

Dairy Dispatch – Winter 2001

California Dairy Industry Sets National Precedent

The first wave of dairies to gain "best practices in environmental protection" status were awarded certificates during a December 5 ceremony held at the state Capitol. Ten California dairies had completed all phases of the California Dairy Quality Assurance (CDQA) Environmental Stewardship program. Those include: Charles Ahlem Ranch in Turlock; Alderson Dairy in Gerber; Bancrest Dairy Inc. in Ferndale; Bartelink Dairy in Escalon; Bucher Dairy in Healdsburg; Flamingo Dairy in Corona; Walter Stornetta Ranch in Point Arena; Gary Bordessa Dairy in Valley Ford; Sietse Tollenaar Dairy in Wheatland; and Double Diamond Dairy and Ranch in El Nido.

"This is a proud moment for the California dairy industry," said Chuck Ahlem, Hilmar dairyman and chairman of the CDQA program. "This voluntary program has provided us with the opportunity to bring our care for the environment to a higher level. With it, consumers can feel confident that we are continuing our goal to produce wholesome and nutritious dairy products in concert with a healthy environment." Ahlem noted that the program assists dairy farmers in making meaningful decisions about dairy management and interpreting the complex rules and regulations that govern their operations.

Alexis Strauss, director of the U.S. Environmental Protection Agency's water division in San Francisco, said the program's success to certify dairy producers is an unprecedented accomplishment for the nation's dairy industry.

"These dairies are investing time and effort to show that environmental stewardship and dairy production can indeed go hand in hand," Strauss said. "California's environment will continue to benefit as we get more and more dairies to complete this compliance program."

Concerns expressed by consumers regarding the environmental cost associated with buying dairy products, as well as the frustration expressed by producers who had become increasingly baffled by the regulatory maze under which they were forced to operate, resulted in a first-of-its-kind voluntary program to help California's dairies comply with environmental regulations. A major goal of the program is to elevate public perception of the dairy industry as a good environmental steward. Formed in 1997, the program includes three components: Environmental Stewardship, Food Safety, and Animal Health and Welfare.

The CDQA Environmental Stewardship Program has provided voluntary training to about 1,400 dairy farmers and their employees. Certified dairies attend six hours of UC Cooperative Extension courses that cover water regulations, facility evaluation, manure management and storm water pollution prevention plans. Each dairy producer evaluates their specific farm conditions and prepares an environmental stewardship farm management plan tailored to their facility. Following completion of the short-course series and farm management plan, dairies must then pass a rigorous on-farm evaluation by the California Department of Food and Agriculture (CDFA) to become certified.

The CDQA program began its initial evaluations late last summer. Following the non-regulatory evaluations by CDFA, these dairies voluntarily agreed to have follow-up inspections performed by the Regional Water Quality Board staff. Currently, on-farm evaluations are being funded by a substantial grant from the U.S. EPA that will cover certification of up to 1,000 dairy facilities.

The CDQA is supported by dairy industry leadership, including the Alliance of Western Milk Producers, California Farm Bureau Federation, California Manufacturing Milk Advisory Board, California Milk Advisory Board, Milk Producers Council, and Western United Dairymen. Government agencies and academic organizations partnering with the environmental certification program include the California Department of Food and Agriculture, the California Environmental Protection Agency, the State Water Resources Control Board, the California Resources Agency, the Department of Fish and Game, Region 9 of the U.S. Environmental Protection Agency, University of California, Davis, and the U.S. Department of Agriculture Animal Plant Health Inspection Service, Natural Resources Conservation Service and Farm Services Agency.

For more information on the CDQA program, visit www.cdqa.org, or contact Michael Payne at (530) 752-7507, or mapayne@envtox.ucdavis.edu.

Food Science Researchers Conduct Consumer Trials

Edible shellac: Scholars investigate alternatives to using biological exudate from insects in chocolate

By Courtney Hendricks

Some UC Davis students who participated in consumer tests at the Memorial Union recently are concerned they may have eaten chocolate-covered beetles, according to Soo-Yeun Lee, a graduate student in the UC Davis Department of Food Science and Technology.

