

CALIFORNIA Dairy Dispatch

RESEARCH, EDUCATION AND SERVICE TO SUPPORT THE DAIRY INDUSTRY

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HAPPY BIRTHDAY, CDRF!

CDRF celebrates 15 years of investing in vital dairy research

While an anniversary is typically celebrated with a glass of bubbly, Joseph O'Donnell and his colleagues more appropriately lifted tall glasses of the white stuff to ring in 2003 and commemorate 15 years of service by the California Dairy Research Foundation (CDRF).

"This is why we're here," said O'Donnell, CDRF's executive director, admiring the glass of milk he held aloft. "For the past decade and a half our number one priority has been California milk and preserving and expanding its markets."

Founded in April 1988, CDRF is a not-for-profit foundation established to consolidate and focus the dairy research investments of California's dairy farmers, who had first begun collectively investing in dairy foods research in 1983. Five years later, producers and processors, who realized the importance of research recognized the need for creation of a coordinating organization. That determination resulted in creation of the California Dairy Research Foundation (CDRF).

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Executive Director Joseph O'Donnell joins Corinne Esser and Marion Vinck in a toast to 15 years of CDRF service.

International food labs offer innovative processing technologies

Dairy processors and producers seeking to refine existing products or to apply new technologies to improve production methods may benefit from research that is being conducted overseas. Researchers in Australia, Ireland, The Netherlands and France are working toward improvements in manufacturing, development and nutritional value of dairy products. CDRF has identified four research organizations with which U.S. producers may wish to establish relationships. This could be especially productive by working through one of the U.S. dairy foods

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CDRF's responsibilities include identifying and managing research projects that are demonstrably beneficial in marketing milk products. Driven by that objective, CDRF encourages development of new products and technologies, supports new understanding of the role of milk components in nutrition, sponsors research and instruction programs in environmentally and market-focused farming practices, and supports public education to reinforce consumer confidence in dairy products. The relative proportion of funding varies with market conditions.

The Foundation is the first and only regional, industry-operated organization managing dairy research

projects. It contracts with research facilities, including those at the University of California, Davis, and Cal Poly, San Luis Obispo, to conduct studies in nutrition and food processing relevant to the dairy industry.

This partitioning of university research and industry management has benefited both sides: the university gains an additional source of funding for research, while the dairy industry is given a conduit through which to articulate and specify the scope of research studies with value to the dairy industry and to consumers. CDRF has significantly invested in research programs, the results of which are readily available and applicable to commercial, educational and marketing sectors.

"California producers have benefited significantly from CDRF's management structure," said Stan Andre, chief executive officer of the California Milk Advisory Board. "The streamlined approach has allowed better focus of our investments and has attracted outside funding to augment research efforts."

The annual industry commitment to CDRF's research efforts has grown with funding increasing from \$800,000 in 1988 to \$2.5 million in 2003. O'Donnell, who has been with CDRF since 1990, is always looking for ways to increase the scope and potency of the Foundation's research investments through co-funding and partnerships. Last year through the University of California (UC) Discovery Grant program, he was able to secure a partnership with UC Davis researchers and a biotechnology firm to work on a dairy-based vaccine for the respiratory syncytial virus (RSV) in children. CDRF plans to submit additional grant proposals.

CDRF-funded research has resulted in development of edible films

used to protect foods and as carriers for bioactive ingredients; has contributed to increased dairy product safety through detection tests for listeria and salmonella in fluid milk; has helped increase understanding of the role all milk components play in supporting nutrition and health; has advanced the emerging field of *Probiotics*, which applies friendly bacteria associated with cultured dairy products in yielding health benefits to consumers; and has led to vaccines against coliform mastitis, salmonella and footwart pathogens for improved herd health and food safety.

Throughout the years, the Foundation's research investments have changed with the times. Along with promoting nutritional benefits, CDRF has helped dairy producers engage constructive on-farm (preharvest) practices resulting in improvements in food safety, animal welfare and environmental stewardship. The rise in new threats, including Johne's Disease, tuberculosis and BSE, demonstrates the need to remain vigilant in supporting research to develop aggressive treatments. CDRF places corresponding emphasis on producer education and training, including the California Dairy Quality Assurance Program (CDQAP).

