

December 30, 2002

Volume XVI No. 4

XVI 41-02 HEAT-INDUCED CHANGES IN ANGEL FOOD CAKES CONTAINING EGG-WHITE PROTEIN OR WHEY PROTEIN ISOLATE

C.W. Pernell, P.J. Luck, E. Foegeding, and C.R. Daubert
J. Food Sci. *67* (8): 2945. 2002.

Angel food cakes made from egg white or whey protein foams were compared. Cakes were evaluated based on final volume, dynamic volume change, and rheological transitions during baking. Cake expansion during baking was a function of protein concentration regardless of protein type. Cakes containing whey proteins had a lower ability to prevent collapse once starch gelatinization started during baking. Heat-treating whey proteins or adding xanthan gum increases cake volume, but not to the extent of egg-white proteins. Cakes containing egg-white proteins became more elastic at 60 to 85°C than those containing whey proteins, indicating physical differences in the heat-set protein foam network associated with protein type.

XVI 42-02 TRANSGLUTAMINASE CROSS-LINKING OF WHEY/MYOFIBRILLAR PROTEINS AND THE EFFECT ON PROTEIN GELATION

J.C. Ramirez-Suarez and Y.L. Xiong
J. Food Sci. *67* (8): 2885. 2002.

Transglutaminase (TGase)-catalyzed interactions of whey (WPI)/myofibrillar (MPI) protein isolates were investigated under 5 conditions: (1) ionic strengths; (2) calcium/ethylenediaminetetra-acetic acid (EDTA); (3) enzyme:substrate ratio; (4) WPI:MPI ratio; and (5) preheating of WPI (80°C). TGase treatments of MPI in distilled water converted myosin heavy chain and actin into lower-molecular-weight polypeptides. The reaction, accelerated by the presence of WPI but diminished by NaCl, was completely reversed upon extended incubation. There was no visible WPI/MPI cross-linking; and the enzyme:substrate or WPI:MPI ratio, preheating, calcium, and EDTA did not influence the enzyme reaction. TGase treatment did not alter the melting pattern of WPI/MPI mixtures, but markedly enhanced their thermal gelling ability.

XVI 43-02 FOOD PROTEIN FUNCTIONALITY IN A LIQUID SYSTEM: A COMPARISON OF DEAMIDATED WHEAT PROTEIN WITH DAIRY AND SOY PROTEINS

M.F. Webb, H.A. Naeem, and K. A. Schmidt
J. Food Sci. *67* (8): 2896. 2002.

Solubility, surface properties, overrun, foam stability, apparent viscosity, and emulsification properties were evaluated for 3% protein dispersions of deamidated wheat pro-

tein (DWP), sodium caseinate (SC), soy protein isolate (SPI), and whey protein isolate (WPI). DWP dispersion had the highest apparent viscosity, 25% higher emulsion activity index (EAI), and 82% higher emulsion stability index (ESI) when compared to SPI dispersions. Dispersions of DWP had similar foaming properties and surface properties when compared to SC, but had 50% higher EAI and 1000% greater ESI when compared to the 2 dairy proteins. The utilization of DWP could be expanded into liquid food systems currently using dairy proteins.

XVI 44-02 PRODUCTION OF AN EXOPOLYSACCHARIDE-CONTAINING WHEY PROTEIN CONCENTRATE BY FERMENTATION OF WHEY

E.P. Briczinski and R.F. Roberts
J. Dairy Sci. 85 (12): 3189. 2002.

