

INTERPRETIVE SUMMARIES, MARCH 2018

Stabilizing vitamin D₃ using the molten globule state of α -lactalbumin. *By Pedersen et al., page 1817.* Vitamin D (vitD) is responsible for increasing intestinal absorption of calcium and show beneficial effects against several diseases. A large part of the population lacks sufficient amounts of vitD, and food fortification with vitD ensures that adequate amounts are consumed. We showed that the whey protein α -lactalbumin (α -LA) can be used to stabilize vitD at low pH where hydrophobic patches of α -LA are exposed. This study demonstrates the potential of α -LA as a component in vitD fortification, particularly for low-pH applications.
<https://doi.org/10.3168/jds.2017-13818>.

Effect of bovine lactoferrin and human lactoferrin on the proliferative activity of the osteoblast cell line MC3T3-E1 in vitro. *By Zhang et al., page 1827.* Bovine lactoferrin has many positive effects for humans. Comparing bovine and human lactoferrins in terms of promoting osteoblast proliferation provides information for bovine lactoferrin in infant formula and health foods. Bovine lactoferrin demonstrated a better proliferation effect than did human lactoferrin.
<https://doi.org/10.3168/jds.2017-13161>.

Milk from cows fed with high forage:concentrate ratio diet improves inflammatory state, oxidative stress, and mitochondrial function in rats. *By Cavaliere et al., page 1843.* In our study, we demonstrated that milk produced by dairy cows fed a diet with high forage:concentrate ratio (HFM) had a low n-6/n-3 ratio and high content of conjugated linoleic acid. Our data provide the first evidence that, in rats, administration of HFM has beneficial effects on lipid metabolism, inflammation, and oxidative stress.
<https://doi.org/10.3168/jds.2017-13550>.

Milk basic protein supplementation exerts an anti-inflammatory effect in a food-allergic enteropathy model mouse. *By Ono-Ohmachi et al., page 1852.* We examined the functions of milk basic protein (MBP) derived from bovine milk in T-cell-related inflammatory diseases by evaluating its effects on the causative responses of ovalbumin (OVA)-specific T cells in OVA23-3 mice, a food-allergic enteropathy model species. Dietary supplementation of MBP attenuated OVA-specific immunoglobulin E production in OVA-fed OVA23-3 mice caused by excess interleukin-4 production by CD⁴⁺ T cells, and inhibited bone loss in these mice with developing enteropathy. Because MBP is a complex comprising several proteins with different properties, it could be a useful food for preventing

T-cell-related inflammation and more effective than individual milk proteins.
<https://doi.org/10.3168/jds.2017-13253>.

Influence of partially demineralized milk proteins on rheological properties and microstructure of acid gels. *By Meletharayil et al., page 1864.* The present study explored a clean-label process for the manufacture of acid milk gels (yogurts). Partial demineralization of skim milk through injection of carbon dioxide before and during the process of ultrafiltration and diafiltration produced milk protein concentrate with 80% protein (TMPC80). The TMPC80 and non-fat dry milk were mixed in different ratios to obtain dispersions for the manufacture of acid milk gels. We observed an increase in the gel strength of acid milk gels with increasing protein contribution ratios from TMPC80. The study demonstrates that partial demineralization of milk can modify protein interactions during manufacture of acid milk gels and thus influence their rheological properties.
<https://doi.org/10.3168/jds.2017-13670>.

Construction of an enzymatic route using a food-grade recombinant *Bacillus subtilis* for the production and purification of epilactose from lactose. *By Chen et al., page 1872.* We described a new enzymatic route for the production of a valuable prebiotic, epilactose, from whey powder solution. An efficient epilactose-producing *Bacillus subtilis* strain was developed based on an antibiotic resistance gene-free plasmid. The epilactose produced by the permeabilized recombinant cells was successfully purified with a yield of 24.0% and purity >98%.
<https://doi.org/10.3168/jds.2017-12936>.

Technical note: Development and validation of a new method for the quantification of soluble and micellar calcium, magnesium, and potassium in milk. *By Franzoi et al., page 1883.* Mineral partition between soluble and micellar fractions plays an important role in milk coagulation and thus in the cheese-making process. Current methods generally need correction factors or normalizations to achieve an optimal estimation of soluble and micellar components. In the present study, we developed and validated a laboratory method for determination of micellar and soluble mineral concentrations in milk. Results indicated that the new method overcame the need for correction factors and exhibited good repeatability and reproducibility.
<https://doi.org/10.3168/jds.2017-13419>.