"The environment for dairy products has changed significantly during the past 15 years," said O'Donnell. "Consumer attitudes toward environmental stewardship, animal health/food safety, and animal welfare issues are playing a key role in driving the market. By being responsive to consumer needs and quickly eradicating ill-informed doubts and fears, we will continue to build new markets while keeping dairy products wholesome and safe."

ODD



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Highlights of CDRF-supported research

Product Technology/Development

- Edible Films from Whey Protein Concentrates
- Milk Powder Applications Laboratory (Cal Poly-San Luis Obispo)
- Butter/Spreads Application Program (Cal Poly-San Luis Obispo)
- Increased Cottage Cheese Quality
- Controlled-Melt Cheese

Dairy Herd Health & Food Safety

- On-farm Break Through Management (BTM)
- J-5 Vaccine
- Salmonella Vaccine
- Neospora-induced Abortion Vaccine
- Footwart Virus Vaccine Research
- Detection Tests for Listeria and Salmonella in Fluid Milk
- Technology to Reduce Pathogen Contamination in Hispanic Cheese

Dairy Product Nutrition Research

- Milkfat
- Probiotics and Prebiotics
- Modification of Milk Composition

Dairy Quality Assurance

- California Dairy Quality Assurance Program (UC Davis)
- Dairy Food Safety Laboratory (UC Davis)

Education Resources

- Marschall Cheese Seminar
- Short Courses, Workshops
- www.cdqa.org
- www.dairyfoodsafety.com
- www.ediblefilms.org
- www.healthywhey.org
- www.usprobiotics.org

A nutritious and delicious day at the fair

By Joseph O'Donnell,
executive director, CDRF

So there I was, passing out cheese samples, smiles and hellos in the California Milk Advisory Board's booth at the 2002 California State Fair, when I had the opportunity to change someone's life. A man and a woman visited the booth, but only the man took some cheese. When I invited the woman to try a sample, her reply was that she suffered from lactose intolerance—the lack of the intestinal enzyme to digest milk sugar, known as lactose. Imagine the woman's surprise when I informed her that most natural cheeses contained little or no lactose. Apparently, when she was diagnosed as lactose intolerant, her physician told her to eliminate all dairy products.

My response sparked a long conversation. I pointed out that although processed cheese food is low in lactose, it is sometimes supplemented with whey, resulting in increased lactose content. I told her that cottage cheese and cream cheese also contain lactose. But all of the hard cheeses (Cheddar, Monterey Jack, Mozzarella) and soft-ripened cheeses like Brie contain little if any lactose. She then asked about eating pizza, and I told her to knock herself out and enjoy. That really brightened her day.

I then moved the discussion to yogurt. I pointed out that in other societies, notably those of North Af-

rica, many people are lactose intolerant yet consume yogurt as a regular staple of their diet. Yogurt contains plenty of lactose, but the live and active bacterial cultures that are used in fermenting milk to yogurt contain huge quantities of the enzyme that breaks down lactose. When these friendly bacteria enter the intestine, they release the enzyme and digest the lactose, eliminating associated problems. She was flabbergasted.

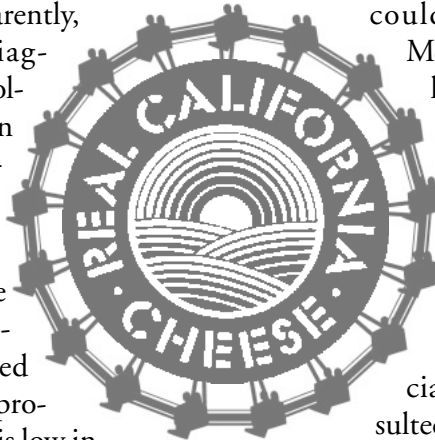
This person left the booth eager to go home and try some of the dairy foods she'd been missing all of these years. Here was someone who was told by her physician that she had to avoid all dairy products because she couldn't digest lactose.

