

CALIFORNIA Dairy Dispatch

RESEARCH, EDUCATION AND SERVICE TO SUPPORT THE DAIRY INDUSTRY

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Edible films with superpowers

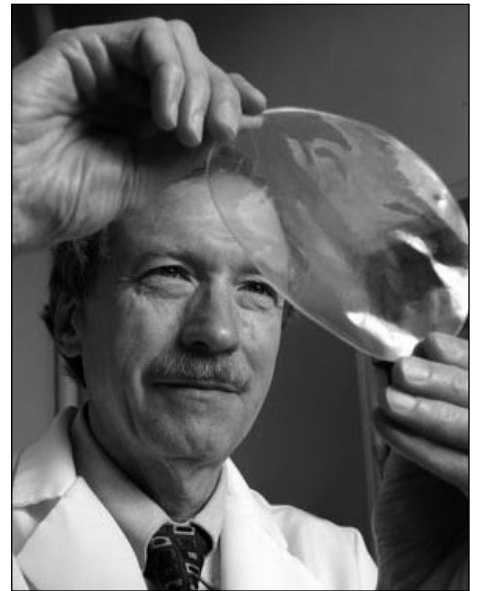
In a handful of food science labs around the country, people who talk about food in terms of microbes and polymers have been turning the natural pathogen fighters found in everyday food into edible films and powders. If their work pans out, thin films woven with a thyme derivative that can kill *E. coli* could line bags of fresh spinach. The same material in powder form might be sprinkled on packages of chicken to stop salmonella. Food scientists believe the potential for using these everyday ingredients to make a safer food supply is huge.

“These natural films are really a very hot topic these days,” said Michael Chikindas, a food scientist working with the team at Rutgers. “The range of applications is endless, from very delicate foods to Army rations and space missions.”

On the most basic level, the films are something like a plastic wrap made of edible components that dissolves in water. The films can be infused with molecules from cloves, thyme or other foods that can keep unhealthy bacteria from growing. They can even be manipulated to carry flavor.

In any food processing innovation, the timing has to be right for both consumers and manufacturers, and this might be the moment. Reports of food-borne sickness outbreaks have become part of the daily news. Recently, baby carrots infected with shigella, a bacteria, were recalled in 12 states. In July, 86 brands of canned chili sauce and other meat products were recalled in a botulism scare. In June consumers were advised to throw away bags of the snack called Veggie Booty after salmonella in it made people in 17 states sick.

(see **Edible films** on page 2)



UC Davis Professor John Krochta examines edible film developed in his lab.

Milk—it does a business, a country and a population good

By Joseph O'Donnell

Having worked for dairy producers for 24 years, I can always tell the price of milk by the tenor of any processor or producer meeting – especially board meetings in which project funding is considered. Such is the fate of commodity production throughout the world. It is a constant flux of building up and tearing down equity with the long-term hope that the building exceeds the tearing down. Simple demand will drive the price up while oversupply drives it down, and that is about the extent of my understanding of economics. The bigger question is why anyone would want a career in this business or, more to a personal

(see **Milk...** on page 5)

INSIDE

3

DANISCO KNOWLEDGE AWARD

Cal Poly students win third for cheese spread

4

USPROBIOTICS.ORG

Web site featured at gastroenterology meeting

6

INTERNATIONAL MILK GENOMICS

IMGC launches beta version of research portal

8

CALENDAR

10th Annual Dairy Ingredients Symposium
March 18–19

Edible films *from page 1*

As shoppers demand safer food, they're also demanding healthier food made with ingredients they can pronounce.

"We're working on consumer-friendly antimicrobials, so people will read the package label and not freak out," said Mark Daeschel, a professor of food science at Oregon State University.

Professor Daeschel teamed up with the food scientist Yanyun Zhao to engineer an edible film made from a fiber found in crab and shrimp shells. They mixed in lysozyme, a

protein found in both eggs and human tears that has proven effective against listeria and staphylococcus. "It's why we don't get eye infections," he said. The result is a film that could coat fruit or meat or even become an edible yogurt lid.

Beyond concerns for safer food and more natural products, consumers are becoming accustomed to thinking about edible film as a product that can deliver mouthwash and cough syrup.

