CALIFORNIA
# Dairy Dispatch

RESEARCH, EDUCATION AND SERVICE TO SUPPORT THE DAIRY INDUSTRY VOL. 16, NO. 1 • SUMMER 2006

## California dairy industry earns kudos from water regulators

*By Michael Payne, D.V.M., Ph.D., and Deanne Meyer, Ph.D.*

In August of last year, dairy producers in California's Central Valley received certified letters from the Regional Water Quality Control Board requesting a Report of Waste Discharge (ROWD) and a fee from each dairy with an October 17 deadline. It left many producers confused and concerned. What was a ROWD, and why was there a fee?

The answers to these questions go back to 2003—the year the U.S. Environmental Protection Agency (EPA) published its rule changes requiring states to regulate Confined Animal Feeding Operations (CAFOs). California then delegated CAFO permitting to its nine regional boards. The Central Valley Regional Water Quality Control Board (RB-5) is the largest of the state's regional water boards and covers most dairies stretching from the Oregon border to the Tehachapi Mountains.

To those following water regulation, it didn't come as a complete surprise. The state's conditional waiver (under which most dairies had

*(see* **CDQAP** *on page 2)*

## Butter research focuses on maximizing quality

Butter is often stored refrigerated or frozen for extended periods of time because supply and demand fluctuates. Manufacturers must know when flavor and texture begin to deteriorate in order to deliver the high-quality product consumers expect.

Researchers at North Carolina State University (NCSU) recently examined the impact of refrigerated or frozen storage on butter flavor and texture during a two-year study supported by the industry and the California Dairy Research Foundation.

MaryAnne Drake and her colleagues at NCSU obtained fresh butter on two occasions from two facilities. They placed the butter into both frozen and refrigerated storage to determine oxidative stability index (OSI), peroxide value (PV), free fatty acid value (FFA), fatty acid profile, and

*(see* **Butter** *on page 7)*

## INSIDE

## CDQAP *from page 1*

operated) expired in 2002. The regional boards understandably saw this as an opportunity to coordinate state and federal permitting of dairies.

Why a "Report Of Waste Discharge"? The primary objective of the ROWD was to identify existing dairies. This gives the agency a "big picture" upon which they can base further requirements. It answers questions such as how many dairies are operating, how big they are, where they are located and how to contact them. This information is the necessary first step in implementing a comprehensive permitting program.

What about the fee? In spring of 2003, when California was facing billions of dollars in budget deficit, the state Legislature passed a bill that required the cost of permit programs to be paid by the permittee. Simply stated, dairies are now required to pay an annual fee to help pay for the CAFO regulatory program. The fee is based on the number of cows in the herd with average-sized dairies (between 700 and 1,499 cows) paying an annual fee of more than $1,300.

So how did the dairy industry do? According to Water Board records, 98 percent of the region's dairies submitted their paperwork by the October deadline—a rate practically unheard of, even for a mandatory reporting program. To put it into context, this response can be compared to a different state agriculture reporting program rolled out last year that required a form (but no fee), and generated only a 41 percent response rate. In short, the dairy industry rose to the occasion and did an outstanding job.

Cooperation and communication between the regulators and the regulated made the difference between the dairy ROWD and some others. In addition to regular communications through dairy organizations, trade associations and publications, the Region 5 staff also tapped the resources of the California Dairy Quality Assurance Program (CDQAP) to help educate producers.

CDQAP partners worked diligently with RB-5 staff to discuss requirements and develop curriculum. In short order and with assistance from a number of industry partners, a comprehensive schedule of free workshops was established from Glenn to Kern Counties—24 in total. These hands-on sessions walked more than 500 producers through the ROWD process, provided a roadmap for the rest of the regulatory process and also allowed for direct questions to Water Board staff.

"Early on we realized that, in order to get the word out, we needed assistance. The CDQAP stepped in with a very tight time frame to pull industry education sessions together," said John Menke, an environmental scientist with the state Water Resources Control Board. "I would attribute the high (dairy operator) response rate to their cooperative efforts."

For area dairy producers, the workshops provided not only background and education on submitting the ROWD, but also helped identify areas for ongoing monitoring in preparation for the permit process. Beyond on-site assistance, however, the workshops gave producers a much-needed platform to demonstrate their interest in water quality protection and interact directly with water board staff.