Lee is investigating the use of alternative films and coatings as a way to enhance the quality and safety of foods. She, alongside UC Davis professor John Krochta, is researching the benefits of using whey coating-instead of the common shellac-on food products.

The taste tests on campus were an important phase in the investigation, in which Lee and Kirsten Danganan, another graduate student in food science, tested the consumer reaction to these two types of coatings on chocolate-covered almonds.

Edible shellac, also known as confectioner's glaze, is currently used as a glazing agent in food products such as jelly beans and chocolate candies and even on some fruits and nuts to provide a glossy appearance and moisture protection.

According to Krochta, one of the problems with shellac is that it is imported from China, Thailand and other Asian countries, which can be quite expensive.

"The shellac is an exudate of an insect, which means literally that the insect leaves its exudate on the branches of trees and then people come and scrape it off," Krochta said. "It then goes through a purification process, but edible shellac is the same shellac used to coat floors."

Lee said that the coating has other disadvantages. "Because (shellac) is an alcohol-based coating agent, it can give off flavors in the case that alcohol is absorbed into the chocolate or it can produce volatile organic compounds which are harmful to the environment," Lee said. "It may also cause an explosion during the process, so it has to be monitored carefully."

Dangaran said there is also the danger of workers inhaling damaging vapors because shellac is submerged in ethanol alcohol. In order to prevent any accidents, special precautions have to be taken in chocolate-producing plants, which increases the cost of shellac even more.

Whey protein, on the other hand, is a by-product of the cheese-manufacturing process. Krochta said that cheese manufacturers used to view whey as a low-value material, and in many cases it was fed to animals.

He described the current project as a "win-win situation" in which food producers, the dairy industry and consumers alike would benefit from using whey protein as an edible-coating agent. Krochta explained that whey is similar to that of shellac from an instrumental point of view, but that "the true test is always with the consumers." UC Davis participants rated taste, texture and appearance of the chocolate-covered almonds. However, they were not given any actual guidelines on what to consider in evaluating the products.

After comparing the whey-coated and shellac-coated chocolates, participants were asked if their intent to purchase the candy would be affected had they been informed about the role of beetles in the chocolate's production process. Some students responded that they would never eat chocolate again, although Lee said she questioned the likelihood of such vows.

"Our hypothesis was that the whey protein-coated chocolates will not differ in the consumer acceptance when compared to the shellac-coated chocolates," Lee said. "We have not finished our data analysis, so we can not conclude anything yet. However, our preliminary analysis of the results indicate that consumers actually favored some of the whey protein-coated chocolate over the shellac-coated ones." Lee noted that this study is the first of many that will follow in this area of optimizing whey protein-coating formulas for the chocolate glaze.

This article first appeared in the California Aggie newspaper on Dec. 7, 2000.

Our Greatest Opportunity and Our Greatest Threat Lie Within

By Joseph O'Donnell

In past columns I have raised the notion that the single purpose of milk is to nourish mammals. It is a message I have often repeated, and it also is the mantra of prominent University of California scientist Dr. Bruce German. German presented this concept at the meeting of the International Food Technologists (IFT) in June.

German's discussion of the topic was spellbinding. The ability to understand the full potential of milk in delivering health benefits has never been greater than today, and still there is much activity in this area of research as we learn more and more. We can draw on strong research in genomics, but also on the metabolic results of genetic expression. Everything we learn is just one more exposé on how milk nourishes our bodies and maintains good health. It is important to understand that milk prevents disease. It is not a medicine designed to cure disease. Milk and dairy products help consumers to keep their health.

In fact, milk has no other purpose; no other food was designed to do what milk does. Every component of milk exists to support that mission of health. Although milk is unilateral in purpose, it does not function unilaterally.