"One of the big breakthroughs were those Listerine strips," said Tara McHugh, a food researcher with the Department of Agriculture who makes films from carrots and tomatoes. "Consumers have just become more comfortable eating films."

Many people already eat more films and coatings than they realize. The wax on apples and the coating on aspirin are examples of edible protective layers used to battle oxygen, moisture and mishandling. Most coatings are made from gluten, cellulose, starch and various proteins approved by the Food and Drug Administration as safe for consumption. They line ice cream cones and coat battered frozen food. Fresh sliced apples and other produce get coatings of ascorbic acid to keep them from turning brown.

Indeed, many shiny confections like chocolate-covered almonds and raisins are coated with confectioner's glaze, a substance that might make some snackers cringe. It is often made with the secretions of a mite-sized beetle that lives in India and Thailand.

Making confectioner's glaze also requires ethanol, which is regulated by the Environmental Protection Agency, said Dr. John Krochta, a food scientist at the University of California, Davis. The new kinds of edible coatings might eliminate the need for ethanol, he said.

In the mid-1990s, when work on

edible films was beginning to take off, Professor Krochta figured out how to turn whey into a film that would be biodegradable. He was interested in the film, but also in finding a way for cheesemakers to use the excess whey they produced. The California government and the state's dairy industry helped pay for the research.

Now he is investigating whether his milk film can fight bacteria. The magic ingredients are milk proteins designed to help protect calves from bacterial infections. He believes they could be manipulated so that edible film wrapped around ready-to-eat turkey or smoked salmon would inhibit salmonella or listeria.

Researchers are still noodling over several problems. One is how to control the timing of the release of the natural bug fighters once the film is on the food. Others are the films' excessive sensitivity to humidity, and how they can be applied to food so that the good bacteria touch every surface. Then there are labeling issues. Are the milk and shellfish proteins used in films the same ones that trigger allergic reactions? What about milk films on products a vegan might eat? And no one knows how much it might cost in additional research and new equipment to actually transfer films from a lab to a food plant.

But scientists say the films might be a more palatable way of killing pathogens than irradiation, a process that has met resistance from food advocacy organizations. And as excited as the scientists are about their new powders and films, they are quick to point out that the products are not cure-alls.

"This is not intended to make up for sloppy growing or handling or cleaning and processing," Professor Krochta said.

This story was excerpted from a New York Times article by Kim Severson, published on Aug. 28, 2007.

CDD



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For more information, contact:

Joseph O'Donnell, Executive Director

California Dairy Research Foundation

502 Mace Blvd., Suite 12

Davis, CA 95618

Phone (530) 753-0681

Fax (530) 753-1453

E-mail: odonnell@cdrf.org

Editor: **Corinne Esser**, CDRE, (530) 753-0681

Contributing Writer: **Jennifer Giambroni**

Produced by **EditPros**, Davis, CA (530) 759-2000

New spin on cheese and crackers helps Cal Poly students win third place in national new-food product contest

Food science students from Cal Poly San Luis Obispo won third place in the national Danisco Knowledge Award competition calling for new and unique food or beverage products. The product, Let's Dip, includes a gourmet artichoke cheese dip and unique honey flavored crackers.

Let's Dip was created by team leader Paula Durongwong, Scott Gualco and Pamela Quok. Durongwong and Quok completed their bachelor's degree in food science and nutrition in June and are now working in the food industry. Gualco is enrolled in Cal Poly's Master of Science degree program and will specialize in dairy products technology.

The annual contest is sponsored by Danisco USA and draws entries from universities and students across the nation. This year Kansas State took first place and the University of Idaho won second. This is the second time in four years that Cal Poly has placed in the top three.

The students are charged with developing a new food or beverage using two or more Danisco ingredients. The new product entries are judged on originality of concept, flavor/aroma, technical feasibility, texture, physical stability and appearance. In addition, a written report is submitted and must include information on market

potential/demand, commercial feasibility, shelf life, nutrition profile and regulatory compliance.

