

# CALIFORNIA Dairy Dispatch

RESEARCH, EDUCATION AND SERVICE TO SUPPORT THE DAIRY INDUSTRY

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## Food scientists assist in creating nutty Cheddar flavor

**M**any factors influence the flavor of cheese. Taste sensitivity plays an important role in the personal preferences of consumers when selecting cheese, and the rising popularity and increased consumption of cheese varieties has fueled the demand for science-based knowledge about cheese flavor and the sensory factors that drive preferences.

Natural cheeses contain living microorganisms. Their byproducts cause cheese flavor to change and develop over time. Researchers at the Southeast Dairy Foods Research Center in Raleigh, North Carolina, have discovered some of the chemical compounds that contribute to nutty flavor in Cheddar cheese.

Food scientist MaryAnne Drake and her colleagues at North Carolina State University and the University of Illinois found that by adding Strecker aldehydes to older Cheddar cheese samples, aged for nine months or more, the nutty flavor increased, an effect not as dominant when the compounds were added to young (less than 8-month-old) Cheddar cheese.

“We carried out the analysis on

15 cheeses between 3 and 5 years of age with high-intensity nutty flavors. After a year and a half of study, we identified compounds consistently present in nutty cheeses—the Strecker aldehydes 2-methylpropanal, 2-methylbutanal and 3-methylbutanal,” explained Drake, an associate professor of microbiology and sensory analysis.

Their discovery offers new and possibly more cost-efficient opportunities for  
*(Continued on page 2)*



MaryAnne Drake, an associate professor of microbiology and sensory analysis at North Carolina State University, conducting gas chromatography olfactometry.

## International Symposium on Milk Genome and Human Health, Nov. 11–12

**E**xperts in nutrition, genomics, bioinformatics and milk will gather in Napa, California, this fall to establish the framework for an international consortium for milk-specific genomic research at the first International Symposium on the Milk Genome and Human Health.

The event, to be held Nov. 11–12 at the COPIA Center for Wine,

Food & the Arts in Napa, is sponsored by the California Dairy Research Foundation. The program will feature four sessions over the two-day period, discussing topics such as the state of the science for milk research. Speakers will cover everything from the molecules and nutritional functions to the genetics of milk. Additional topics will include the process of lactation, the

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## Nutty Cheddar *from front page*

dairy manufacturers to develop the desirable, aged, nutty flavor, without going through the actual aging process.

“Our findings suggest that a symphony of volatile compounds are present in slightly older Cheddar cheeses, providing the background for the perception of the nutty flavors,” said



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Drake. “Nutty flavor is a very elusive flavor that is difficult to pinpoint, but it only occurs in extremely aged Cheddar cheeses,” she added.

Six years ago, Drake and her colleagues successfully compiled a comprehensive descriptive sensory language for Cheddar cheese flavor. This language resource known as the cheese “lexicon,” was generated from the analysis of 220 Cheddar cheeses and 70 other cheeses representing age, fat content and geographical regions. A panel of specially trained tasters used a cheese flavor wheel to distinguish the differences between the flavors identified in Cheddar cheeses, as well as to formulate a common language for identifying the flavors.

Drake’s previous work on the cheese wheel—which includes flavors like waxy/crayon, bell pepper and fruity, among many others—characterized nutty flavor as “nut-like aromatic associated with different

“**Nutty flavor is a very elusive flavor that is difficult to pinpoint, but it only occurs in extremely aged Cheddar cheeses.**”

nuts.” Lightly toasted unsalted nuts, unsalted wheat thins and roasted peanut oil extract were used as guides for nutty flavor.

Now that the nutty flavor has been identified, the food scientists are ready to build a wider picture of how

they evolve. Understanding what compounds cause particular flavors will enable them to begin to link cheese flavor to cheese production. Certain amino acids must be present in order for the production of Strecker aldehydes and resulting nutty flavor in Cheddar cheese. Drake says that there may be three methods to accelerate nutty flavor: the use of starter cultures capable of releasing the required amino acids; addition of the required amino acids into cheese milk or slurry; and accelerating the conversion rate of the required amino acids into aroma compounds.