"The workshops were very helpful and well organized. Having Water Board representatives on hand provided an open dialogue and really fostered a sense of cooperation," said Justin Gioletti at Gioletti & Sons Dairy in Turlock. "I applaud the Water Board's efforts at working with groups like the CDQAP—it made the process much smoother."

"Western United field staff and the CDQAP did a good job of coordinating and putting together a well-organized presentation on an issue that needs to be addressed," said Rodney Kamper of Mt. Whitney Dairy in Riverdale. "I'm pleased as a producer that others in the industry took the issue seriously and did what was necessary to move forward."

In addition to demonstrating the ability for industry and regulators to work together in a productive way, this was a true test of the effectiveness of the CDQAP. Since its inception in 1997, one of the primary goals of the program has been to act as a liaison between producers, academics and regulatory agencies so dairy producers and processors could better understand and address regulatory



California Dairy Dispatch is a quarterly publication of the California Dairy Research Foundation.


For more information,contact:
**Joseph O'Donnell, Executive Director**
California Dairy Research Foundation
502 Mace Blvd., Suite 12
Davis, CA 95616
Phone (530) 753-0681
Fax (530) 753-1453
E-mail: odonnell@cdrf.org

Editor: **Corinne Esser,** CDRF, (530) 753-0681
Contributing Writer: **Jennifer Giambroni**
Produced by **EditPros,** Davis, CA (530) 759-2000

requests and potential consumer confidence issues.

"For an area with upwards of 1,600 dairies, this response was outstanding and far exceeded our expectations. We recognize all of the work the CDQAP put into setting up meetings in multiple locations, the presentations covered the ROWD response and beyond, and really helped producers prepare. We also appreciated the open exchange of information—being able to collaborate on curriculum and materials development," said Rudy Schnagl, chief of the Agricultural Regulatory and Planning Unit at the Central Valley Regional Water Quality Control Board. "Like everything the dairy industry is changing, by working together we can make it easier for everyone."

Jovita Pajarillo, associate director of the US EPA's Region 9 Water Division, echoed the sentiment. "We were expecting industry support, however, we were very enthused over the large turnout and participation. The CDQAP workshops promoted a sound understanding of what regulators expect. To see the numbers of producers in attendance sent a very strong and positive message from the industry to the regulators, that they are engaged," she said. "The CDQAP is very effective in providing compliance assistance through education. Their work has resulted in a change in attitudes and behavior on both sides. Having been a partner of the program since 1999, we have no doubt that it is a model of innovation and a successful and real example of how collaboration can work to the benefit of both in striving together to protect the environment."

***The key to the success of CDQAP's outreach was the ability to leverage efforts from the program's many partners.***

The key to the success of CDQAP's outreach was the ability to leverage efforts from the program's many partners. These partners include trade associations, dairy cooperatives, consultants, University of California Cooperative Extension specialists and advisors. It also includes Dairy CARES (Community Alliance for Responsible Environmental Stewardship), which helped coordinate, staff and implement workshops.

By working with both industry and regulatory agencies, the CDQAP is able to offer another positive collaboration in the form of annual fee reductions. Recognizing that dairies that have gone through the CDQAP third-party evaluation are at a much lower environmental risk, the state allows for a 50 percent annual fee reduction for CDQAP-certified dairies. It's a win-win situation. Producers get a fee break for doing the extra work to prove they are in compliance with environmental regulations and the water boards can conserve regulatory resources for higher risk operations.

Protection of the state's water resources is something everyone wants and the dairy industry can be proud of this initial effort. It is only the first step, however ,of what will be a multi-year implementation of a formal permit. With input from a variety of industry and environmental stakeholders, regional water boards are now crafting a "Waste Discharge Requirements" or WDR for dairies. Producers can expect in the near future additional requests for information. Ultimately all producers in the state will be required to provide documentation that manure application on their farms is not adversely affecting surface or ground water quality. The CDQAP is committed to work with producers and regulators as we move forward in this process. If the response to this ROWD is any indication, we are looking good for the future.

As Paul Martin, director of environmental services for Western United Dairymen, a CDQAP partner, stated, "We are proud of producers for stepping up to the plate and being proactive in meeting regulatory requirements."