Dr. Maret Traber from Oregon State University eloquently made this point at the same meeting of IFT. Milk enhances the absorption of nutrients that are primarily sourced from other foods. Vitamin E content of milk is very modest while the vitamin E content of many plant oils, especially some nuts, is relatively high. However, the vitamin E in those oils is poorly absorbed unless milk is present in a meal as well. Plants don't produce vitamin E so that people stay healthy-they make it to protect themselves from oxidation. Milk is the key to putting many nutrients to better use.

We also know that milk supports the growth of probiotic cultures. Over time scientists have learned the secrets of the relationship between these cultures, dairy products and health. More recently, research has been able to focus on specific health benefits and to begin to understand the mechanisms and the means to exploit this natural relationship. Again at the IFT meeting, Dr. Todd Klaenhammer, North Carolina State University, thoroughly addressed the various facets whereby lactic cultures do or can play important roles in promoting good health for consumers.

From the perspective of a physiologist, our gastrointestinal tract most closely resembles our skin-both separate our bodies from another world. And what a world exists in our intestines! It's a war down there with every bacterium fighting for existence. Our intestines need to house bacteria that will aid digestion, enhance intestinal cell function and resist pathogens. Once again, milk delivers as a carrier of these cultures and as a supplier of a good environment for them to prosper.

Our greatest advantage as an industry is just knowing the capabilities of milk and marketing them to the hilt. There is no other food that has the advantages of milk-no other food with the mission of health. Soy protein wasn't designed to reduce blood cholesterol as is implied in the health claim. Any effect soy has on blood chemistry is accidental, not purposeful. Meanwhile, milk has all the advantages expected in a biomaterial specifically designed to nourish.

All of this said, it's clear that neither soy nor any other food is our greatest threat. Instead, it is only we, the dairy industry, that can bring us down. How could that happen? Examples abound-what brought down some ice cream brands? What laid certain hamburger companies low? What hammered certain juice companies? The list is endless. Consumers will not eat food that they think is the least bit suspect. Food is in great abundance in this country. If one item gains a reputation-deserved or not-that it isn't safe, then woe to you. The food marketplace does not tolerate breaks in food safety, especially in foods that are fed to the "family." There are plenty of pathogens out there waiting for the opportunity. Pasteurization notwithstanding, there is no single hurdle to keep pathogens out. Implementation of many hurdles acting in concert will keep our food safe.

Furthermore, our greatest threat may not be the pathogens we know all too well. It may be the pathogens we are just beginning to know-especially those pathogens that might enter the food chain at the preharvest stage. Making products to compete with soybeans is easy-we already have an inherently superior product. But the threats we face within our own walls require much more focus and coordination to overcome.

Scary? I hope so. Exciting? I hope so. This is a great industry. By focusing on the opportunities we will expand our markets. By focusing on the threats, we also enable the expansion of our markets. We in the industry not only have opportunities but an obligation to deliver this unmatched wholesomeness to consumers around the world.

Joseph O'Donnell is executive director for the California Dairy Research Foundation. This article first appeared in the June 23, 2000, edition of Cheese Market News.

New dairy projects in fluid milk and cheese launched at UC Davis

Investigators at UC Davis have begun work on two new dairy projects in January supported by the California Dairy Research Foundation. Brief descriptions of these projects follow:

Pulsed Ultraviolet Light Inactivation of Johne's Disease and E. coli 0157: H7 in Fluid Milk
Principal Investigator: Manuel Lagunas-Solar, research chemist at Crocker Nuclear Laboratory

In this project investigators will study, evaluate and develop an application of pulsed ultraviolet light (PUV) technologies to the non-thermal disinfection of fluid milk to inactivate *Mycobacterium avian* (subspecies *paratuberculosis*-Johne's Disease in cattle) and *E. coli* 0157:H7. The main objectives for this project are to establish an efficient process capable of complementing pasteurization without compromising sensory, nutritional and market attributes of fluid milk. Investigators will use industry standards in assessing milk quality attributes, and the project will address expressed public health concerns regarding fluid milk, as well as provide the baseline for a potential alternative disinfection technique at the farm level.