“Cheese flavor is very complex, particularly aged cheese flavor, but selected starter adjuncts may enhance nutty flavor development. Cheese trials are currently underway to understand the development of the flavor kick-started by a selected starter adjunct culture and we are expecting results in about a year’s time,” explained Drake.

This project was funded in part by Dairy Management Inc. and the California Dairy Research Foundation (CDRF). Drake gives credit to a CDRF-funded study titled “Determination of regional flavor differences in aged Cheddar cheese,” because it provided this study with a large library (> 500 40-lb blocks) of aged Cheddars (1-4 years) from which to sample.

“Ultimately, flavor is a sensory judgement,” said Drake. “Understanding sources of specific flavors gives us a platform from which to build, to control, alter, or accelerate specific flavors in cheeses.”

Full findings of the nutty flavor study are published in the July 2004 issue of the *Journal of Dairy Science*.

*CDR*

## Sign of the times: Environmental roadside sign program launched as CDQAP certifies its 200<sup>th</sup> dairy

California dairy families are getting great headlines this year for their environmental stewardship efforts. More than a dozen newspapers around the state wrote stories in March about the California Dairy Quality Assurance Program. Those stories spotlighted dairy producers who have completed environmental stewardship certification, which involves completing classroom education, creating a farm plan and undergoing an on-site, independent third-party evaluation of the dairy.

CDQAP partners, in cooperation with Dairy CARES, coordinated the press conferences, held March 17-18, that triggered these stories. We wanted the public and dairy producers to recognize that CDQAP



From left, Wayne Nastri, US EPA regional administrator; Chuck Ahlem, undersecretary for CDFA; and Hank Van Exel, certified dairy producer. (Photo: Casey Freeman/Lodi News Sentinel)

—a partnership of dairy industry groups, environmental regulators and the University of California — has reached some important milestones.

One of those milestones: The 200<sup>th</sup> dairy in the state certified in early

March. Several more have certified since and CDQAP anticipates dozens more in coming months.

Another milestone: The launch of a roadside sign program, a cooperative effort of CARES and CDQAP. Now producers who complete environmental certification are provided an attractive, brightly colored aluminum roadside sign, which prominently displays their commitment to environmental stewardship.

The first signs went up on March 17-18 at ceremonies in Tulare, Hanford, Bakersfield, Lodi, Petaluma, Denair and Merced. Since then, dozens more signs have appeared along the roadsides in dairy counties. *EDD*

### Symposium *from front page*

tools of genomics, and the Milk Genome Project. The goal of the meeting is to produce a guiding document for the Milk Genome Project, a joint effort currently underway to coordinate scientific research on the study of milk and its benefits.

According to symposium organizer Bruce German, a professor in the Department of Food Science and Technology at the University of California at Davis, and director of the Milk Genome Project, this will be the first time researchers involved with or interested in the project will meet in person to discuss the tools and technologies being utilized in this effort.

“This project is tapping into technology in ways that will produce big results for the dairy industry,” said German. “We now have a new strategy for discovering even broader nutritional benefits of milk. The



study of genomics allows us to go beyond simply understanding that milk is beneficial and challenges us to discover precisely how and why.”

A number of leading experts will join German in speaking at the symposium event, including Jim McManaman and Margaret (Peggy) Neville from the University of Colorado Health Services Center, Floyd Schanbacher from Ohio State University, Tim Smith from the US Department of Agriculture, as well as Matthew Lange, Bo Lönnerdal, Juan Medrano and David Rocke of UC Davis.

Advance symposium registration is \$225 through October 1, and \$275

thereafter. The registration fee includes all program materials and meals, as well as a COPIA tour and Napa wine dinner.

The COPIA Center for Wine, Food & the Arts is a cultural museum and educational center dedicated to exploring the distinctively American contribution to the character of wine and food in close association with the arts and humanities, and to celebrating these as a unique expression of the vitality of American life, culture and heritage.