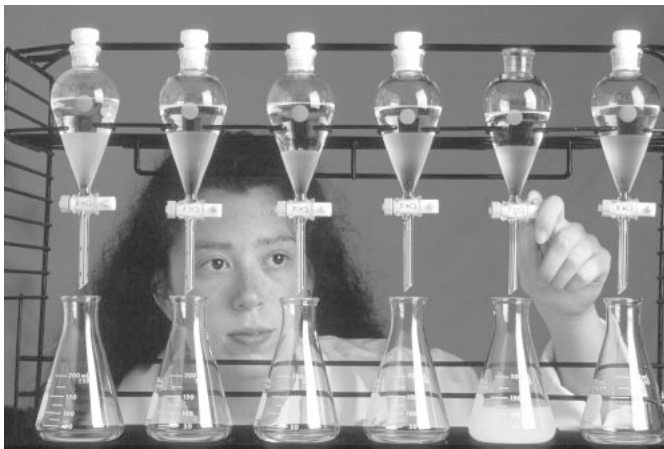
Medical school curriculum is notoriously poor in nutritional science, but the physician has an obligation to become better informed on dietary matters. If the physician would have consulted with a dietitian, the

patient could have been spared the misery of denial of so many foods and the nutritional benefits that dairy foods offer. Removal of dairy foods substantially compromises the nutritional quality of a diet. That's why many countries are now seeking ways in which to increase milk production to improve the nutritional status of their populations.

The life of this woman changed, based on a chance visit to a booth at the California State Fair. While the results are laudable, the circumstances

(See **Fair** on page 6)





Internationally, researchers are working toward improvements in manufacturing, development and nutritional value of dairy products. Photo courtesy of USDA, Agricultural Research Service.

International *from page 1*

research centers to have full access to all available information.

Food Science Australia

A joint venture of CSIRO (Commonwealth Scientific and Industrial Research Organization) and the Australian Food Industry Science Centre (AFISC), Food Science Australia is the largest food research and development organization in Australia, with research centers located in Melbourne, Sydney, Brisbane and Adelaide. Some of Food Science Australia's commercial achievements include:

- Scale-up of process for production of a calcium-casein phosphopeptide product for food and oral health care applications.
- Applied biochemistry, chromatographic technology and chemical engineering to support manufacture of novel dairy ingredients, such as total whey protein isolate and whey protein fractions.

- Development of a patented process for manufacture of a dairy-based gelled product that has been used commercially as a fat replacement in reduced-fat manufactured meat products.

- Development of more consistent performance of dairy protein products as food ingredients, and for use of enzyme technology in modifying functional performance of foods.

CDRF enjoys a long history of collaboration with Food Science Australia and could facilitate access to its expertise. For more information on Food Science Australia, visit www.foodscience.afisc.csiro.au on the Web.

Moorepark Technology, Ltd.

Moorepark Technology Ltd. (MTL) provides technological support for product and process development in dairy products, food ingredients and related consumer food products. Based in Cork, Ireland, MTL is a constituent of Teagasc, the Irish agriculture and food development authority. MTL's Dairy Products Research Centre comprises four research areas:

Food ingredients

- Protein technology and functionality
- Structure, manufacture and utilization of ingredient powders

- Rheology and microstructure

Cheese

- Microbiology and genetics
- Flavor biochemistry and analysis
- Cheese texture
- Cheese technology

Dairy quality

- Food pathogens and spoilage organisms
- Bacteriocins
- Protein chemistry/biotechnology
- Probiotics/functional foods/nutrition

Consultancy and Training

- Specialized analysis and laboratory services
- Training courses and workshops
- Communications and dissemination

CDRF has enjoyed a long-standing collaboration with Moorepark Technology and could readily facilitate access to this Irish company's expertise. For more information, visit www.moorepark.net on the Web.

