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XIX 1-05 **MASTITIS-CAUSING STREPTOCOCCI ARE IMPORTANT CONTRIBUTORS TO BACTERIAL COUNTS IN RAW BULK TANK MILK**

R. N. Zadoks, R. N. Gonzalez, K. J. Boor, and Y. H. Schukken
J. of Food Protection 67 (12): 2644. 2004.

The objective was to probe the contribution of streptococci to the microbial quality of raw milk. Over a 5-month period, bulk tank milk samples from 48 dairy farms were analyzed qualitatively for bacterial ecology and quantitatively for total bacterial, streptococcal, staphylococcal, and gram-negative bacterial counts. Linear regression analysis was used to determine the contribution of differential counts to total bacterial counts. Streptococci, staphylococci, and gram-negative bacteria accounted for 69, 3, and 3% of total bacterial count variability, respectively. Randomly selected Streptococcus isolates from each bulk tank milk sample were identified to species by means of the API 20 STREP identification system. The most commonly identified streptococcal species were Streptococcus uberis, Aerococcus viridans, and Streptococcus agalactiae, which were detected in 81, 50, and 31% of 48 bulk tank samples, respectively. For five herds, S. uberis isolates from bulk tank milk and individual cows were characterized by PvuII ribotyping. A farm-specific dominant ribotype was found in each bulk tank sample, and that ribotype was isolated from at least one cow within each herd of origin. Bacteriological and strain typing data indicate that control of streptococci, specifically mastitis-causing species, is important for improvement of the microbial quality of raw milk.

XIX 2-05 **EFFICACY OF PASTEURIZATION CONDITIONS FOR THE INACTIVATION OF MYCOBACTERIUM AVIUM SUBSP. PARATUBERCULOSIS IN MILK**

J. R. Stabel and A. Lambertz
J. of Food Protection 67 (12): 2719. 2004.

Mycobacterium avium subsp. paratuberculosis, the causative agent of a chronic enteritis in ruminants (Johne's disease), has been linked to Crohn's disease in humans. This microorganism is shed by infected animals primarily in the feces but is also shed in the milk at much lower levels. Therefore, dairy products from infected animals may be one mode of transmission of this animal pathogen. This study was designed to evaluate the effectiveness of the holder and high-temperature short-time pasteurization standards on the destruction of M. paratu-

berculosis. One hundred eighty experiments were conducted in this study using a slug-flow pasteurizer unit and a laboratory scale pasteurizer unit. Ultra-high-temperature milk was inoculated at two concentrations, 108 and 105 CFU/ml, with three different field strains of M. paratuberculosis. Five different time-temperature combinations were evaluated: 62.7°C for 30 min, 65.5°C for 16 s, 71.7°C for 15 s, 71.7°C for 20 s, and 74.4°C for 15 s. Three replicates of each experiment were run for the pasteurizer unit, time-temperature combination, and strain of M. paratuberculosis. Treatment of milk regardless of bacterial strain or pasteurizer unit resulted in an average 5.0- and 7.7-log kill for the low and high concentrations of inoculum, respectively. Milk treated for cheese production (65.5°C for 16 s) resulted in a much lower and more variable kill. Results from this study indicate that the current U.S. minimum standards for batch and high-temperature short-time pasteurization of grade A milk significantly reduced the survivability of M. paratuberculosis, but some bacteria survived subpasteurization heat treatment of milk used for cheese manufacture.

XIX 3-05 SHIGA TOXIN-PRODUCING ESCHERICHIA COLI: PRE- AND POSTHARVEST CONTROL MEASURES TO ENSURE SAFETY OF DAIRY CATTLE PRODUCTS

S. Hussein and T. Sakuma
J. of Food Protection 68(1): 199. 2005.

The large number of cases of human illness caused by Shiga toxin-producing Escherichia coli (STEC) worldwide has raised safety concerns for foods of bovine origin. These human illnesses include diarrhea, hemorrhagic colitis, hemolytic uremic syndrome, and thrombotic thrombocytopenic purpura. Severe cases end with chronic renal failure, chronic nervous system deficiencies, and death. Over 100 STEC serotypes, including E. coli O157:H7, are known to cause these illnesses and to be shed in cattle feces. Thus, cattle are considered reservoirs of these foodborne pathogens. Because beef and dairy products were responsible for a large number of STEC outbreaks, efforts have been devoted to developing and implementing control measures that assure safety of foods derived from dairy cattle. These efforts should reduce consumers' safety concerns and support a competitive dairy industry at the production and processing levels. The efficacy of control measures both before harvest (i.e., on-farm management practices) and after harvest (i.e., milk processing and meat packing) for decreasing the risk of STEC contamination of dairy products was evaluated. The preharvest measures included sanitation during milking and management practices designed to decrease STEC prevalence in the dairy herd (i.e., animal factors, manure handling, drinking water, and both feeds and feeding). The postharvest measures included the practices or treatments that could be implemented during processing of milk, beef, or their products to eliminate or minimize STEC contamination.

