aging treatments used by small abattoirs. No one inoculum was suitable as an ECO157 surrogate across all intervention treatments used by large abattoirs. Effects seen on neck tissue were representative of other tissues, and the low value of the neck supports its use as the location for evaluating treatment efficacy in in-plant trials.

Foodborne Pathogens

Fates of Foodborne Pathogens in Raw Hams Manufactured Rapidly Using a New Patented Method

Y. Omori, T. Sakikubo, M. Nakane, H. Fuchu, K. Miake, Y. Kodama, et al.

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Significance: The raw ham produced using presliced pork loin is practically as safe as conventionally produced raw ham.

This study examined whether raw ham that was developed in an efficient manner (processing time reduced to 5% of the conventional method) could be as safe as ham produced by the conventional method. Pork loin spiked with enterohemorrhagic *Escherichia coli* serotype O157:H7, *Listeria monocytogenes* serotype 1/2c, *Salmonella enterica* serovar Enteritidis, and *Staphylococcus aureus* were processed using either the new or conventional method. The reduced processing time in the new system allowed for the ham to be vacuum packed with retention of the nitrite (6.9 ± 1.2 ppm, $P < 0.01$). This accounts for the prominent decrease in *L. monocytogenes* (2.3 log reduction in 35 days) and *S. aureus* (3.3 log reduction in 13 days) counts during storage. *E. coli* O157 and *Salmonella* Enteritidis were likely resistant to the nitrite in the ham. The pathogens were unable to multiply in the ham and decreased gradually as in the conventionally produced ham. The bacteriostatic nature of the raw ham was also indicated by the gradual decrease in coliforms (1.3 log reduction in 13 days) in nonspiked ham.

Quantitative Microbial Risk Assessment for *Escherichia coli* O157:H7, *Salmonella enterica*, and *Listeria monocytogenes* in Leafy Green Vegetables Consumed at Salad Bars, Based on Modeling Supply Chain Logistics

S.O. Tromp, H. Rijgersberg, E. Franz

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Link to full text: <https://www.ingentaconnect.com/cart/sign-in?url=%2Fcontent%2Fiafp%2Fifp%2F2010%2F00000073%2F00000010%2Fart00008%3F&payment=1>

Significance: Modeling the probabilistic nature of supply chain logistics is of additional value for microbial risk assessments regarding psychrotrophic pathogens in food products for which time and temperature are the postharvest preventive measures in guaranteeing food safety.

This study quantitatively assessed the difference between simulating supply chain logistics (MOD) and assuming fixed storage times (FIX) in microbial risk estimation for the supply chain of fresh-cut leafy green vegetables destined for working-canteen salad bars. The relative growths of *Escherichia coli* O157 (17%) and *Salmonella enterica* (15%) were identical in the MOD and FIX models. The relative growth of *Listeria monocytogenes* was considerably higher in the MOD model (1,156%) than in the FIX model (194%). The probability of *L. monocytogenes* infection in The Netherlands was higher in the MOD model (5.18×10^{-8}) than in the FIX model (1.23×10^{-8}). The risk of listeriosis-induced fetal mortality in the perinatal population increased from 1.24×10^{-4} (FIX) to 1.66×10^{-4} (MOD).

Probiotics

Use of *Tuf* Gene-Based Primers for the PCR Detection of Probiotic *Bifidobacterium* Species and Enumeration of Bifidobacteria in Fermented Milk by Cultural and Quantitative Real-Time PCR Methods

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Journal of Food Science, Vol. 75, No. 8; pp. M521–M527, 2010

Link to full text: <http://onlinelibrary.wiley.com/doi/10.1111/j.1750-3841.2010.01816.x/full>

Significance: All the bifidobacteria cells originally present in yogurt products were viable and culturable within 15-d storage after manufacture.

Partial sequences of the *tuf* gene for 18 *Bifidobacterium* strains belonging to 14 species were determined. Alignment of these sequences showed that the similarities among these *Bifidobacterium* species were 82.24% to 99.72%. Based on these *tuf* gene sequences, 6 primer sets were designed for the polymerase chain reaction (PCR) assay of *B. animalis* subsp. *animalis*, *B. animalis* subsp. *lactis*, *B. bifidum*, *B. breve*, *B. longum* subsp. *infantis*, *B. longum* subsp. *longum*, and the genus of *Bifidobacterium*, respectively. These *Bifidobacterium* species are common probiotic species present in dairy and probiotic products. For each target species, more than 70 bacterial strains other than the target species, including strains of other *Bifidobacterium* species, strains of *Lactobacillus* spp., *Enterococcus* spp., and other bacterial species, all generated negative results. PCR assay with primers specific to *B. animalis* subsp. *lactis* and *B. longum* subsp. *longum* confirmed the presence of these *Bifidobacterium* species in commercial yogurt products. For each product, enumeration of the bifidobacteria cells by culture method with BIM-25 agar and the quantitative real-time PCR showed similar cell counts.

