

CALIFORNIA Dairy Dispatch

RESEARCH, EDUCATION AND SERVICE TO SUPPORT THE DAIRY INDUSTRY

VOL. 18, NO. 1 • Summer 2008

Butter study focuses on maintaining flavor and texture during storage

Butter represents a significant dairy industry commodity and plays a major role in California's economy. California is responsible for 33 percent of the 1.5 billion pounds of butter produced in the United States each year. Butter flavor and texture are critical components of consumer acceptability and marketability. While butter texture has been well characterized, the sensory perception of butter flavor had not been classified using a defined and quantifiable language. Additionally, no quantifiable information was available on how the flavor and texture of butter holds up through frozen storage, adversely affecting the marketability of frozen product. During times of surplus, butter (bulk and sticks) is often frozen to maintain shelf life and may be held at -20°C for two years or longer.

The CDRF recently concluded a three-year project, led by Dr. Mary-Anne Drake of North Carolina State University, to establish a quantifiable sensory language for butter flavor and texture and to characterize the flavor, texture and functional characteristics of bulk and stick butter throughout

(see **Butter** on page 2)



5th Milk Genomics Symposium spotlights bovine genome, insights from research around the world

The Bovine Genome Project will be one of the main topics of the 5th International Symposium on Milk Genomics & Human Health, which will be held Oct. 14-16, 2008, at the Amora Jamison Hotel in Sydney, Australia. The two-and-a-half day event will feature experts in nutrition, genomics, bioinformatics and milk from Australia, New Zealand, the United States and Europe to address milk-specific genomic research.

The program gets underway Tuesday, Oct. 14, with an introduction by UC Davis' Bruce German, chair of the International Milk Genomics Consortium's (IMGC) Scientific Advisory Committee. Sessions will include the Bovine Genome Project and the genes, pathways and mole-

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the refrigerated and frozen storage process.

The study began with a trained descriptive panel evaluating 27 commercial butters using a defined language based on the sensory characteristics that drive consumers' preference of butter with key discriminating sensory characteristics such as color intensity and diacetyl, cooked, grassy, milkfat and salty flavors. Focus groups and quantitative consumer testing found that sensory expectations of butter vary among consumers, and butters with specific sensory characteristics could be marketed to specific target market segments.



Photo courtesy of California Milk Advisory Board

The effects of refrigerated and frozen storage on the sensory and physical characteristics of butter were evaluated, working with quarter-pound sticks and nine-pound bulk blocks of product. Butters were placed into frozen (-20°C) and refrigerated storage (5°C) and were sampled after 0, 6, 12, 15, 18 and 24 months. After 6 and 12 months of frozen storage, the butters were removed and placed in refrigerated storage for 3 and 6 months with oxidative stability index (OSI) measurement and descriptive sensory analysis (texture, flavor and color) conducted every 3 months. Peroxide value (PV), free fatty acid value (FFA), fatty acid profiling, differential scanning calorimetry (DSC), vane, instrumental color and oil turbidity were determined every 6 months. Variance was analyzed to characterize the effects of storage time, temperature and package type on butter flavor, OSI, PV and FFA.

The study concluded that for optimum quality, butter quarters packaged in wax parchment paper should be refrigerated for less than 6 months. When frozen at -20C, quarters can be stored for up to 12 months. It is still advantageous for manufacturers to store butter in large blocks, which may not completely stop quality deterioration but will maintain freshly produced butter flavors (milkfat and cooked/nutty) longer. For bulk butter in refrigerated conditions, flavor quality is maintained for at least 9 months. In frozen

storage, bulk butter can be stored for 18 months without flavor detriment. This estimate of the shelf life for bulk butter is conservative, since smaller (4 kg) blocks were used in the study for convenience and cost, and butter is often stored in 25 kg block form.

A final aspect of this study examined the impact of package material on butter shelf stability and if lipid oxidation was the primary source of flavor quality loss in butter. Butter quarters packaged in wax parchment paper and foil were evaluated across refrigerated and frozen storage. Both sensory and instrumental volatile analyses, in conjunction with peroxide value and oxidative stability index tests were conducted. Results indicated that while lipid oxidation occurred during storage, it was not the driving force behind flavor quality loss and that lipid oxidation tests (PV value, OSI) were not correlated with sensory flavor quality loss. Instead, absorption of volatile organic components from the package and refrigeration or frozen storage unit were the primary source of flavor quality loss. Butter quarters packaged in foil or thick wax parchment wrappers, as a result, will maintain freshness longer than butter wrapped in thinner wax parchment paper.