For more information about the Symposium on the Milk Genome & Human Health, visit [www.cdrf.org](http://www.cdrf.org), or contact event coordinator Jennifer Giambroni at [info@cdrf.org](mailto:info@cdrf.org) or (510) 530-7983. Bruce German may be reached at [jbgerman@ucdavis.edu](mailto:jbgerman@ucdavis.edu) or (530) 752-1486. *EDD*

# “Safety First” — protecting the foods we produce, process and eat

By Joseph O'Donnell

**F**ood safety is an essential part of everyday life; after all eating is something we all do—many times throughout the day. Generally, we think very little about food safety—we assume that the food we eat is safe, and rightfully so.

Protecting the food we eat starts with production and carries through to the dinner table—no matter what kind of food it is. Food production, processing and delivery technology in the United States today makes food poisoning the exception rather than the rule, but where did it all begin? Throughout history, the most effective pressure on food systems to become safe and remain that way has come from consumers. Numerous examples exist of how consumers will avoid any food they think will make them sick. Consumers in the United States not only fear the consequences of eating tainted products, but have a myriad of options available to them. If you put risky beans in front of a starving man, he will most likely eat them. In places where few go hungry, consumers will choose less risky foods.

## Heavy scrutiny

Apples, strawberries, chicken and beef (because of Mad Cow Disease) have endured heavy scrutiny by consumers concerned about safety. In the recent BSE (Mad Cow) scare, the export market for beef suffered considerably, but why not the domestic market? I'm sure the quick response by the USDA to reassure the public about the safety of U.S. beef was a key factor in its resilience at home. Another positive response came from government agencies that stepped forward to let consumers know that the BSE organism has never been found in milk. Consumers have confidence in

these agencies and, as a result, dairy was not seriously affected by the BSE incident.

However, the BSE scare was a definite wake-up call for all food producers and brings up a serious question: What other bugs are out there in our cattle population that could become a consumer issue? More importantly, what are we doing to control and test for them?

Milk producers recognize the threat disease-causing pathogens pose to their markets. After all, food safety incidents have put many commodity producers out of business throughout the years. Throughout the United States, veterinary schools, land grant universities and government laboratories are working hard to identify and test for these pathogens, develop on-farm management techniques to control them, as well as processing techniques to kill them should they get into milk. The bottom line is, consumers don't want food from sick animals—nor should they. After the marketing of “downer” cows became a consumer issue, the USDA ended the practice immediately.

Dairy products have a healthy image. We need to make sure this image is protected and maintained, not only theory but in practice as well. Educational materials aimed at controlling on-farm pathogens are currently available to producers, and more are on the way. These materials were developed as a proactive response by groups of producers who recognized a need and acted upon it. They compiled resources within the producer community, such as commodity boards, and worked with universities and agencies that could get the work done in the most efficient manner.

These producer-inspired efforts go beyond education to include research into techniques for better pathogen detection; management practices to eradicate or protect herds from pathogens; vaccines and medicines to cure or prevent diseases; and programs in which producers who demonstrate compliance with regulations face reduced fees and the possibility of no new regulations. It's all about dairymen working hand-in-hand to protect their markets by protecting consumers.

## An attitude seldom seen

The attitude of dairymen with which I've worked has seldom been shared by producers of other commodities. Dairymen believe it is their responsibility to improve the nutritional status of the global population by producing a very special product—milk. After all, milk is the only product designed by nature for the exclusive purpose of delivering health and nutrition. Putting this responsibility at risk by producing a product that doesn't meet the standards for wholesomeness expected from our consumers not only affects sales, but also reduces the confidence in dairy products as a whole.

Each day, as we learn more about milk and its composition, we are able to do more to make it healthier and safer for consumers. Research, collaboration and cooperation are key, and the industry is taking charge to make “Safety First” a reality, not just a slogan.

*This article first appeared in the April 2004 issue of Western DairyBusiness.*

*OOD*

## \$4.7 million federal grant to protect California's food supply

**I**n August a \$4.7 million grant was presented to the Western Institute for Food Safety and Security at the University of California, Davis, to help protect the food supply of California and the nation against acts of terrorism.

The two-year grant will support development and delivery of training programs aimed at helping personnel in the food production system prevent, recognize and deal with potential terrorist acts directed at the nation's food supply.

"This award is a very important step toward preventing terrorist attacks on the food systems in California," said Jerry Gillespie, director of the institute and principal investigator. "Because California leads the nation in dairy, fruits and vegetables, and other specialty-crop production for this nation, and because of the state's dominance in international food trade, it is extremely important that we do all we can to ensure the safety of our food systems.