NIZO food research

NIZO food research, based in The Netherlands, works with the dairy, ingredients, food, beverage and pharmaceutical industries on innovations in taste, texture, nutrition and food safety. NIZO's core research fields include:

- Microbiology
- Identification
- Metabolic engineering
- Intestinal health
- LAB collection

(Continued)

- Process technology
- Predictive modeling
- Separation and drying
- Fermentation and inactivation
- Pilot plant
- Biopolymers
- Structure and stability
- Emulsions
- Enzymatic modification
- Proteins and polysaccharides

One of NIZO's recent developments is a patented method for selectively removing proteins that trigger allergic reactions in infants from the total milk protein. Additionally, researchers developed a method for testing the treated milk to assure that harmful proteins have been removed and that it is safe for infant consumption.

Another project involves the use of Real-Time PCR for detecting the presence of probiotic microorganisms in the intestinal flora. The technique "maps out" all bacteria, and the apparatus is so sensitive that very low concentrations of microorganisms are shown directly without previous accumulation in a culturing medium.

In addition, many successful Dutch cheeses have a special flavor developed by NIZO food research. Examples are Leerdammer, Cantenaar, Maasdammer and Kernhemmer cheeses.

CDRF has worked closely with the Dutch dairy industry for more than 10 years, and can facilitate access to the organization's expertise. For more information on NIZO food research, visit www.nizo.com on the Web.

France's National Institute for Agricultural Research

The Institut National de la Recherche Agronomique (INRA), which operates under the joint authority of France's Ministries of Research and Agriculture, was established in 1946 and became a national public scientific and technological institute in 1984.

The INRA's has more than 3,600 researchers and engineers in 260 research units, 80 experimental units and technological facilities, and 100 service units.

The INRA's Animal Product Processing Department includes a Research Laboratory for Dairy Technology, which is engaged in:

- Improving transformation processes of milk in conventional products such as fluid milks, fermented milks and yogurts, cheese and powdered dairy products through the use of new technologies using membranes (microfiltration, ultrafiltration, nanofiltration).
- Exploring new value-added uses of milk components, notably in the areas of dietetics, cosmetics and pharmaceuticals.
- Transferring skills and knowledge of milk and dairy products to other food liquids, especially egg products.

The INRA established its Dairy Research and Applied Genetics Unit in 1997 to improve the performance of lactic acid bacteria and to study its relationship with pathogenic bacteria. The research undertaken by the unit focuses in the fields of molecular bi-

ology, genetics, physiology, biochemistry, taxonomy and in the manufacturing and analysis of dairy fermentation. One of the unit's major projects explores the micro-organisms of the human colon responsible for intestinal gases. Researchers have identified a bacteria (probiotic) that, when ingested, reduces the production of gas in the colon, thus, relieving painful symptoms of digestive disorders that plague a countless number of adults in the Western world.

France's large dairy industry supports sophisticated research efforts. CDRF is prepared to help U.S. manufacturers explore collaborative projects. The English version of the INRA's Web site can be found at www.inra.fr/ENG/index.html.

The studies under way in these laboratories can corroborate the findings of U.S. researchers and suggest new approaches to enhance the nutritional content and cost-effectiveness of domestic dairy products.

CDR

Save the dates!



**40th Annual
Marshall Seminar
Sept. 16-18, 2003
Visalia, Calif.**

Researchers develop rapid test to help dairies manage wastewater

Scientists at the University of California have developed a system for dairy operators to quickly measure nitrogen in dairy wastewater, giving them an important tool in the complex and environmentally sensitive task of managing wastewater lagoons.

Typically, dairy wastewater is pumped from plastic-lined storage areas called lagoons or ponds into adjacent farmland, where farmers grow corn or winter forage for cow feed. To ensure a good crop, com-

mercial fertilizer is commonly added. But the practice can result in application of more nitrogen than the crop can use. The residue can seep down into the aquifer and pollute groundwater.

“A lot of dairy operators don’t have the capacity in a wet winter to hold all the water in their ponds,” says Thomas Harter, a groundwater hydrology specialist at the University of California, Davis. “It is standard practice to empty the pond in the fall. But if the soil is sandy, you can’t put fertilizer on during one part of the year

and hope it is there six months later to help plants grow.”