Using whey as a fermentation medium presents the opportunity to create value-added products. Conditions were developed to partially hydrolyze whey proteins and then ferment partially hydrolyzed whey with *Lactobacillus delbrueckii* ssp. *bulgaricus* RR (RR; an EPS-producing bacterium). In preliminary experiments, pasteurized Cheddar cheese whey was treated with Flavourzyme to partially hydrolyze the protein (2 to 13% hydrolyzed). Fermentation (2L, 38°C, pH 5.0) with RR resulted in EPS levels ranging from 95 to 110 mg of EPS per liter of hydrolyzed whey. There were no significant differences in the amount of EPS produced during fermentations of whey hydrolyzed to varying degrees. Since a high level of hydrolysis was not necessary for increased EPS production, a low level of hydrolysis (2 to 4%) was selected for future work. In scale up experiments, whey was separated and pasteurized, then treated with Flavourzyme to hydrolyze 2 to 4% of the protein. Following protease inactivation, 60 L of partially hydrolyzed whey was fermented at 38°C and pH 5.0. After fermentation, the broth was pasteurized, and bacterial cells were removed using a continuous centrifuge. The whey was then ultrafiltered and diafiltered to remove lactose and salts, freeze-dried, and milled to a powder. Unfermented hydrolyzed and unhydrolyzed whey controls were processed in the same manner. The EPS-WPC ingredients contained approximately 72% protein and 6% EPS, but they exhibited low protein solubility (65%, pH 7.0; 58%, pH 3.0).

XVI 45-02 EFFECT OF PASTEURIZATION ON SURVIVAL OF MYCOBACTERIUM PARATUBERCULOSIS IN MILK

A. Gao, L. Mutharia, S. Chen, K. Rahn and J. Odumeru
J. Dairy Sci. 85 (12): 3198. 2002.

Mycobacterium paratuberculosis (Mptb) is the causative agent of Johne's disease of ruminant animals including cattle, goats, and sheep. A total of 18, including 7 regular batch and 11 high temperature short time (HTST) pasteurization experiments, were conducted in this study. Raw milk or ultra-high temperature pasteurized milk samples were spiked at levels of 10^3 , 10^5 , and 10^7 cfu of Mptb/ml. *Escherichia coli* and *Mycobacterium bovis* BCG strains at 10^7 cfu/ml were used as controls. Pasteurization experiments were conducted using time and temperature standards which were 63°C for 30

min, and HTST method: 72°C for 15 s. The death curve of this organism was assessed at 63°C. No survivors were detected after 15 min. Each spiked sample was cultured in Middlebrook 7H9 culture broth and Middlebrook 7H11 agar slants. Samples selected from 15 experiments were also subjected to BACTEC culture procedure. Survival of Mptb was confirmed by IS900-based PCR of colonies recovered on slants. No survivors were detected from any of the slants or broths corresponding to the 7 regular batch pasteurization trials. Mptb survivors were detected in 2 of the 11 HTST experiments. One was by both slant and broth culture of the sample spiked to 10^7 cfu/ml of Mptb, while the other was detected by BACTEC for the sample spiked to 10^5 cfu/ml. These results indicate that Mptb may survive HTST pasteurization when present at $\approx 10^5$ cfu/ml in milk. A total of 710 retail milk samples were tested for the presence of Mptb. Fifteen % of these samples (n = 110) were positive. However, no survivors were isolated from the broth and agar cultures of 44 PCR positive and 200 PCR negative retail milk samples. The lack of recovery of live Mptb from the retail milk samples tested may be due to either the absence of live Mptb in the retail milk samples tested or the presence of low number of viable Mptb which were undetected by the culture method used in this study.

XVI 46-02 MAGNETIZED CARBONYL IRON AND INSOLUBLE ZIRCONIUM HYDROXIDE MIXTURE FACILITATES BACTERIAL CONCENTRATION AND SEPARATION FROM NONFAT DRY MILK

M. A. Cullison and L.A. Jaykus

J. Food Protection 65 (11): 1806. 2002.

A mixture of magnetized carbonyl iron and insoluble zirconium hydroxide was investigated for its ability to concentrate various foodborne pathogens from 25-ml samples of reconstituted nonfat dry milk. Each sample was artificially contaminated with 10^3 to 10^6 CFU/25ml of representative foodborne pathogens (*Salmonella enterica* serovar Enteritidis, *Listeria monocytogenes*, and *Bacillus cereus* spores) and processed for bacterial concentration. Bacterial recoveries, as evaluated on the basis of loss to discarded supernatants, exceeded 75% for all organisms at all inoculum levels and were usually >90%. Additional experiments confirmed that the magnetized carbonyl iron-insoluble zirconium hydroxide mixture was relatively nontoxic to both *Salmonella* Enteritidis and *L. monocytogenes*. Overall, the entire concentration scheme resulted in a 25-fold reduction in sample volume with the recovery of viable bacterial cells. This novel compound shows promise for facilitating inexpensive, rapid, and effective bacterial concentration in food systems.