"One of the most effective strategies for achieving this goal is to have food industry employees informed and actively participating in protection strategies," he added.

Gillespie said the training grant will enable the university and its partners to train people in the food industry to anticipate, prevent and respond to harmful acts directed at the food system—from the farm to the consumer.

UC Davis expects the training to be a national model for bringing together food system employees, health officials, law enforcement personnel, and government officials to prepare for a prompt and effective response to agroterrorist activity.

More than three dozen biological

and chemical agents are considered to be potential agricultural threats. This includes those that cause bacterial and viral diseases like anthrax, brucellosis, botulism, hantavirus and salmonella. Also included are chemical agents that range from pesticides to flammable liquids and corrosive industrial acids. Some could cause extensive illness in humans or food animals, while others could have a devastating economic impact by affecting agricultural crops or livestock.

Fresh and processed tomatoes, apples and dairy products will be the three focus food groups for the training program. These were selected because they are considered to be at risk of terrorist attack; to represent high per-capita consumption,



VMTRC/Tubere

especially among infants and children; to constitute major U.S. production, particularly in California; or to be used widely as ingredients in other foods or prepared meals.

The training program, which is expected to impact more than 1 million front-line personnel, will begin immediately, Gillespie said. It will expand existing programs that are currently offered through the Western Institute for Food Safety and Security as well as UC Cooperative Extension, University Extension and other campus academic programs.

During the first year of the grant, the training program will focus on inventorying existing programs, identifying industry-specific terrorist hazards and threats, communicating risks to industry leaders, and identifying and coordinating those personnel considered to be in the best position for identifying or responding to possible terrorist actions. During the later part of the program, communications systems will be improved, regional and national workshops and conferences held and an assessment made of the nation's level of preparedness in the area of agricultural bioterrorism defense.

The Western Institute for Food Safety and Security is dedicated to coordinating research and education efforts that address food-safety issues, drawing upon the expertise of scientists in academia, government and industry. It was established in 2002 as a partnership between UC Davis and California's Department of Food and Agriculture and Department of Health Services.

Its mission is to develop the capability to identify food-borne hazards more rapidly and accurately, and to develop effective methods to prevent natural and intentional food contamination that might lead to food-borne illnesses and outbreaks.

Collaborating with the institute on the new training grant are 14 partners representing agriculture, public health, law enforcement, and emergency services and management.

For more information, contact Jerry Gillespie, Western Institute for Food Safety and Security, at (530) 757-5757, or [jrgillespie@ucdavis.edu](mailto:jrgillespie@ucdavis.edu).

*CDP*

## Hundreds attend CDQAP air workshops

**M**ore than 700 dairy producers attended a series of 17 California Dairy Quality Assurance Program workshops in May and June to learn about new air quality regulations.

Morning and evening workshops were held in each of the eight counties that make up the San Joaquin Valley Air Pollution Control District. Dairy producers learned about new requirements related to air quality, including the need for producers to file Conservation Management Practice plans (CMPs) for dust control.

"We're extremely pleased with the success of these workshops," said Paul Martin, Director of Environmental Services for Western United Dairymen, a CDQAP program partner. "Some of the requirements required confusing paperwork, and these workshops provided easy, free one-stop shopping for the producers."

The workshops fulfilled some of the key goals of the program, according to CDQAP's Program Director Michael Payne. It also has expanded its relevance to include air quality issues.

"Our main objective is to increase environmental compliance through education," Payne said. "These workshops did just that, by adding the element of air quality education to our already very successful water quality short course. CDQAP has shown once again that dairy producers are willing to comply with environmental requirements once they understand what is expected of them and what it takes to achieve that goal."

J.P. Cativiela, program coordina-

tor for Dairy CARES, an industry environmental stewardship coalition that funded and organized the workshops, said the effort caps off about two years of work and cooperation between industry and the San Joaquin Valley air district.

"Dairy families are committed to doing their part to protect the air, which we all share," Cativiela said. "Through these workshops, the dairy industry has come together to ensure maximum cooperation with the air regulators in developing fair, science-based regulations. CDQAP has provided an excellent avenue for educating producers about the requirements and what's necessary to improve stewardship. CARES is proud to support the program."