*Michael Payne, and Deanne Meyer are partners in the California Dairy Quality Assurance Program (CDQAP). Payne serves as director of the CDQAP and assistant director for the Western Region of the Food Animal Residue Avoidance Databank (FARAD) at UC Davis. Meyer is a livestock waste management specialist with the Department of Animal Science at UC Davis.*

## Cal Poly professor receives International Dairy Foods Research Award

Dairy Products Technology Center Director Phil Tong has received the International Dairy Foods Association Research Award for his work in the area of dairy foods processing. The award recognizes leading researchers in the field of applied dairy science. Tong received the award during the American Dairy Science Association's recent annual meeting in Minneapolis, Minn.

Tong is the 13th award recipient and the first recipient from the Western United States. He was recognized for his research in dairy ingredients processing, functionality and composition control. Working directly with the dairy and food industries, Tong and his Cal Poly research application team have helped processors use dairy ingredients in the development of new dairy-based beverages as well as bakery products and other foods.

*Phil Tong*

Tong received the award in specific recognition of his studies of dairy calcium, cream cheese and yogurt.

The Cal Poly professor's research on calcium fortification has demonstrated how milk calcium can be increased by using new membrane filter technology. He developed a process to produce lactose-reduced milk protein concentrates with higher calcium retention using ultra-filtration technology. The process manipulates the state of calcium in feed streams.

His work on cream cheese improved understanding of factors that influence graininess perception in the product, and how cream cheese textural quality can be better maintained.

In studies on yogurt, Tong's group has documented how variations in whey protein concentrate can influence yogurt texture and flow properties. The research project provided industry with a better understanding of how to determine the extent of whey protein denaturation in whey protein concentrates, and how this relates to the actual gel firmness and viscosity of yogurt.

Most recently, Tong spearheaded work on protein standardization using lactose and milk permeate. The research project has improved understanding of how traditional heat classification of milk powders and protein content variability are related to functional properties such as heat stability and viscosity. It has also documented the potential economic value of protein standardization criteria for milk powder producers.

The research work has been particularly relevant as the United States expands its export of dairy ingredients into international markets, where they are used for recombined milk applications such as sweetened condensed milks, evaporated milks, yogurt and dairy beverages.

## UC Davis vet named to USDA Advisory Committee on animal diseases

The U.S. Secretary of Agriculture has appointed veterinarian Dale A. Moore, associate professor at the University of California, Davis, School of Veterinary Medicine, to the USDA Advisory Committee on Foreign Animal and Poultry Diseases.

This group of farmers, scientists, trade associations, academics and others advise the Secretary of Agriculture on means to prevent, suppress, control, or eradicate an outbreak of foot-and-mouth disease or other destructive foreign animal or poultry diseases if they should enter the United States. The committee advises USDA officials on the practicality of proposed programs; provides experience and knowledge of the livestock and poultry industries; and evaluates disease control programs.

*Dale A. Moore*

A dairy veterinarian and epidemiologist with DVM, Master of Preventive Veterinary Medicine, and PhD degrees, Dr. Moore is based at the school's Veterinary Medicine Teaching & Research Center in Tulare, CA. She is a collaborator in the National Center for Foreign Animal and Zoonotic Disease Defense, which sponsors research related to homeland security.

Moore was nominated for the position by the American College of Veterinary Preventive Medicine and the American Association of Bovine Practitioners. Her term of service begins immediately and runs until April 2008.

## Dairy by-product offers natural preserving alternative to chlorine

Whey permeate, a by-product of cheese production, could be a food preserver, suggests new research, as the industry looks to alternatives to chlorine solutions for preserving fresh-cut vegetables.

Fresh-cut fruits and vegetables are a rapidly growing segment of the market, and chlorine solutions are widely used by the industry to sanitizes and prolong the shelf-life. But concerns about the potential formation of carcinogens from chlorine usage has prompted some to investigate alternative sources including essential oils and irradiation.

The new research, published in the journal *Innovative Food Science and Emerging Technologies* (Vol. 7, pp. 112-123), looks at the use of whey permeate (WP) solutions of varying concentrations on the markers of preservation, such as color and textural changes, microbiological concentrations and nutritional content (vitamin C and carotenoid).

Three concentrations of WP solutions were prepared: 0.5 per cent (pH 3.84), 1.5 per cent (pH 3.53), and 3 per cent (pH 3.45). The whey permeate was provided by Glanbia, Ireland. A chlorine solution (120 ppm, pH 8) was also prepared for comparison. Iceberg lettuce and carrots were used as test vegetables.