XVI 47-02 DETERMINATION OF VEGETAL PROTEINS IN MILK POWDER BY SODIUM DODECYL SULFATE-CAPILLARY GEL ELECTROPHORESIS: INTERLABORATORY STUDY

M. A. Manso, T. M. Cattaneo, S. Barzaghi, C. Olieman, and R. López-Fandiño

J. AOAC Int'l. 85 (5): 1090. 2002.

An interlaboratory study, with the participation of 8 laboratories, was conducted to evalu-

ate a sodium dodecyl sulfate–capillary gel electrophoresis method for determination of adulteration of dry milk with soy and pea proteins. Calibration standards and adulterated nonfat dry milks (0–5%, w/w, soy and pea proteins in total protein) were produced. Vegetal proteins were determined after removal of milk proteins by pretreatment of the samples with tetraborate–EDTA buffer, pH 8.3. Repeatability standard deviations ranged from 9 to 15% and reproducibility standard deviations ranged from 25 to 30% in the samples containing 5% vegetal protein in total protein.

XVI 48-02 DETERMINATION OF VEGETAL PROTEINS IN MILK POWDER BY ENZYME-LINKED IMMUNOSORBENT ASSAY: INTERLABORATORY STUDY

L. Sanchez, M. D. Perez, P. Puyol, M. Calvo, and G. Brett
J. AOAC Int'l. 85 (6): 1390. 2002.

Eight laboratories participated in a collaborative study to evaluate an enzyme-linked immunosorbent assay (ELISA) to determine soy, pea, and wheat proteins in pasteurized or ultra-high temperature (UHT) dry milks. Collaborators received calibration standards composed of dry milk containing 0-8 % (w/w) vegetal protein in total protein and blind test samples containing approximately 1, 2, and 5% (w/w) vegetal protein. An indirect competitive ELISA was performed. Test samples and calibrants were extracted with phosphate-buffered saline, pH 7.4, containing 0.05% Tween and assayed with the ELISA kits. The degree of adulteration was affected by the type of heat treatment applied to the samples. The estimated percentage of vegetal protein addition was close to the theoretical value for pasteurized samples but much lower for UHT samples. For pasteurized samples, intralaboratory relative standard deviations ranged from 5 to 22% and interlaboratory relative standard deviations ranged from 14 to 34%.

XVI 49-02 KEEPING YOUR SIFTER IN TOP SHAPE

R.D. Ricklefs
Powder and Bulk Engineering 16 (12): 40. 2002.

Because a sifter rotates, vibrates, gyrates, or reciprocates at high speed, it's subject to high levels of mechanical stress. In this article, find out how to keep your sifter in top shape by regularly inspecting and servicing it.

XVI 50-02 THIRTEEN THINGS TO CONSIDER WHEN CHOOSING A BULK BAG UNLOADER

E. Heller
Powder and Bulk Engineering 16 (12): 59. 2002.

If you'll be receiving materials in bulk bags, you'll need to invest in an appropriate bulk bag unloader to handle them safely, efficiently, and cleanly. This article outlines 13 things you need to consider before selecting a bulk bag unloader for your plant.

NEW AND REVISED 3-A STANDARDS

3-A Sanitary Standards for Stainless Steel Automotive Transportation Tanks for Bulk Delivery and Farm Pick-Up Service, Number 05-15. Effective November 24, 2002.

3-A Sanitary Standards for Formers, Fillers, and Sealers of Containers for Fluid Milk and Fluid Milk Products, Number 17-10. Effective November 24, 2002.

3-A Sanitary Standards for Centrifugal Separators and Clarifiers, Number 21-00. Effective November 24, 2002.

3-A Sanitary Standards for Equipment for Packaging Viscous Products, Number 23-04. Effective November 24, 2002.

3-A Sanitary Standards for Non-Coil Type Batch Processors, Number 25-03. Effective November 24, 2002.

3-A Sanitary Standards for Equipment for Packaging Dry Milk and Dry Milk Products, Number 27-05. Effective November 24, 2002.