This work is intended as a proof-of-principle or feasibility phase at the end of which the baseline information obtained will be sufficient to make an informed decision toward prototyping for commercial use of pulsed UV technology, to define a strategy for regulatory approval, and to determine financial viability.

PUV processing affects a broad range of microbes and thus the PUV process is capable of inactivating other microorganisms as well-including other pathogens, simultaneously and within the same energy ranges. Therefore, as a non-thermal treatment, PUV is thought to provide an additional or a complementary non-thermal (cold) pasteurization effect.

The University of California has patented the basic methodology for PUV process, and applications have been submitted for new, related patents.

Shear Viscosity of Process Cheese at Temperatures above the Melting Temperature
Principal Investigators: Kathryn McCarthy, associate professor, and Michael McCarthy, professor, in the Department of Food Science and Technology
Process cheese is produced by blending several different varieties of natural cheese and other ingredients (e.g., water, emulsifying salts, color and condiments) to give the desired flavor and color. These ingredients are comminuted and mixed together by stirring and heating. The purpose is to produce a smooth homogeneous product that can be kept at room temperature without oil separation. The advantages of process cheese over natural cheese include its versatility in use (e.g., cooking, dips, sauces) and that the manufacturing process allows the economic use of cheese not suitable for consumption as natural cheese.

This two-year project addresses the characterization of the rheological properties of process cheese when it is in fluid form. When the mix is heated to 80-90°C, the flow behavior, or rheological properties, play an important role in the mixing and/or extrusion processes. In addition, as cheese is increasingly used as an ingredient in prepared foods, the meltability and flow characteristics during heating and serving are best optimized to meet the needs of preparation and serving.

Profs. Kathryn and Michael McCarthy, researchers at the University of California, Davis, have successfully collaborated on research projects that utilize magnetic resonance imaging (MRI) as an experimental technique to evaluate flow behavior and phase distribution. In this work, the collaborative effort focuses on using magnetic resonance imaging techniques to study viscometric flow of process cheese in pipes. The objective is to develop improved rheological methods that can distinguish between process cheeses of different composition and liquid/solid fat ratios. These methods will be used to enhance and augment current practices in plant and quality assurance applications.

Names in the News

Phillip S. Tong, professor, Dairy Products Technology Center at Cal Poly, San Luis Obispo, gave two invited presentations at the 1st National Conference on Fresh Milk Technologies, Nanjing Agricultural University, Nanjing, China, in October. The presentations were titled "High Pressure Filtration Technology for Milk Processing," and "Trends in the United States Dairy Industry." Approximately 200 attendees from throughout China attended the five-day conference, which was co-organized by Nanjing Agricultural University and the Dairy Association of Jiangsu Province. During his eight-day trip to China, Tong visited dairy companies in Suzhou, Shanghai and Xuzhou to advise them on approaches to improve their dairy processing technology. This was his third trip to China in the last 12 months. With the pending accession of China into the World Trade Organization, China and the United States will expand business in many areas including dairy.

Tong has written chapters for two books to be published early this year. His chapter on recombined milk appears in the *Encyclopedia of Dairy Sciences*, Academic Press, and his chapter on butter and anhydrous milkfat appears in *Fats in Food Technology*, Sheffield Academic Press, to be published on Feb. 21.

Christine Bruhn, consumer food marketing specialist in the UC Davis Department of Food Science and Technology, was recently elected a Fellow of the Institute of Food Science and Technology, United Kingdom. The senior grade of IFST membership requires 10 or more years of appropriate experience plus evidence of having made a substantial contribution to food science and technology or having reached a position of seniority and authority in the profession. Christine Bruhn was invited to address the Institute of Food Science and Technology, United Kingdom, on biotechnology in the late 1990s and presented a keynote lecture at the British Crop Protection Council in 1999. Her Fellow recognition is based on her work to better understand consumer attitudes and perceptions and to her leadership in communicating food safety and quality issues to the public.