Harter, UC Davis soils specialist Roland Meyer, UC Cooperative Extension farm advisor Marsha Campbell-Mathews and Regional

“Within four years, the nitrate level in shallow groundwater adjacent to the demonstration fields dropped nearly 75 percent.”

Fair *from page 3*

under which she was misinformed are deplorable. All of us in the dairy industry need to be vigilant and insist that the medical advice given to people with nutritional problems is accurate. Eliminating an entire category of foods, such as dairy, from a diet can be disastrous. Achievement of a balanced diet without including dairy foods is very difficult. It can be done, but it takes a lot of work—not to mention losing the sensory pleasure of dairy products.

Solid nutrition information is available to the public through the Dairy Council of California <www.dairycouncilofca.org>, the California Milk Advisory Board at <www.calif-dairy.com>, and through the National Dairy Council, <www.nationaldairycouncil.org>. The work these organizations do for us can be extended if each of us is vigilant in persuading our acquaintances to consult these excellent sources of nutritional information. We could be talking about your physician, dentist, neighbor, your child’s teacher, or any-



“All of the hard cheeses (Cheddar, Monterey Jack, Mozzarella) and soft-ripened cheeses like Brie contain little if any lactose.”

one else you know. You don’t need to get into a proselytizing argument—just point out that checking these sources by phone or from the Web might make a big difference in their lives, or in the lives of people they know. And by the way, don’t miss the dairy booth at the State Fair next August.

This essay was adapted from an article that first appeared in the October 2002 issue of Western DairyBusiness Magazine.

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Water Quality Control Board scientist Harley Davis reported in the *Journal of Contaminant Hydrology* that shallow groundwater in the vicinity of five Stanislaus County dairies had high levels of nitrate. After 44 wells were installed at the five dairies, water quality was observed over a four-year period. The average shallow groundwater nitrate concentration was 64 milligrams per liter, compared to 24 milligrams per liter in shallow wells immediately upgradient of these dairies.

“Data seems to indicate that 80 percent of the nitrate associated with the groundwater is coming from misapplication of nutrients to the field,” Campbell-Mathews says. “Fortunately, we can do something about that.”

Campbell-Mathews says careful monitoring of nitrogen in dairy lagoon water and precise application procedures allow dairies to produce a top-yielding crop and reduce the risk of contaminating groundwater. The scientists demonstrated the system at the Clauss Dairy Farm in Stanislaus

(Continued)

Rapid test *continued*



A new method developed by University of California scientists is helping dairies to better manage their wastewater lagoons. The researchers took measurements of a typical lagoon's oxygen and organic acid content.

County. Within four years, the nitrate level in shallow groundwater adjacent to the demonstration fields dropped nearly 75 percent.

The research on groundwater contamination was conducted in a part of the state with sandy soils, which are more likely to allow nitrates to leach into groundwater.

"If we demonstrate significant improvements here in the worst-case scenario, we've developed a system that can protect groundwater quality at dairies throughout the state," Meyer says.

The system requires proper equipment, including a rapid ammonia test, flow meter, adequate conduits to the fields and sufficient storage capacity for lagoon water.

Campbell-Mathews worked with Hach Chemical to develop the four- to six-minute rapid ammonia test, which substitutes for a laboratory test that can take several days. Farmers can use the rapid test to sample lagoon water without ever

leaving the lagoon bank.

Where the system has been implemented, farmers have been pleased with the results. "They are saving about \$50 to \$70 per acre on fertilizer costs and finding the nutrient management system is not any more hassle than hauling anhydrous ammonia tanks around the farm to apply fertilizer," Campbell-Mathews says.

The researchers have trained about 200 dairy operators on the new lagoon nutrient management system in Stanislaus, Fresno and Tulare counties, and developed a Web site (<http://groups.ucanr.org/lnm>) for dairy farmers interested in implementing the system.