Control of *Listeria monocytogenes* in whole milk using antimicrobials applied individually and in combination. By Kozak et al., page 1889. Antimicrobials were added individually or in combination to whole milk inoculated with *Listeria monocytogenes* at 4 log₁₀ cfu/mL and stored at 7°C for 21 d. Inhibitory concentrations of lauric arginate (800 mg/L), ε-polylysine (100–400 mg/L), sodium caprylate, and caprylic acid (3,200 mg/L each) were identified, as were bactericidal concentrations of ε-polylysine (800 mg/L) and hydrogen peroxide (200, 400, and 800 mg/L). The combination of ε-polylysine and sodium caprylate was synergistic. This study identifies effective listeristatic and listericidal treatments in milk and serves as a basis for continued development of antimicrobial controls for *L. monocytogenes* in dairy products.
<https://doi.org/10.3168/jds.2017-13648>.

Phenotypic, fermentation characterization, and resistance mechanism analysis of bacteriophage-resistant mutants of *Lactobacillus delbrueckii* ssp. *bulgaricus* isolated from traditional chinese dairy products. By Deng et al., page 1901. In this work, we isolated 2 bacteriophage-resistant mutants, *Lactobacillus delbrueckii* ssp. *bulgaricus* mutants BIM8 and BIM12, from traditional Chinese dairy products. Both possessed good phage resistance and dairy fermentation attributes, and their phage-resistance mechanism resulted from a change in the bacteriophage attachment receptor in the cell wall in both strains. The BIM8 mutant also possessed an active, phage-resistant restriction/modification system. These 2 mutants showed good potential as phage-resistant dairy starter cultures for industrial application.
<https://doi.org/10.3168/jds.2017-13823>.

***Lactobacillus casei asp23* gene contributes to gentamicin resistance via regulating specific membrane-associated proteins.** By Zhang et al., page 1915. Antibiotic resistance is a global health problem. However, most published studies have only focused on studying antibiotic resistance in pathogens, not probiotics. *Lactobacillus casei* Zhang is a koumiss-originated probiotic strain. The present study compared the proteomes of the *asp23* knockout mutant and its wild-type strain to reveal the function of the alkaline shock protein-coding *L. casei asp23* gene in gentamicin resistance. The results suggested that protein encoded by *asp23* might counter gentamicin stress by modulating some cell membrane proteins. Our study has provided insights into the physiological role of *asp23* in antibiotic resistance in *L. casei*.
<https://doi.org/10.3168/jds.2017-13961>.

The effect of different precooling rates and cold storage on milk microbiological quality and composition. By Paludetti et al., page 1921. Milk leaves

the cow's udder at approximately 35°C, a temperature favorable for the growth of a variety of microorganisms. Therefore, to avoid significant bacterial growth after milking, it is necessary to cool and store milk at appropriate temperatures. Cooling milk before it enters the bulk tank reduces overall cooling time. This aids in reducing bacterial growth over time, thereby preserving milk quality. An increase in bacterial counts in milk could decrease protein, fat, and lactose contents, thus affecting relevant milk processing characteristics and nutritional value.
<https://doi.org/10.3168/jds.2017-13668>.

Prevalence of *Salmonella enterica*, *Listeria monocytogenes*, and pathogenic *Escherichia coli* in bulk tank milk and milk filters from US dairy operations in the National Animal Health Monitoring System Dairy 2014 study. By Sonnier et al., page 1943. As part of the National Animal Health Monitoring System (NAHMS) Dairy 2014 survey, bulk tank milk and milk filters were collected from 234 dairy operations and analyzed for the presence of *Salmonella enterica*, *Listeria monocytogenes*, and *Escherichia coli* virulence genes. We detected *Salmonella* in 18.5% of operations, *L. monocytogenes* in 3.0% of operations, and one or more *E. coli* virulence genes in 30.5% and 73.5% of operations in milk and filters, respectively. Resistance to ≥4 antimicrobial agents was observed in 13.9% of *Salmonella* isolates. These data support that consuming unpasteurized dairy products poses a health risk.
<https://doi.org/10.3168/jds.2017-13546>.

Short communication: Lactose enhances bile tolerance of yogurt culture bacteria. By Mena and Aryana, page 1957. Bile reduces bacterial survival by destroying cell membranes. Enhancing the bile tolerance of yogurt culture bacteria would result in increased survivability when these bacteria encounter this hurdle in the gastrointestinal tract. The objective was to study bile tolerances of yogurt culture bacteria as influenced by lactose concentrations of 0 (control), 1, 3, and 5% (wt/vol) M17 and THIO MRS (de Man, Rogosa, and Sharpe broth supplemented with sodium thioglycolate) broths. Results indicated that use of lactose at 5% (wt/vol) significantly improved the bile tolerance of *Streptococcus thermophilus* and *Lactobacillus bulgaricus*.
<https://doi.org/10.3168/jds.2017-13919>.

Short communication: Snapshot of industry milk hauling practices in the western United States. By Waite-Cusic et al., page 1960. Milk hauling sanitation and operation practices are mandated by the Pasteurized Milk Ordinance (PMO). Several of the regulatory practices of the PMO are described using vague terminology (e.g., “as needed”) and require further clarification to help industry determine best

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