2009-11-09-229 Food Pathogens databases updated (2009-11-07)
To: (04) Foodborne diseases; (23) Veterinary education
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New publications in the FOOD PATHOGENS DIGEST database (381-384)

In vitro culture combined with quantitative TaqMan PCR for the assessment of Toxoplasma gondii tissue cyst viability
Veterinary Parasitology, 164, 167-172

Toxoplasma gondii is a serious food-borne pathogen with a worldwide distribution. In order to assess the risk of contracting toxoplasmosis from certain foods, many studies rely on the molecular detection of T gondii DNA. However, determining the viability of parasites in positive samples is much more problematic. In this paper we describe a novel viability assay that relies on semi-quantitative comparison of the amount of parasite DNA present in samples used to infect host cell monolayers in vitro, and the amount of DNA detected in the same monolayers after 23 days incubation. Our assay is robust, easy to perform and interpret and offers a viable alternative to bioassays, for use in epidemiological studies, or the evaluation of specific food safety treatments. (C) 2009 Elsevier B.V. All rights reserved

382 Poltronieri, P., de Blasi, M.D., D'Urso, O.F. (2009)
Detection of Listeria monocytogenes through real-time PCR and biosensor methods
Plant Soil and Environment, 55, 363-369

Listeria monocytogenes is a foodborne pathogen causing listeriosis, especially in sensitive individuals such as children, pregnant women and persons with compromised immune systems. This pathogen has been isolated from different food products, but milk products surely play a major role in the epidemiology of this foodborne disease. Identification traditionally involved culture methods based on selective enrichment and plating followed by the characterization of Listeria spp. based on colony morphology, sugar fermentation and haemolytic properties. These methods are the gold standard, but in the last years more rapid tests were developed based on antibodies (ELISA) or molecular techniques (PCR or DNA hybridization). More recently, molecular methods were developed that target RNA rather than DNA, such as RT-PCR, real time PCR or nucleic acid sequence-based amplification (NASBA). In this review, real-time PCR assays, protein chip methods and label-free SPR immunosensors were compared for their application in bacterial detection

Pathogen Detection in Food Microbiology Laboratories: An Analysis of Qualitative Proficiency Test Data, 1999-2007
Journal of Food Safety, 29, 521-530

The objective of this study was to assess laboratories' ability to detect or rule out the presence of four common food pathogens: Escherichia coli O157:H7, Salmonella spp., Listeria monocytogenes and Campylobacter spp. To do this, qualitative proficiency test data provided by one proficiency test provider from 1999 to 2007 were examined. The annual and cumulative 9-year percentages of false-negative and false-positive responses were calculated. The cumulative 9-year false-negative rates were 7.8% for E. coli O157:H7, 5.9% for Salmonella spp., 7.2% for L. monocytogenes and 13.6% for Campylobacter spp. Atypical strains and low concentrations of bacteria were more likely to be missed, and the data showed no trend of improving performance over time. Percentages of false-positive results were below 5.0% for all four pathogens. PRACTICAL APPLICATIONS The results imply that food testing laboratories often fail to detect the presence of these four food pathogens in real food specimens. To improve pathogen detection, supervisors should ensure that testing personnel are adequately trained, that recommended procedures are followed correctly, that samples are properly prepared, that proper conditions (temperature, atmosphere and incubation time) are maintained for good bacterial growth and that recommended quality control procedures are followed. Supervisors should also always investigate reasons for unsatisfactory
proficiency test results and take corrective action. Finally, more research is needed into testing practices and proficiency test performance in food testing laboratories.

Journal of Food Safety, 29, 588-600

Contamination of poultry by Campylobacter is a significant source of human diarrheal illness. The purpose of this study was to compare standard culture-based methods and real-time polymerase chain reaction (RT-PCR) for detection of Campylobacter jejuni from retail chicken samples. Culture methods were compared with RT-PCR (without enrichment) for detection of C. jejuni in naturally contaminated chicken samples. Purchased chicken samples (n = 43) were collected from four supermarkets. C. jejuni was detected by direct plating to selective agar (DPSA; 5/43, 11.6%), RT-PCR (15/43, 34.9%) and Bolton's enrichment (BE; 8/43, 41.9%). Fifteen chicken samples were concordant by RT-PCR and BE whereas three samples were positive only by BE. The sensitivity of the RT-PCR and DPSA, when compared to BE as the reference standard (100% sensitivity) were 81 and 29%, respectively. Application of rapid and sensitive methods for detection and enumeration of C. jejuni is important for the maintenance of a safe poultry supply. PRACTICAL APPLICATIONS Campylobacter spp are one of the most common causes of bacterial diarrheal disease worldwide. This zoonotic pathogen is reported to have a low infective dose with high pathogenicity. The practical application of the experiment is directed to assess the "standard culture-based methods and real-time polymerase chain reaction (RT-PCR)" to detect Campylobacter jejuni, which is most commonly isolated campylobacter species from clinical infections and chicken samples. Because of the growth characteristics and difficulty of routine diagnostic technique, evaluation of food samples for the presence of C. jejuni can be challenging. The main focus of the study is to assess the sensitivity and sensitivity of culture and RT-PCR. The results are instrumental resources in the area of food safety, epidemiological surveillance, policy development to monitor and regulate the food matrices and diagnostic laboratories. The audiences of this information will be both academic and commercial sectors involved in poultry production and processing institutions, food regulatory and inspection institutions, risk assessment and also the consumer.

