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To: (04) Foodborne diseases; (23) Veterinary education
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New publications in the FOOD PATHOGENS DIGEST database (286-290)

286 Saranwong, S., Kawano, S. (2008)
Interpretation of near infrared calibration structure for determining the total aerobic bacteria count in raw milk: interaction between bacterial metabolites and water absorptions
Journal of Near Infrared Spectroscopy, 16, 497-504

The objective of this work is to clarify the structure of the near infrared (NIR) calibration equation for predicting the total aerobic bacteria count (TBC) of raw milk which was developed in a previous article. First, an experiment on the monitoring of chemical changes in stored raw milk having different Levels of TBC was conducted. Then the relation between the regression coefficient plots of the TBC calibration equation and the absorption bands of the constituents related to bacterial metabolism was investigated. Finally, the meaning of each factor used in the calibration equation was interpreted through the study of its loading weight plots. It was found that Lactic acid and urea-nitrogen, the waste from Lactose and from protein catabolism of bacteria, increased with the increase of TBC value. On the other hand, the decreases in lactose and protein content, the energy sources of many bacteria, were observed. The results from the investigations on the regression coefficient and the loading weight plots indicated that the TBC calibration equation utilised the information from both the absorptions of the four chemicals and the absorptions of water species. It is believed that the changes in the metabolites and energy sources influenced the species and the NIR absorptivity of water. In addition, the band assignments in the regression coefficient plots have been performed. For example, the peak at 988nm was linked to Lactic acid absorption, the peak at 1008nm peak was identified as due to urea-nitrogen absorption, and the 1026nm and 1032nm peaks were identified as being due to casein-protein absorptions. As for water, the 952nm, 962nm, 976nm and 998nm were likely to represent the fluctuation of water species with 0, 1, 2 and 3 hydrogen bonds, respectively.

Novel approach to control Salmonella enterica by modern biophotonic technology: photosensitization
Journal of Applied Microbiology, 106, 748-754

Salmonellosis is one of the most common foodborne diseases in the world. The aim of this study was to evaluate the antibacterial efficiency of 5-aminolevulinic acid (ALA) based photosensitization against one of food pathogens Salmonella enterica. Salmonella enterica was incubated with ALA (7.5 mmol l(-1)) for 1-4 h and afterwards illuminated with visible light. The light source used for illumination of S. enterica emitted light lambda = 400 nm with energy density 20 mW cm(-2). The illumination time varied from 0 to 20 min and subsequently a total energy dose reached 0-24 J cm(-2). The data obtained indicate that S. enterica is able to produce endogenous photosensitizer PpIX when incubated with ALA. Remarkable inactivation of micro-organisms can be achieved (6 log) after photosensitization. It is obvious that photosensitization-based inactivation of S. enterica depends on illumination as well as incubation with ALA time. ALA-based photosensitization can be an effective tool against multi-drug resistant Gram-negative bacteria S. enterica serovar Typhimurium. Experimental data and mathematical evaluations support the idea that ALA-based photosensitization can be a useful tool for the development of nonthermal food preservation technology in future.

Suitability of Rapid Detection Methods for Salmonella in Poultry Slaughterhouses
Food Analytical Methods, 2, 1-13
In the perspective of an announced prohibition to bring Salmonella-contaminated fresh poultry meat on the retail market as of December 2010, requirements are postulated for rapid methods for detection of Salmonella in poultry meat. These rapid methods should deliver reliable results in time to make it possible to steer the finished products in poultry slaughterhouses into the direction of the fresh poultry market or into the direction of industrial treatment. The most important requirements are the detection limit (1 cfu/25 g), the time of analysis (within hours up to a maximum of 24 h), the sensitivity and specificity, and the validation of the rapid detection method. To determine a requirement for the number of samples to be analyzed per unit of time of the detection methods, a sampling plan for pooling of samples is suggested. Information of commercially available detection methods from literature and data provided by the suppliers was compared to the postulated requirements. The results showed that none of the commercially available detection methods meet all the suggested requirements. For all available methods, the time of analysis is too long to steer the production process in time. This implicates that faster methods should be developed before the announced prohibition can be sensibly introduced. Also, information about sensitivity and specificity, which is essential for the reliability of the rapid test method, should be examined in a more uniform way.