The microbial counts for 3 percent WP were similar or better than the chlorine solution, but the less concentrated WP solutions were found to result in higher microbial counts. However at the end of storage (10 days) the microbial counts for the 0.5 and 1.5 percent WP solutions was still lower than the recommended safety levels for fresh-cut vegetables (100m CFU per grams).

The sensory analysis showed that both the 3 percent WP and the chlorine solution produced less acceptable products due to slight blanching of the vegetables. The use of the higher concentration WP also reduced the vitamin C and carotenoid level more than the 0.5 and 1.5 percent WP washes.

"Whey permeate showed good antimicrobial activity when used as a wash treatment for sliced carrots and fresh-cut lettuce. The concentration of the WP was an important factor in the control of microbial growth," wrote lead author Anabelen Martin-Diana.

This anti-microbial activity is most likely due to the pH of the wash solutions, suggested the researchers, or perhaps due to the presence of bio-active peptides.

"These results suggest that three percent WP is a promising formula although further investigations are needed in order to optimize in terms of shelf-life, nutritional value, safety and quality," concluded the researchers.

*This article first appeared in the June 16, 2006, issue of FoodNavigator.com*

## Low-fat dairy may cut diabetes risk for women

Diets rich in low-fat dairy could cut the risk of type-2 diabetes for women by over 20 percent, says a new study from Harvard. Dairy food makers looking to drill further into the health benefits of their primary foodstuffs will welcome the new findings that appear to fit with previous research for men (May 2005, *Archives of Internal Medicine*).

"Although studies have indicated that increased dairy intake may reduce risk of overweight and insulin resistance syndrome, data directly relating dairy intake to type-2 diabetes remain sparse," explained lead author Simin Liu in the July issue of the journal *Diabetes Care* (Vol. 29, pp. 1579-1584).

To attempt to fill this void in data, the scientists from Brigham and Women's Hospital, the Massachusetts General Hospital, Harvard School of Public Health, Harvard Medical School, UCLA, and the Center for Disease Control and Prevention tracked 37,183 women for 10 years.

The prospective study found that the risk of developing type-2 diabetes was cut by 4 percent for each serving-per-day increase in dairy intake.

During the 10 years of follow-up, 1,603 women developed type-2 diabetes. After adjusting the data to account for BMI, smoking status, family history of diabetes, high cholesterol and other potential risk factors, the researchers found that women in the highest dairy intake group had a 21 percent lower risk of type-2 diabetes than the women in the lowest dairy intake group.

"A dietary pattern that incorporates higher low-fat dairy products may lower the risk of type-2 diabetes in middle-aged or older women," wrote the researchers.

**Diabetes** *continued from page 5*

The mechanism behind the effect is not clear, said the researchers, and further research was necessary to confirm the results and elucidate the active ingredients. However, when the researchers adjusted for vitamin D, calcium, magnesium, fat and fiber content of the dairy products, the association between dairy intake and diabetes risk was still present.

This suggests a potential role for other nutrients in the milk, possibly milk proteins. A report at the end of 2005 in the *American Journal of Clinical Nutrition* (vol 82, pp. 972-979) indicated that skimmed milk consumption could lower the risk of hypertension, and put the effects down to both caseins and whey proteins in the milk.

Liu and co-workers called for research to continue in this area before any public health measures concerning dairy consumption could be recommended.

*This article by Stephen Daniells appeared in the July 11, 2006, issue of Dairyreporter.com*

## Chinese dairies catch on to probiotic bacteria

Chinese dairies are jumping on the probiotics bandwagon, with a spate of new products containing the healthy bacteria being launched recently. All of the leading players have developed new probiotic products or extended their ranges since the beginning of June.

For example, Yili introduced a new 390g pack with free spoon for its Big Pieces Fruits Aloe and Kiwifruit Yogurt with LGG bacteria, licensed from Finland's Valio. It already offers LGG yoghurt in 125g, 200g, 500g and 950g packages as well as a drinking yoghurt in 200g daily-dose bottles. LGG probiotic bacteria can help with the growth of culture inside the body, improve the immune and digestive systems, help with diarrhea and reduce allergies, according to the company.