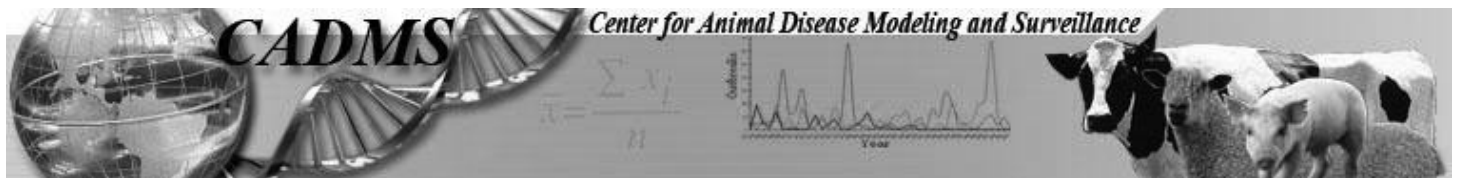
The Cal Poly team was advised by Cal Poly Dairy Products Technology Center staff researcher Jessica Morton and center Director Phil Tong.

For their third-place finish the students received \$2,000 and Danisco paid all trip expenses for Durongwong and Tong to attend the New Products Conference in Naples, Fla., Oct. 14-17.



From left, Pamela Quok, Paula Durongwong, Scott Gualco and Professor Phil Tong.

UC Davis Food and Mouth Disease Survey



In the wake of the recent foot-and-mouth disease outbreak in the UK, researchers at the Center for Animal Disease Modeling and Surveillance (CADMS) at UC Davis are calling upon livestock producers to participate in an online survey. The goal of the survey is to collect information for a computer simulation model that will help predict how foot-and-mouth would spread in the United States and to identify the best control strategies for containment. The survey consists of nine questions about animal and people movements on and off the farm and takes only about 5 to 10 minutes to complete. Dairy, swine and goat producers are especially encouraged to participate.

“In the U.S., the economic impact of an outbreak is estimated to be as high as \$13 billion,” said Dr. Tim Carpenter, professor of veterinary epidemiology and primary investigator for the study. “By answering our short survey and forwarding it to others, livestock producers can help us prevent this from happening in the U.S.”

The online survey is at <http://www.fmdsurvey.com>. CADMS guarantees that all the information will be kept confidential and will only be used for modeling purposes.

This first appeared in the October 2007 issue of *Western Dairy Business*.

ODD

Probiotics Web site featured in October gastroenterology meeting

The CDRF's probiotic information Web site, which launched in January 2001, has been redesigned. The USprobiotics.org site's new look features a green and blue color scheme to indicate health and wellness and a simple layout for easy use. Since its debut, the site has become a go-to resource for consumers and industry on the growing field of probiotics, attracting over a million page views and more than 350,000 unique visitors. The site is frequently referenced in trade and mainstream media coverage and is often linked to by industry giants such as Dannon and Yakult. In 2006, the Kashi com-

pany added the URL to the resources list on the packaging for its Vive probiotics cereal product.

Part of the new layout incorporates an area for presentations, podcasts and interviews, including a Webcast of the symposium, "Probiotics: Applications in Gastrointestinal Health and Disease," which was presented in conjunction with the American College of Gastroenterology's 72nd Annual Scientific Meeting in Philadelphia this past October. The Webcast features four presentations on probiotics and their impact on human health as well as potential for disease treatment by speakers, including:

- Martin Floch, M.D., Yale School of Medicine Department of Internal Medicine;
- Mary Ellen Sanders, Ph.D., Dairy and Food Cultures Technology;
- Stefano Guandalini, M.D., University of Chicago Medical Center;
- Eamonn Quigley, M.D., Department of Medicine at the National University of Ireland.

Site content for USprobiotics.org is provided by Mary Ellen Sanders and pulled from various public resources. For more information, visit www.usprobiotics.org.

EDD

Cast paper examines the role of probiotics in human health

Probiotics—live microorganisms that when administered in adequate amounts confer a health benefit on the host—have been studied for both human and animal applications, and research on this topic has accelerated in recent years. The Council for Agricultural Science and Technology (CAST) is releasing a new issue paper, titled "Probiotics: Their Potential to Impact Human Health," as a contribution to the scientific literature on this important topic.

"To the uninitiated, the list of benefits from probiotics seems too diverse to be possible," says Task Force Chair Mary Ellen Sanders of Dairy and Food Culture Technologies in Centennial, Colo. "But once it is understood that probiotics can impact any colonized regions of the body and that colonizing bacteria have the potential to influence the body locally and systemically, the scope of benefits can be appreciated."