This article, by Jeannette Warnert, first appeared in California Agriculture, University of California. Copyright: Regents of the University of California.

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News and Notes



Tong talks about ice cream on science program for kids

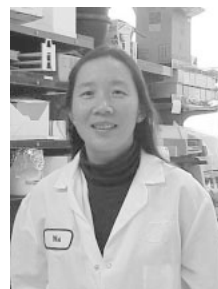
Phillip Tong, professor of dairy science at Cal Poly San Luis Obispo, appeared in an episode of DragonflyTV that aired Jan. 31 on Public Broadcast Station KLCS in Los Angeles. Tong explained the art and science of inventing new ice cream flavors on the science program for kids, which was created by St. Paul, Minn.-based Twin Cities Public Television, producer of the Emmy-winning *Newton's Apple*.

DragonflyTV is broadcast at different times in different markets across the United States.

For more information about DragonflyTV and its programming, visit <http://pbskids.org/dragonflytv/> on the Web.

Food engineer Wang-Nolan joins Cal Poly's Dairy Ingredients Program

Dr. Wei Wang-Nolan has joined the Dairy Ingredients Applications Program at Cal Poly San Luis Obispo as a principle research associate.



Wei Wang-Nolan

Dr. Wang-Nolan's technical expertise in the area of food processing and engineering will complement our group's activities," said Phillip Tong, the program's

project director. "Her practical industrial experience will help to insure our work is directly applicable to dairy ingredient manufacturers and food processors."

Dr. Wang-Nolan received her bachelor's degree in food engineering from Wuxi Institute of Light Industry, Wuxi, China. She went on to earn her master's degree in agricultural engineering from Kansas State University, Manhattan, KS, and her Ph.D. in food engineering from UC Davis. Prior to joining Cal Poly, Dr. Wang-Nolan worked for four years as a process scientist with Unilever Research and Development, one of the world's largest food companies, in Colworth, England.

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Calendar of **EVENTS**

March 18-21, 2003

Cal Poly/ UC Davis 15th Annual Cheese Short Course I. This four-day course (including one day of hands-on cheesemaking) will teach participants the basic scientific information and practical skills needed to understand and manufacture cheese. Location: Cal Poly DPTC, San Luis Obispo, CA. For more information contact Laurie Jacobson at (805) 756-6097 or by e-mail: ljacobso@calpoly.edu.

May 20-23, 2003

7th Annual Cal Poly/UC Davis Cheese Short Course II. This course provides details on factors influencing development of quality attributes of cheese and their measurement, as well as advanced techniques in the manufacture of cheese. Completion or familiarity with material covered in Cal Poly/UC Davis Cheese Short Course I or equivalent recommended. Location: Cal Poly DPTC, San Luis Obispo, CA. For more information contact Laurie Jacobson at (805) 756-6097 or by e-mail: ljacobso@calpoly.edu.

July 12-16, 2003

Institute of Food Technologists (IFT) Meeting and Food Expo. Location: Chicago. For more information, visit www.ift.org, or call (800) 438-3663.

August 24-27, 2003

2nd World Symposium on Dairy Products in Human Health and Nutrition. This symposium will focus on dairy nutrition, milk as a functional food and ingredient, advances in processing dairy streams and production of novel dairy ingredients, and communication and promotion of dairy products in human health and nutrition. Keynote speakers include UC Davis Food Science Professor Bruce German. Location: Melbourne, Australia. For more information, visit www.2003foodsforlife.com on the Web.

September 8-12, 2003

IDF World Dairy Summit and Centenary. IDF is celebrating 100 years. Some key areas that will be explored include nutrition, trade, technology and farming. For more information, visit www.idf2003.com on the Web.

September 16-18, 2003

Marschall Cheese Seminar. The 40th annual Marschall Cheese Seminar, sponsored by Rhodia Inc. and CDRE, will be held at the Visalia Convention Center. For more information please contact Jo Ann Sterenberg at (574) 264-2557 or visit www.marschallcheeseseminar.org for continuing updates.