XIX 4-05 SHORT COMMUNICATION: COMPARISON OF COVERED AND UNCOVERED SCHREIBER TEST FOR CHEESE MELTABILITY EVALUA TION

A. Altan, M. Turhan and S. Gunasekaran
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Schreiber meltability tests were performed on glass Petri dishes, with and without the Petri dish cover placed over the cheese samples, at 100, 150, and 232°C. Meltability of different process cheese and Cheddar cheese samples was determined based on the melt spread distance and area. At the test temperature of 232°C, the covered Schreiber was significantly superior to the uncovered test because of no crust formation, no browning, and a circular melting pattern, which were attributed to the barrier effect of covering the cheese samples (which inhibits moisture loss during the test). The covered Schreiber test data were statistically more robust as measured by the lower average coefficient of variation than the data from the traditional uncovered Schreiber test.

XIX 5-05 PHYSICAL PROPERTIES OF ICE CREAM CONTAINING MILK PROTEIN CONCENTRATES

V. B. Alvarez, C. L. Wolters, Y. Vodovotz and T. Ji
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Two milk protein concentrates (MPC, 56 and 85%) were studied as substitutes for 20 and 50% of the protein content in ice cream mix. The basic mix formula had 12% fat, 11% nonfat milk solids, 15% sweetener, and 0.3% stabilizer/emulsifier blend. Protein levels remained constant, and total solids were compensated for in MPC mixes by the addition of polydextrose. Physical properties investigated included apparent viscosity, fat globule size, melting rate, shape retention, and freezing behavior using differential scanning calorimetry. Milk protein concentrate formulations had higher mix viscosity, larger amount of fat destabilization, narrower ice melting curves, and greater shape retention compared with the control. Milk protein concentrates did not offer significant modifications of ice cream physical properties on a constant protein basis when substituted for up to 50% of the protein supplied by nonfat dry milk. Milk protein concentrates may offer ice cream manufacturers an alternative source of milk solids non-fat, especially in mixes reduced in lactose or fat, where higher milk solids nonfat are needed to compensate other losses of total solids.

XIX 6-05 SHELF LIVES OF PASTEURIZED FLUID MILK PRODUCTS IN NEW YORK STATE: A TEN-YEAR STUDY

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Food Protection Trends 25 (2): 102. 2005.

The results of an ongoing fluid milk quality evaluation program are summarized to illustrate trends in commercial fluid product shelf lives. Packaged fluid milk

samples were collected from 23 dairy processing plants across New York State at least twice per year over a 10 year period and subjected to shelf-life analyses that included Standard Plate Count (SPC), coliform count and sensory evaluation. Products were tested initially and after storage at 6.1°C for 7, 10 and 14 days post-packaging. On an annual basis, the percent of samples that met the Pasteurized Milk Ordinance (PMO) standard of SPC = 20,000 cfu/ml after 7, 10, and 14 days ranged from 46% to 66%, 25% to 50%, and 12% to 32%, respectively. Over the ten-year period, SPC values across test days decreased in 8 plants, including the 4 plants that had the lowest SPC scores among all 23 plants; increased in 2 plants and did not change significantly in the remaining 13 plants. The percent of samples positive for coliforms in a given year ranged from 5% to 15% on initial testing and up to 34% after subsequent storage. The percent of samples scored as unacceptable from a sensory perspective (score <6.0) after 7, 10, and 14 days ranged from 0% to 8%, 16% to 35 %, and 41% to 67%, respectively. For the majority of plants, product flavor scores improved during this 10-year period. Although some plants involved in the study can produce fluid milk products that are consumer acceptable when stored at 6.1°C for = 14 days, others consistently fall short of this goal.

XIX 7-05 UTILIZATION OF FRONT-FACE FLUORESCENCE SPECTROSCOPY FOR ANALYSIS OF PROCESS CHEESE FUNCTIONALITY

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The purpose of this was to evaluate the feasibility of front-face fluorescence spectroscopy (FFFS) to predict the meltability of process cheese spreads or products. Twenty-seven commercial samples from 3 manufacturers were used in this study. Each sample was analyzed using dynamic stress rheometry, which was used to calculate the meltability index (temperature at $\tan\delta$ = 1). Additionally, fluorescence spectra of tryptophan (excitation: 290 nm; emission: 305 to 400 nm) were collected on each sample at 20°C using a front-face accessory. Fluorescence spectrum for each sample consisted of an average of 36 scans (6 scans performed on 6 replicates). The spectral data set consisted of normalized and mean-centered spectra from all the samples. Multivariate statistical analysis was used to correlate spectral data with cheese meltability index as measured by dynamic stress rheometry. A prediction model was developed using partial least square regression and was calibrated using a cross-validation method. A correlation coefficient of 0.93 was obtained between fluorescence spectra and cheese meltability. The regions 335 to 350 nm and 385 to 400 nm had the highest correlation to cheese meltability. A negative correlation between the peak height of tryptophan (335 to 350 nm) and cheese meltability index was observed. This correlation may be due to presence of tryptophan residues in a more hydrophobic environment in stronger emulsions as compared with a more polar

environment in weak emulsions. These results indicate that the melt properties of process cheese spreads or products are related to molecular structure that can be measured using FFFS. Hence, FFFS can be used as an analysis technique to predict process cheese meltability.