This latest CAST publication describes the characteristics of probiotics, discusses what is known about

the microbes that colonize humans, outlines the impacts of probiotics on human health and disease for specific conditions, and suggests future research and policy.

"This paper was written and reviewed by a task force of scientists from around the world," says CAST

Executive Vice President John M. Bonner. "CAST is pleased to present its newest issue paper as a timely overview of current developments and preview of future applications in the study of probiotics."

The full text of the paper *Probiotics: Their Potential to Impact Human Health* (Issue Paper No. 36) may be accessed on the CAST Web site at www.cast-science.org, along with many of CAST's other scientific publications, and is available in hardcopy for \$5 (includes shipping) by contacting the CAST office at (515) 292-2125. CAST is an international consortium of 38 scientific and professional societies. It assembles, interprets, and communicates credible science-based information regionally, nationally, and internationally to legislators, regulators, policymakers, the news media, the private sector, and the public.

For more information, contact Mary Ellen Sanders at (303) 793-9974 or MES@mesanders.com

EDD



Milk... from page 1

point, why would anyone want to work for someone in this business? The answer for me and many others may be more profound than what can be found in other industries – we have a great product that people need in order to be healthy.

Global demand for milk is up because global economies are improving. Nothing earthshaking here. The first thing any economy wants to do when it has stabilized economically is to eat better. Diets that are based on limited selections of vegetable foods typically contain many essential nutrients but are not in balance or in adequate supply. It's like leaving something essential out of your production process – while things might not grind to a halt, production yield and quality will alter significantly. The same thing happens with people. Add modest amounts of a nutritionally dense and well-balanced food source to the type of diet typically seen in economically depressed populations and the resulting improvement in health and height is exponentially more than what could be achieved otherwise.

Milk is the most nutritionally complete food on the planet. Adding a reasonable amount of milk to an otherwise unbalanced diet unlocks the ability of all the components of the diet to function fully. By nutrients being in balance with each other, the body can now approach its full genetic potential. We can all point to populations around the world in which the people went from a subsistence diet to a nutritionally complete diet with the height and health profile demonstrating dramatic improvements. This is not rocket science, but very fundamental nutrition science.

This desire for health drives the demand. As soon as a population can afford milk, it will demand it and the

nutritional status of that population will increase. Of course, as demand goes up the attending price increase motivates greater milk production, which goes to help even more people. This is a noble thing that the dairy industry does, but it does not come easily. As in any commodity business, the low cost provider will succeed. Thus, the efficiency of milk production and manufacturing remains a constant driver in the business and requires continuous research. The lower the cost of production and manufacturing, the more product hits the



marketplace with more people able to afford it, which is better business for the dairy producer and processor.

We all want to feel good about what we do every day. Dairy producers have taken on the very important role of producing the greatest health food available on earth. Processors bring that product to the consumer. Nevertheless, in order to stay in business there must be a profit factor. This is where the people and organizations that work for the dairy industry come in. Some of us do the research needed

to maintain healthy animals and low production costs, while others create new technologies for product development, address marketing issues and communicate the nutritional advantages of dairy products to consumers. That's just a small example of the affiliated enterprises that exist to support and promote dairy products. We work to keep the industry profitable. Of course, we have to make a living too but we, like producers and processors, are dedicated to bringing health and nutrition to the world. Who can't feel good about that?

Nutritional imbalances have been and always will be with us. However, I am proud to work in an industry dedicated to delivering nutritional solutions to these problems. It has always been that way – starting with the first domesticated cow turning useless grass into the most nutritious product on earth. The National Dairy Council was founded by producers and processors in 1915 based on educating consumers as to the nutritional value of milk. You find the same story in virtually all countries with a sizeable dairy industry. Nutrition is what dairy does better than any other food group. Delivering that nutrition in a great variety of products is very much a part of that. Many years ago, the tag line Milk has something for every body was challenged by the Federal Trade Commission (no doubt under the prompting of milk detractors). The FTC lost. There will always be those who see attacks on the dairy industry as a means to a livelihood. That's part of their business, and they will use the government or any other means to support it. What is important to remember are the billions of people adamantly seeking your product in order to lift the health of their families. That's YOUR business – and a good one.