289 Tu, S.I., Reed, S., Gehring, A., He, Y.P. (2009)
Detection of Salmonella Enteriditis from Egg Components Using Different Immunomagnetic Beads and Time-resolved Fluorescence
Food Analytical Methods, 2, 14-22

The types of chemical linkage used to bind antibodies to magnetic beads to form immunomagnetic beads (IMB) were compared in the capture and detection of Salmonella Enteriditis from egg white, egg yolk, and whole egg. Egg components were inoculated with outbreak strains of S. Enteriditis. After incubation under different conditions, IMBs derived from linking antibodies to core magnetic beads via biotin-streptavidin interactions, Schiff-base bonds and unspecified proprietary chemistry were used to capture S. Enteriditis. Europium-labeled anti-Salmonella antibodies completed the sandwich, and time-resolved fluorescence served as the means of detection. For the Salmonella isolated in stationary phase and cultured from universal pre-enrichment broth (UPB), the detection signal intensity was affected by the chemistry utilized to link the antibodies to IMB, with results varying among the three test strains. When S. Enteriditis was cultured in egg yolk alone, plating data were similar to those of the growth of S. Enteriditis in UPB. Egg white by itself did not support the growth of S. Enteriditis. The addition of UPB to egg white restored the growth of Salmonella and yielded stronger detection signals than from cultures obtained from UPB with egg yolk. The detection signals obtained from the immunoassay were less intense for cultures grown in egg yolk + UPB than from cultures grown in UPB alone. The lower detection signals elicited by all IMBs suggest the availability of the antigenic groups recognized by the antibodies on IMBs was reduced in the presence of egg yolk.

290 Li, Y.X., Li, Y.Q., Qu, L.L., He, C.Y. (2008)
Microfluidic Chip Electrophoresis with Laser-Induced Fluorescence Detection for Rapid Analysis of Four Foodborne Pathogenic Bacteria
Chinese Journal of Analytical Chemistry, 36, 1667-1671

A rapid and simple method based on a microfluidic chip system with laser-induced fluorescence detection was developed and applied to rapid analysis of quadruplex polymerase chain reaction (PCR) products for determination of four foodborne pathogenic bacteria. The four specific primer pairs were designed to amplify the target gene fragments: Vpara(16S-23S rDNA IGS)gene of Vibrio parahemolyticus, invA gene of Salmonella, rfb0157 gene: of Escherichia coli 0157: H7 and ipaH gene of Shigella. Then the quadruplex PCR system was optimized. The multiplex P:R products were separated and detected by microfluidic chip electrophoresis. Excellent separation was achieved using 2. 2% hydroxypropyl methylcellulose-50 (HPMC-50) and 3. 75 mu mol/L ethidium bromide(EB) at 120 V/cm. The, proposed method was employed to detect the quadruplex PCR products of four foodborne pathogenic bacteria simultaneously under the optimal Conditions within 600 s. 1 x 10(2) cfu/mL for all four pathogens could be detected. The relative standard deviations of migration time were from 0.7% to 2. 1%. No amplification products were obtained using DNA templates from 10 strains of non-target bacteria in the quadruplex PCR reaction, which showed that this method was specific. The present method has been successfully applied to rapid analysis of multiplex PCR products of pathogenic bacteria in artificially inoculated food samples. This study offered another reliable and valuable tool for rapid analysis of foodborne pathogenic bacteria, which was very important for ensuring food safety and security.
New publications in the PathogenCombat PARTNERS database (140)


Fermented milk containing Bifidobacterium lactis DN-173 010 improved self-reported digestive comfort amongst a general population of adults. A randomized, open-label, controlled, pilot study
Journal of Digestive Diseases, 10, 61-70

Some probiotics improve digestive comfort of people with Irritable Bowel Syndrome, but this needs confirmation in a healthy population. The objective of this pilot study was to investigate the effect of consuming fermented milk containing the probiotics Bifidobacterium lactis DN-173010 and yoghurt strains (test product) on digestive comfort and symptoms amongst adults without diagnosed gastrointestinal disorders. The study was designed to approximate a real-life situation, by using a branded product in the intervention groups. In an open-label, randomized, controlled trial, 371 adults reporting digestive discomfort were randomized into three groups who had a daily consumption of either one or two pots of test product over 2 weeks, or to follow their usual diet. Digestive comfort and bother from digestive symptoms were assessed by questionnaire at baseline and follow-up (per protocol population n = 360). Self-reported change in digestive comfort and computed change between baseline and follow-up for each of 20 items were compared between groups (Cochran-Mantel-Haenszel test). A higher percentage of participants consuming the test product reported improved digestive comfort (1-pot group 82.5%; 2-pot group 84.3%), than controls (2.9%). Their self-reported change scores differed significantly (P < 0.001). For both test product groups, almost all symptom scores improved significantly more than controls (P < 0.001). There were no significant differences between 1-pot and 2-pot groups. This pilot study shows that daily consumption of a probiotic food in real-life conditions may be useful in improving digestive comfort and symptom experience of adults from general population. Further double-blind randomized controlled studies are required to confirm these health benefits