Food Allergy

National Prevalence and Risk Factors for Food Allergy and Relationship to Asthma: Results from the National Health and Nutrition Examination Survey 2005-2006

A.H. Liu, R. Jaramillo, S.H. Sicherer, R.A. Wood, S.A. Bock, A.W. Burks, et al.

The Journal of Allergy and Clinical Immunology, Vol. 126, No. 4; pp. 798-806, 2010

Link to full text: [http://www.jacionline.org/article/S0091-6749\(10\)01140-1/fulltext](http://www.jacionline.org/article/S0091-6749(10)01140-1/fulltext)

Significance: Food allergies could be an under-recognized risk factor for problematic asthma.

Nationally representative estimates of the prevalence of and demographic risk factors for food allergy (FA) were developed and associations of FA with asthma, hay fever, and eczema were investigated in 8203 participants in the NHANES 2005-2006. Subjects had food-specific serum IgE for peanut, cow's milk, egg white, and shrimp. Food-specific IgE and age-based criteria were used to define likely FA (LFA), possible FA, and unlikely FA and to develop estimates of clinical FA. The estimated prevalence of clinical FA was 2.5% (peanut, 1.3%; milk, 0.4%; egg, 0.2%; shrimp, 1.0%; not mutually exclusive). Risk of possible FA/LFA was increased in non-Hispanic blacks (OR=3.06; 95% CI=2.14-4.36), males (1.87; 1.32-2.66), and children (2.04; 1.42-2.93). Study participants with doctor-diagnosed asthma (vs. no asthma) exhibited increased risk of all measures of food sensitization. In those with LFA, the adjusted OR for current asthma (3.8; 1.5-10.7) and an emergency department visit for asthma in the past

year (6.9; 2.4-19.7) was both notably increased.

Can Early Introduction of Egg Prevent Egg Allergy in Infants? A Population-based Study

J.J. Koplin, N.J. Osborne, M. Wake, P.E. Martin, L.C. Gurrin, M.N. Robinson, et al.

The Journal of Allergy and Clinical Immunology, Vol. 126, No. 4; pp. 807-813, 2010

Link to full text: [http://www.jacionline.org/article/S0091-6749\(10\)01173-5/fulltext](http://www.jacionline.org/article/S0091-6749(10)01173-5/fulltext)

Significance: Introduction of cooked egg at 4 to 6 months of age might protect against egg allergy.

This study determined whether confirmed egg allergy in 12-month-old infants was associated with duration of breast-feeding and ages of introducing egg and solids in a population-based cross-sectional study. Parents reported on infant feeding and potential confounding factors before skin prick testing for egg white. Egg-sensitized infants were then offered an egg oral food challenge. A total of 2589 infants participated. Compared with introduction at 4-6 months, introducing egg into the diet later was associated with higher risks of egg allergy (adjusted OR=1.6 [95% CI, 1.0-2.6] and 3.4 [95% CI, 1.8-6.5] for introduction at 10-12 and after 12 months, respectively). These findings persisted even in children without risk factors (OR=3.3 [95% CI, 1.1-9.9]; 10-12 months). At age 4-6 months, first exposure as cooked egg reduced the risk of egg allergy compared with first exposure as egg in baked goods (OR=0.2 [95% CI, 0.06-0.71]). Duration of breast-feeding and age at introduction of solids were not associated with egg allergy.

Caffeine

A review of the Epidemiologic Evidence Concerning the Reproductive Health Effects of Caffeine

Consumption: A 2000–2009 Update

J.D. Peck, A. Leviton, L.D. Cowan

Food and Chemical Toxicology, Vol. 48, No. 10; pp. 2549-2576, 2010

Link to full text: http://www.sciencedirect.com/science?_ob=MIimg&_imagekey=B6T6P-509W7CP-3-1&_cdi=5036&_user=10&_pii=S0278691510003935&_origin=browse&_zone=rslt_list_item&_coverDate=10%2F31%2F2010&_sk=999519989&_wchp=dGLbVlz-zSkWb&md5=c2f741c125d4c074968df0ec6c7e004a&ie=/sdarticle.pdf

Significance: The weight of evidence presented in this review does not support a positive relationship between caffeine consumption and adverse reproductive or perinatal outcomes.