This article, written by CDRF Director Joseph O'Donnell, first appeared in the August 2007 issue of Cheese Market News.

ODD

IMGC launches new beta version of its research portal

The International Milk Genomics Consortium recently launched a new beta version of its Research Portal on the Web. The Portal, which has been redesigned using Plone open-source technology, is easier to browse while offering detailed content about the biology of milk and its health-giving properties.

Logged-in viewers can access contents, including more than 400 literature-derived lactation genes; nearly 450 manually annotated functions of these genes; a curated lactation-specific subset of the NCBI GEO microarray database; and milk proteomic data for the bovine, human and mouse.

The new International Milk Genomics Consortium Research Portal is available at <http://www.imgconsortium.org> or <http://lactoknow.ucdavis.edu>.



Central Valley water regulations online resource center now available

The Central Valley Regional Water Quality Control Board recently enacted new, comprehensive water quality regulations affecting the area's dairy producers. In early July, producers received a copy of the regulations – called Waste Discharge Requirements or WDRs – by certified mail. The California Dairy Quality Assurance Program (CDQAP) immediately implemented a program to assist producers with understanding and complying with these regulations through a series of materials and workshops.

With the first reporting deadline – Preliminary Dairy Facility Assessment (PDFA) – set for Dec. 31, the

CDQAP has now made all program materials, handouts, forms and binder materials available online at www.cdqa.org. The Central Valley Water Regulations section of the CDQAP site outlines the immediate steps producers must take to comply as well as offering links to forms, related sites and downloads.

For more information, producers are encouraged to contact their producer trade association, milk processor or UC Cooperative Extension Advisor, or call the CDQAP toll-free at 1-866-66CDQAP (866-662-3727).

CDD

NEWS AND NOTES

CLA in milk works for weight management

The use of conjugated linoleic acid (CLA) as a functional ingredient in skim milk can cut body fat mass by 3 percent, says a new study from Spain. Drinking skimmed milk fortified with three grams of CLA (Tonalin, Cognis) led to significant body fat mass reductions among 30 healthy men and women over 12 weeks, compared to the same amount of people drinking a placebo milk.

The study adds to an ever-growing body of science supporting the potential of CLA for weight management and weight loss, a category of already estimated to be worth \$7 billion worldwide.

“Dairy products are excellent carriers for CLA, considering taste, color, texture, processing and product development issues,” said David Cai, senior scientist,

Cognis Nutrition & Health. “Formulators will find CLA to be a health-enhancing ingredient that can be added to a dairy product without adversely affecting the sensory characteristics of the product,” he added.

Published recently in the *British Journal of Nutrition*, the randomized, double-blind, placebo-controlled intervention trial showed that 12-weeks of supplementation with the CLA-rich milk led to significant reductions in fat mass in the trunk (torso) area of the body.

University of Barcelona researchers recruited 60 overweight and obese men and women, aged between 35 and 65, and randomly assigned them to a daily intake of 500 ml skimmed milk fortified with 3 grams of CLA, or a placebo milk.

The researchers, led by Amalia Lafuente, report that consumption of the CLA-rich milk was associated with

a significant 3 percent reduction of body fat mass in overweight subjects, while no significant fat loss was found in the obese volunteers or in either group taking the placebo.

“These findings have considerable significance for Tonalin CLA, indicating that the ingredient can work as well in a functional food product - a dairy matrix, for example, as it does in a food supplement,” said Dr. Doris Bell, leader of Cognis’ global research program on Tonalin CLA.

“Pending Novel Food approval, there are clearly huge opportunities for functional food manufacturers to join supplement producers in marketing successful products for healthy fat loss featuring Tonalin CLA,” she concluded.

This story was excerpted from an article by Stephen Daniells in the Oct. 16, 2007 issue of DairyReporter.com.

CDD

Post-workout milk boosts fat burn

By André Picard, Aug. 9, 2007, Globe and Mail

Want to get the most from your workout? Then ditch the Gatorade and reach instead for a tall, cool glass of milk. That is the message emerging from a new Canadian study that found that exercisers who drink milk after a workout gain more muscle and lose more fat than those who consume sports drinks.