Mengniu, another of China's top three dairies, has introduced a strawberry flavored probiotic yoghurt to its range. It is claimed to have 200 million probiotic bacteria per 1,000 grams including *lactobacillus bulgaricus*, *streptococcus thermophilus*, *bifidobacterium* and *lactobacillus acidophilus* supplied by Chr Hansen.

Meanwhile Mengniu rival Shanghai-based Bright Dairy has launched Abioo Jianneng Yoghurt with grape flavor, said to contain 100 million probiotic bacteria per 1,000 grams including *lactobacillus bulgaricus* and *lactobacillus acidophilus*. This product is available in a bottle of 190g or as a drink in a 580g bottle.

French group Danone, one of the first to introduce probiotic yoghurts in China, is also keeping up with Chinese innovation, introducing a kiwi and cucumber yoghurt with BE80 bacteria, which is said to make the skin healthy and smooth, and to benefit overall health.

The trend for probiotics, which only started about two years ago in China, has caught on quickly among smaller producers too. These include Shenyang Dairy, which recently added new flavors to its Huishan Yunzhiwei Yogurt range, said to be rich in four lactobacillus bacteria. It claims the bacteria are good for maintaining health and are said to help improve the digestive system.

Probiotic culture suppliers Danisco and Chr. Hansen say that demand for probiotics is growing by up to 30 per cent each year, thanks to the rapid take-up of domestic heavyweights like Mengniu and Bright Dairy.

Danisco says demand for such products is driven by the rising consumption of dairy, particularly among more affluent consumers, as well as the growing awareness of preventive health.

Consumption of dairy products is still only at 0.3kg per capita each year compared with 9kg in Japan and even Thailand is higher at 3kg. But the sector, especially yoghurts, is growing rapidly. Yoghurt sales are rising by about 40 percent each year.

The invention of freeze-dried cultures some years ago allows culture suppliers to easily distribute the bacteria around vast countries like China, which do not yet have the sophisticated cool chains of Western markets.

Didier Carcano, vice president of innovation for the culture division of Danisco, has commissioned a global survey into consumer understanding of probiotics, which will be presented at the International Dairy Federation conference this October in Shanghai.

*This article by Dominique Patton was excerpted from the July 18, 2006, issue of DairyReporter.com*

# New California Dairy Research Foundation Nutrition & Health projects

The California Dairy Research Foundation's research portfolios—Nutrition and Health, Dairy Confidence, Manufacturing, and Education/Outreach—reflect a focus that can improve the dairy business environment for producers and can ultimately increase dairy products sales. According to the World Health Organization, "Nutrition is an input to and foundation for health and development. Better nutrition means stronger immune systems, less illness and better health. Healthy children learn better. Healthy people are stronger, are more productive and more able to create opportunities to gradually break the cycles of both poverty and hunger in a sustainable way. Better nutrition is a prime entry point to ending poverty and a milestone to achieving better quality of life." CDRF supports the position that the more we learn about the components in dairy products, the better we will be able to assist consumers in achieving better quality of life.

The following CDRF nutrition- and health-related projects are underway:

**Robert Rucker**—06 RUD-01 NH

*Nutritional Importance of Pyrroloquinoline Quinone (PQQ) to Fetal, Neonatal, and Probiotic Bacteria*. Project period: 11/15/05-11/14/06

PQQ, a growth factor found in milk, seems to play an important role in cell signaling and metabolism. This project objective is to assess the importance of milk as a source of PQQ and identify the mechanism of action for PQQ.

**Carlito Lebrilla**—06 LEC-01 NH

*The Glycoproteomics of Bovine and Human Milk.* Project period: 3/1/06-2/29/08

This project will analyze bovine and human milk samples using new technology to provide a detailed profile of the proteins found in milk including the specific patterns of sugar found on the protein surface. These protein-sugar structures, called glycoproteins are believed to contribute to the health benefits attributed to consuming milk. The structure-specific functional benefits of the unique glycosylation profiles in milk can then be assigned. The dairy industry can leverage these biological differences into value-added dairy ingredients targeted to different populations with particular health needs.