This review of human studies of caffeine and reproductive health published between January 2000 and December 2009 serves to update the comprehensive review published by Leviton and Cowan (2002). The adverse reproductive outcomes addressed in this review include: (1) measures of subfecundity; (2) spontaneous abortion; (3) fetal death; (4) preterm birth; (5) congenital malformations; and (6) fetal growth restriction. Methodologic challenges and considerations relevant to investigations of each reproductive endpoint are summarized, followed by a brief critical

review of each study. The evidence for an effect of caffeine on reproductive health and fetal development is limited by the inability to rule out plausible alternative explanations for the observed associations, namely confounding by pregnancy symptoms and smoking, and by exposure measurement error.

The Effects of Caffeine and Caffeine Withdrawal on Measures of Mood, Cognition, and Functional Magnetic Resonance Imaging

M. Addicott

Ph.D. Dissertation, 2009, Wake Forest University, The Bowman Gray School; 190 pages, publication #3380543, 2010

Link to the full dissertation: http://gateway.proquest.com/openurl%3furl_ver=Z39.88-

[2004%26res_dat=xri:pqdiss%26rft_val_fmt=info:ofi/fmt:kev:mtx:dissertation%26rft_dat=xri:pqdiss:3380543](http://gateway.proquest.com/openurl%3furl_ver=Z39.88-2004%26res_dat=xri:pqdiss%26rft_val_fmt=info:ofi/fmt:kev:mtx:dissertation%26rft_dat=xri:pqdiss:3380543)

Significance: Measures of selective attention and memory were not negatively affected by abstinence and caffeine improved these measures in an abstained state and in a normal state.

The acute effects of caffeine were investigated among moderate habitual caffeine consumers in an abstained state following 30 hours of caffeine abstinence, and in a normal caffeinated state following normal caffeine use. It was hypothesized that the effects of caffeine on measures of mood, cognition, and functional imaging would be greater in an abstained state than in a normal caffeinated state. The first experiment compared a retrospective interview and a prospective diary of caffeine use against salivary caffeine concentrations obtained during normal caffeine use. Moderate daily caffeine consumers who experienced withdrawal symptoms were included in the second experiment. Withdrawal symptoms were reported in the abstained state, and caffeine had a greater positive effect on mood and choice reaction time in the abstained, than in the normal state, as hypothesized. The effects of caffeine and withdrawal on the blood oxygen level dependent (BOLD) signal were also investigated. Changes in cerebral blood flow, salivary caffeine concentrations, and response time to a visual-motor task predicted different parameters of the BOLD response.

Norovirus

Bovine Norovirus: Carbohydrate Ligand, Environmental Contamination, and Potential Cross-Species Transmission via Oysters

M. Zakhour, H. Maalouf, I. Di Bartolo, L. Haugarreau, F.S. Le Guyader, N. Ruvoën-Clouet, et al.

Applied and Environmental Microbiology, Vol. 76, No. 19; pp. 6404-6411, 2010

Link to full text: <http://aem.asm.org/cgi/content/full/76/19/6404>

Significance: Oysters may not be able to accumulate substantial amounts of GIII strains due to the lack of shared carbohydrate ligand.

Human strains of noroviruses (NoV) bind to oyster tissues through carbohydrate ligands that are similar to their human receptors. Based on presentation of shared norovirus carbohydrate ligands, oysters could selectively concentrate animal strains with increased ability to overcome species barriers. In comparison with human GI and GII strains, bovine GIII NoV strains, although frequently detected in bovine feces and waters of two estuaries of Brittany, were seldom detected in oysters grown in these estuaries. Characterization of the carbohydrate ligand from a new GIII strain indicated recognition of the alpha-galactosidase (-Gal) epitope not expressed by humans, similar to the GIII.2 Newbury2 strain.

Nanotoxicology

The Uncertainty of Nanotoxicology: Report of a Society for Risk Analysis Workshop

R.A. Canady

Risk Analysis, Article first published online: 6 OCT 2010

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Significance: The information presented at this workshop does not indicate the need for a conceptually different approach for risk assessment on nanoscale materials, compared to other materials.

The toxicology discussions at this workshop identified areas of uncertainty that present a challenge for the assessment of nanoscale materials such as novel metrics, characterizing multivariate dynamic mixtures, identification of toxicologically relevant properties and “impurities” for nanoscale characteristics, and characterizing persistence, toxicokinetics, and weight of evidence in consideration of the dynamic nature of the mixtures. The discussion also considered “nanomaterial uncertainty factors” for health risk values like the Environmental Protection Agency's reference dose (RfD). Participants expressed that completing a data set regarding toxicity, or extrapolation between species, sensitive individuals, or durations of exposure, were not qualitatively different considerations for nanoscale materials in comparison to all chemicals, and therefore, a “nanomaterial uncertainty factor” for all nanomaterials does not seem appropriate.