## Adventure Series — New Zealand: Jan. 30-Feb. 15, 2005

*Continuing education for the dairy industry*

New Zealand is one of the world's great dairy-producing nations with the industry geared toward overseas



markets that account for about 90 percent of all milk produced. Visit and learn about New Zealand's unique dairy industry and take home new ideas for your business or practice. This continuing education

program, offered by the UC Davis School of Veterinary Medicine, is designed for the dairy industry, dairy veterinarian, consultant and dairy producer, and will provide a comprehensive overview of New Zealand's dairy industry. Farm visits will include some of New Zealand's best producing dairy farms with operators who can discuss their industry, their farming systems and are willing to impart their knowledge to visitors. The program will include the dairy industry in general with particular emphasis on the economics of dairy farming, animal health and farm management, plus the opportunity to discuss topics of interest with leading vets and consultants. For more information, visit [www.vetmed.ucdavis.edu/ce](http://www.vetmed.ucdavis.edu/ce) on the Web.

## Kid's bones benefit from milk

The link between milk and bone health forms the focus of a new study on children that showed a regular glass of the white stuff can prevent fractures.

Scientists in New Zealand investigating milk consumption of 1,000 children between the ages of 3 and 13 years found that "significantly more of the children who avoided milk reported fractures."

"Children who regularly avoided milk had lower bone mineral density and weighed more—two factors that increase fracture risk," said lead researcher Ailsa Goulding, at the University of Otago, New Zealand. She estimates that children and adolescents need three to four servings



of dairy foods each day to help prevent broken bones now and chronic conditions such as osteoporosis as adults.

The study compared the fracture histories of 50 children who avoided drinking cow's milk for extended periods of time to a group of 1,000 children from the same city, Dunedin, New Zealand.

The children who avoided milk did not eat calcium-rich food substitutes or supplements. Nearly one in three of the young milk-avoiders had broken a bone before they were 8 years of age, frequently from slight trauma such as a minor trip or fall.

"Forearm fractures were especially common," said the researchers, concluding simply that "young children avoiding milk are prone to fracture".

Full findings of the study "Children who avoid drinking cow's milk are at increased risk for prepubertal bone fractures" are published in the February issue of the

*Journal of the American Dietetic Association*, 2004; 104(2):250-253.

*This article was excerpted from the Feb. 25 issue of DairyReporter.com.*

### **Milking nature's benefits**

Last February, milk marketed to help consumers sleep better went on sale in the United Kingdom, where a third of all adults are said to be affected by sleeping problems. The product, called Night Time Milk, is made by Cricketer Farm, a Somerset, UK, dairy that produces milk with higher than normal levels of melatonin from specially selected dairy herds.

Melatonin is a natural hormone that controls the body clock and helps regulate sleep patterns by reducing the body temperature to levels necessary for a good night's sleep.

Cricketer Farm says it has tested numerous milk samples from different herds over recent months at the University of Surrey and identified samples with higher levels of melatonin.

No human trials have been carried out by the company, but it says that by guaranteeing higher levels of melatonin than regular milk, the new drink could help some of the 60 percent of adults who regularly have trouble sleeping to nod off.

The dairy was beaten to the market by Red Kite Farms, which launched its Slumber Bedtime Milk in 2002. This product rapidly exceeded forecasted sales.

The number of functional food consumers in the UK is expected to exceed 5 million by 2007.

*This article was excerpted from the Feb. 18 issue of DairyReporter.com.*

### **Milk-derived peptide aimed at liver health and improved sleep**

Dutch ingredients company DMV International has developed a milk-derived peptide aimed at liver health, an area attracting increasing attention from consumers.

The patented ingredient, a natural peptide-bonded form of cysteine, has been shown in animal studies carried out by the firm to boost levels of glutathione produced in the liver. Glutathione is needed to break down toxic substances, alcohol and stimulants, such as caffeine, but as it ages the body produces less of the substance.