New publications in the PathogenCombat PARTNERS database (181-183)

International Journal of Food Microbiology, 135, 83-89

This research is an extension of previous work reported in Gysemans et al. [Gysemans, K.P.M., Bernaerts K., Geeraerd. A.H., Vermeulen, A., Debevere, J., Devlieghere, F., Van Impe, J.F., 2007. Exploring the performance of logistic regression model types on growth/no growth data of Listeria monocytogenes. International journal of Food Microbiology 114, 316-331.] in which the growth/no growth interface of Listeria monocytogenes was modelled as a function of water activity (a(w)), pH and undissociated acetic acid percentage (UAac). The major difference with the previous work is that in the present research the influence of the cell density (N) is also considered during the modelling process. New experimental data were therefore collected as a function of a wide range of cell densities up until the level of the individual cell. Prior to the development of a model that incorporates N, the expected inadequacy of the high cell density growth/no growth model developed in Gysemans et al. (2007) on the new cell density dependent data was illustrated. Inadequacy of the model at lower cell densities was expected since the data showed a significant reduction of the growth probability as N decreased. For the development of a model that incorporates the effect of N, a square-root type logistic regression model was proposed and evaluated. The model predicts a strong influence of the cell density with an increase in the growth probability if the cell count increased. The onset of this increase is dependent on the intrinsic factors of the medium (pH, a(w), and acetic acid concentration). The model also suggests that it is unlikely that a larger population has a higher chance to start growing just because the chance on a strong cell is higher in a larger population. It seems that the bacteria influence each other's growth. (c) 2009 Published by Elsevier B.V

Tarhana is a traditional fermented product produced from a mixture of spontaneously fermented yogurt and wheat flour in Turkey. The aims of the present study were to enumerate and identify for the first time by molecular biology-based methods predominant lactic acid bacteria (LAB) isolated during processing of Tarhana. Samples were collected from eight different regions of Turkey. In order to explore the relationship between raw material and the microbiology of Tarhana, yogurt and wheat flour were also analyzed. A total of 226 Gram-positive and catalase-negative isolates were obtained from MRS, M17 and SBM (Slanetz and Bartley Medium). The isolates were grouped and identified using a combination of pheno- and genotypic methods including rep-PCR fingerprinting 
[[(GTG)(5) primer]], multiplex PCR, 16S rRNA gene sequencing and carbohydrate assimilation profiling. Pediococcus acidilactici were found to constitute 27% of the isolates, 19% were identified as Streptococcus thermophilus, 19% as Lactobacillus fermentum, 12% as Enterococcus faecium, 7% as Pediococcus pentosaceus, 5% as Leuconostoc pseudomesenteroides, 4% as Weissella cibaria, 2% as Lactobacillus plantarum, 2% as Lactobacillus delbrueckii spp. bulgaricus, 2% as Leuconostoc citreum, 1% as Lactobacillus paraplantarum and 0.5% as Lactobacillus casei. The different production sites investigated all had individual LAB profiles, but with P. acidilactici and S. thermophilus being isolated from the majority of samples. The main source of A acidilactici and S. thermophilus was found to be the yogurt. (c) 2009 Elsevier B.V. All rights reserved

The use of physicochemical methods to detect organic food soils on stainless steel surfaces
Biofouling, 25, 749-756

Food processing surfaces fouled with organic material pose problems ranging from aesthetic appearance, equipment malfunction and product contamination. Despite the importance of organic soiling for subsequent product quality, little is known about the interaction between surfaces and organic soil components. A range of complex and defined food soils was applied to 304 stainless steel (SS) surfaces to determine the effect of type and concentration of soil on surface physicochemical parameters, viz surface hydrophobicity (ΔG(iwi)), surface free energy (γ(s)), Lifshitz van der Waals (γ(LW)(s)), Lewis acid base (γ(AB)(s)), electron acceptor (γ(+) (s)) and electron donor (γ(-) (s)) measurements. When compared to the control surface, changes in γ(AB)(s), γ(+) (s) and γ(-) (s) were indicative of surface soiling. However, soil composition and surface coverage were heterogeneous, resulting in complex data being generated from which trends could not be discerned. These results demonstrate that the retention of food soil produces changes in the physicochemical parameters of the surface that could be used to indicate the hygienic status of a surface.