The reason, researchers believe, is that, in addition to liquid for hydration and carbohydrates for energy, milk is also rich in protein, while sports drinks contain little or no protein.

“The protein in milk is high quality,” Stuart Phillips, associate professor of kinesiology at McMaster University in Hamilton and lead author of the study, said in an interview. “We also think the way milk proteins are digested by the body confers some benefits.”

Phillips said prior research has demonstrated that what exercisers drink and eat in the one or two hours after a workout is crucial in determining muscle gain and fat loss.

The new study, published in the *American Journal of Clinical Nutrition*, involved 56 men, aged 18 to 30 who signed up for a rigorous 5-day-a-week weightlifting program over a 12-week period. The participants were randomly assigned to one of three groups, based on their recovery drink.

One group drank 500 milliliters (about two cups) of skim milk that contained 17.5 grams of protein, 25.7 grams of carbohydrates and 0.4 grams of fat. A second group received a soy drink with identical ratios of nutrients, while a third group got a sports drink.

All three beverages contained 735 calories and were



flavored identically with vanilla and served in opaque containers so participants did not know what exactly they were drinking.

Over the study period, all the young men gained muscle mass and most lost fat, but the milk drinkers came out ahead across the board. For example, the milk-drinking group lost, on average, two pounds of fat each, compared with one pound each for those in the sports-drink group. The soy-beverage drinkers neither lost nor gained fat.

The milk drinkers also came out on top in muscle gain, adding, on average, 2.5 pounds more muscle than the soy-beverage drinkers and 3.3 pounds more than the sports-drink group.

“The practical results are obvious: If you want to gain muscle and lose weight as a result of working out, drink milk,” Phillips said.

While the study did not involve aerobic exercise, he noted that other research has also pointed to the benefits of milk – and chocolate milk in particular – for rehydration and recovery. At marathons, for example, chocolate milk – which is packed with more carbs than regular milk – has become the recovery drink of choice for many finishers.

“A glass of cold milk is refreshing, it rehydrates you and it helps restore muscle. It’s also the source of nine essential nutrients so you get everything in one convenient package,” Phillips said.

The research was funded by the Canadian Institutes of Health Research and the U.S. National Dairy Council. Dr. Phillips stressed that the dairy council grant came with no strings attached and the lobby group had no input on the study design or outcome.

“I don’t have any agenda here, and I think the science stands on its own merits,” he said.

Canada’s new food guide, released earlier this year, recommends two to four servings of milk, dairy products or milk alternatives daily as part of a healthy diet.

CDD

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Calendar **of** **EVENTS**

January 22–25, 2008

9th Annual Frozen Dairy Desserts Manufacturing Short Course will emphasize ingredients function and usage, mix formulation, equipment and processes in frozen dessert manufacture. Hands-on sessions for products quality evaluation and product manufacture included. Location: Cal Poly Dairy Products Technology Center, San Luis Obispo, CA

Save the Date!

March 18-19, 2008 – 10th Annual Dairy Ingredients Symposium

The 10th Annual Dairy Ingredients Symposium will provide an overview and update on the latest trends and issues in the marketing, science, manufacturing technology and application of dairy ingredients, including whey derived and milk derived concentrates and powders. Location: Crowne Plaza – Union Square, San Francisco, CA. Contact: Laurie Jacobson, ljacobso@calpoly.edu.

April 1–4, 2008

20th Annual Cheese Short Course I teaches each participant the basic scientific information and practical skills needed to understand and manufacture cheese (includes one day of hands-on cheese making). Location: Cal Poly Dairy Products Technology Center, San Luis Obispo

July 7–11, 2008

ADSA annual meeting. Location: Indianapolis, Ind. For more information, visit www.adsa.org on the Web.

September 9–12, 2008

10th Dairy Science and Technology Basics for the Farmstead/Artisan Cheesemaker

Learn the basics of quality cheese manufacture with emphasis on artisan/farmstead cheese manufacture. Includes 1 day of hands-on cheese making activities, cheese sensory evaluations, and other considerations in starting a small scale cheese making business. Location: Cal Poly Dairy Products Technology Center, San Luis Obispo, CA