**Britt Burton-Freeman**—06 BUB-01 NH

*Characterization of Gastrointestinal and Adipose Tissue Peptide response to Dairy fat in low- and high-fat meals.* Project period: 5/15/06-5/14/07

This project will compare the consumption of dairy fat vs. non-dairy fats in a meal and determine their effects on the stimulation of gastrointestinal peptides involved in appetite and body weight regulation. This information will help researchers develop a dietary strategy to lower risk for body weight gain and disturbances in glucose and insulin metabolism leading to type 2 diabetes.

(**Butter** *from page 1)*

descriptive sensory analysis (texture, flavor, and color) throughout the storage period. Their results indicated that bulk butter might be stored refrigerated for up to nine months while stick butter storage should be limited to six months. However, they found that frozen butter may be stored for almost a year before evidence of deterioration is detected.

Industry support for research is key to creating new markets for butter. A better understanding of the key drivers of butter purchase will aid in identifying marketing strategies to increase consumption. Additional research conducted at NCSU examined consumer perception. A trained descriptive panel evaluated 26 commercial butters consisting of international, domestic, fresh, cultured, organic/pasture-fed, salted and unsalted, and aged butters. Four focus groups consisting of butter consumers were polled to gain a better understanding of butter usage and consumption habits. Researchers selected eight representative butters for acceptance testing by 165 consumers. Results indicated that three market segments of butter consumers had distinct butter preferences.

Researchers discovered that butter acceptability varies among consumers, and butters with specific sensory characteristics could be marketed to specific target market segments. This information will be important as butter manufacturers move forward with new product development to expand the category.

"Dr. Drake's research has been key to providing improved support to our butter customers through timely, relevant information. This type of research is important in helping to grow the butter category," said Ronald Thompson, VP of regulatory and quality assurance for California Dairies, Inc.

California Dairy Dispatch

California Dairy Research Foundation
502 Mace Blvd., Suite 12
Davis, California 95616

Non-Profit Org.
U.S. Postage
**PAID**
Permit #62
Davis, CA

**Address Service Requested**

# Calendar of EVENTS

**September 19–21**
**Third Annual International Milk Genomics Symposium**, Brussels, Belgium. Sponsored by CDRF and IDF, the symposium will discuss ongoing and future collaborative milk genomics research and provide database mining tools and highlights from International Milk Genomics Consortium participants. For more information, call Jennifer Giambroni at (415) 254-4549 or e-mail jgiambroni@sbcglobal.net

**September 26–29**
**8th Dairy Science and Technology Basics for the Farmstead/Artisan Cheesemaker.** Basics of quality cheese manufacture with emphasis on artisan/farmstead cheese manufacture. Location: Cal Poly Dairy Products Technology Center, San Luis Obispo, CA. For information, call Laurie Jacobson at (805) 756-6097, or visit www.calpoly.edu/~dptc.

**October 16–17**
**Developing Probiotics as Foods and Drugs—Scientific and Regulatory Challenges.** An overview of the historical and current human use of probiotics, as well as advances in clinical studies and potentially new probiotic applications. Location: Mariott Conference Center, University of Maryland College Park Campus, Adelphi, MD. For information, call Amanda Carmody at (215) 442-6176, or e-mail Amanda.Carmody@diahome.org. Visit www.diahome.org for a schedule of events.

## DPTC Symposium to be held Feb. 26-28 in San Francisco

The 9th Annual Cal Poly Symposium on Advances in Dairy Product Technology—Concentrated & Dried Dairy Ingredients will be held Feb. 26-28, 2007, at the Sir Francis Drake Hotel in San Francisco. The event, a joint presentation with Dairy Management Inc., will provide an update on the latest trends in the marketing, science, manufacturing technology and food applications of value-added dairy ingredients including whey-derived and milk-derived concentrates and powders. Experts will provide concise perspectives about key developments that can impact current and future decisions on marketing strategy, manufacturing technology, research and business development for producers and end-users of value-added dairy ingredients. This joint session also will incorporate the 3rd International Spray Dried Milk Conference and will feature additional presentations emphasizing spray dried milk science, technology and products presented by experts from around the world. Additional sponsors include the California Dairy Research Foundation (CDRF), US Dairy Export Council (USDEC), TEAGASC, Ireland, and Institut National de la Recherche Agronomique (INRA).

For more information, visit www.calpoly.edu/~dptc/symp07.html or contact Symposium Coordinator Laurie Jacobson at (805) 305-5056 or ljacobso@calpoly.edu.