DMV is marketing cysteine peptide for its potential to boost energy and improve sleep quality. The whey protein hydrolysate allows the body to synthesize glutathione and therefore act more efficiently on alcohol and caffeine, known to disrupt sleep patterns.

"Liver health is a growing area of interest. In the Asian market, consumers are very aware of the need to pay attention to the liver, but in the United States, this is still an emerging category," said Fiona Taylor, market development manager at DMV.

"There are a number of issues raising awareness of liver health, including the increase in hepatitis. We are also taking more drugs that have to be metabolized by the liver and can often impact its health."

*The above article was excerpted from the Oct. 30, 2003 issue of FoodNavigator.com. For more information on probiotics and prebiotics, visit [www.usprobiotics.org](http://www.usprobiotics.org) on the Web.*

*CPD*

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*Calendar of* **EVENTS**

**October 19-20, 2004**

**9th Annual Dairy Cleaning and Sanitation Short Course.** This course provides basics of plant and equipment cleaning and sanitation, as well as personal hygiene, and introduction to HACCP. Location: Cal Poly San Luis Obispo. For more information, call Laurie Jacobson at (805) 756-6097 or send an e-mail message to [ljacobso@calpoly.edu](mailto:ljacobso@calpoly.edu).

**October 23-27, 2004**

**National Frozen & Refrigerated Foods Convention.** Washington, D.C. For information, call (717) 657-8601, e-mail [info@nfrweb.org](mailto:info@nfrweb.org), or visit [www.nfrweb.org](http://www.nfrweb.org).

**October 24-28, 2004**

**National Dairy Board/National Milk Producers Federation/United Dairy Industry Association Joint Annual Meeting,** Reno, NV. Call National Milk Producers Federation at (703) 243-6111.

**November 1-3, 2004**

**Workshop on HACCP Programs and Principles HACCP: A Basic Concept for Food Protection.** Location: Davis, CA. For more information or to enroll, call (800) 752-0881; e-mail [aginfo@unexmail.ucdavis.edu](mailto:aginfo@unexmail.ucdavis.edu), or visit [www.extension.ucdavis.edu/agriculture](http://www.extension.ucdavis.edu/agriculture) on the Web.

**November 4-5, 2004**

**Advanced Workshop on HACCP Programs and Principles.** Location: Davis, CA. For more information or to enroll, call toll free (800) 752-0881; e-mail [nfo@unexmail.ucdavis.edu](mailto:nfo@unexmail.ucdavis.edu); or visit [www.extension.ucdavis.edu/agriculture](http://www.extension.ucdavis.edu/agriculture) on the Web.

**November 11-12, 2004**

**International Symposium on Milk Genome and Human Health.** Location: COPIA Center for Wine, Food & the Arts in Napa. For more information, visit [www.cdrf.org](http://www.cdrf.org), or contact event coordinator Jennifer Giambroni at [info@cdrf.org](mailto:info@cdrf.org) or (510) 530-7983.

**November 14-17, 2004**

**Dairy Institute of California 2004 Fall Meeting,** Ojai Valley Inn & Spa, Ojai, CA. Call (916) 441-6921.

**November 16-18, 2004**

**Health Ingredients Europe (HiE).** The Netherlands. For general information or registration information, send an e-mail to [ahagenstein@cmpinformation.com](mailto:ahagenstein@cmpinformation.com), or visit [www.hi-events.com](http://www.hi-events.com) on the Web.

**January 30-February 15, 2005**

**Adventure Series—New Zealand.** Continuing education for the dairy industry, dairy veterinarian, consultant and dairy producer, and will provide a comprehensive overview of New Zealand's dairy industry. Visit [www.vetmed.ucdavis.edu/ce](http://www.vetmed.ucdavis.edu/ce) on the Web.

**February 7-8, 2005**

**The 7<sup>th</sup> Symposium on Advances in Dairy Product Technology—Concentrated & Dried Dairy Ingredients.** The two-day symposium will cover the latest trends in the marketing, science, manufacturing technology and food applications of value-added dairy ingredients. Location: The Cliff's Resort in Shell Beach, CA. For more information, call Laurie Jacobson at (805) 756-6097 or send an e-mail message to [ljacobso@calpoly.edu](mailto:ljacobso@calpoly.edu).