In addition to surplus years, maintaining quality during storage is becoming increasingly important as export markets expand. Exports of butter and milkfat totaled 92.8 million pounds during the first five months of 2008, compared with 14.2 million pounds during the same period in 2007. Since butter is a highly prized fat source in terms of flavor and textural properties, it is important that manufacturers understand how long their product can be stored before negative attributes develop. These off-flavors could potentially carry-through to applications and negatively impact consumer perception.

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

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ORGANIZATION SPOTLIGHT: The Dairy Council of California

The Dairy Council of California (DCC) strives to enhance the health and well-being of children and adults by enabling individuals to make healthy food and lifestyle choices through nutrition programs for educators and health professionals. It was formed in 1919 and is funded by dairy producers and processors through assessments collected by the California Department of Food and Agriculture.

Programs

DCC provides free programs and resource materials to educators and health professionals in California. Printed and electronic materials are available for purchase by individuals in other states. Every program utilizes Dairy Council of California's individualized learning model to support multiple learning styles and programs that establish personal relevancy for individuals. These programs are designed to lead to positive behavioral changes in food and activity choices.

Mobile Dairy Classrooms

Dairy Council of California operates four Mobile Dairy Classrooms that bring a cow and calf to visit schools across California. Reaching almost 300,000 schoolchildren each year, the interactive presentation teaches students and teachers about milk's journey from the cow to the dinner table, the nutritional value of dairy foods, basic cow anatomy and agriculture's contributions to the food supply.

Meals Matter Web Site

Dairy Council of California launched its MealsMatter.org consumer Web site in 2001 to make healthy meal planning easier by offering free access to customized nutrition information, interactive educational tools, thousands of recipes, personal cookbooks, meal planning calendars and shopping lists.

Nutrition Philosophy

DCC embraces a nutrition approach that encourages individuals to eat moderate portion sizes of a wide variety of foods. Instructional materials and communications are based on the 2005 Dietary Guidelines and USDA's MyPyramid food guidance system. DCC encourages dietary patterns that emphasize nutrient-rich food choices that are often under-consumed: low-fat dairy, whole grains, fruits and vegetables.

DCC believes that all foods can be part of healthful eating when managed for variety, moderation and proportionality. "We do not support labeling individual foods as 'good' or 'bad,' says Peggy Biltz, executive director. "We recognize that favorite foods, regardless of fat or calorie content, can be part of a balanced diet."

DCC also promotes 30 to 60 minutes of daily physical activity, along with a nutritious diet, to en-

hance an individual's overall health and well-being. Physically active individuals are more able to maintain their body weight and enjoy more flexibility in food choices.

Education Philosophy

DCC programs target children at key developmental stages and adults at critical times in their lives when eating and lifestyle habits are most likely to be re-evaluated. The programs are based on a problem-solving model that supports behavior change. They include learning strategies that are consistent with recent brain research on effective learning.

Functional Foods Task Force

For more than 12 years, the Dairy Council of California closely followed the functional-foods movement (foods that provide a health benefit beyond the basic nutrients). Initially focusing on fruits

(see DCC on page 4)

PHYSICAL ACTIVITY
Be physically active for at least 30 minutes most days of the week.

Use MyPyramid to Make Healthy Choices

For additional resources, visit dairycouncilofca.org and mealsmatter.org

OILS & EXTRAS
Make most of your fat choices from fish, nuts and vegetable oils. Limit your intake of "extra" foods that are mainly fat or sugar.

GRAINS	VEGETABLES	FRUITS	MILK & MILK PRODUCTS	MEATS & BEANS
6 oz. everyday* 1 oz. = 1 slice bread, 1 cup dry cereal, or 1/2 cup rice or pasta	2 1/2 cups everyday* Choose dark green, orange and starchy vegetables as well as dry beans and peas	2 cups everyday* Vary between fresh, frozen or canned without added sugar	3 cups everyday* 2 cups for kids aged 2-8 1 cup = 1 1/2 oz. hard cheese, 2 oz. processed cheese	5 1/2 oz. everyday* 1 oz. = 1 oz. meat, fish or poultry, 1 Tbsp. peanut butter, 1/2 oz. nuts, 1/4 cup dry beans
Make at least half of your grains whole grains	Try to vary your vegetable choices each day	Make most choices whole fruit	Choose fat-free or low-fat most often when you choose milk, yogurt and other milk products	Choose lean meat and poultry. Vary your choices - more fish, beans, nuts and seeds

*Recommended amounts based on a 2,000 calorie diet

© Dairy Council of California, 2005

This pyramid and other resources can be downloaded from www.dairycouncilofca.org.

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and vegetables, functional foods now include other foods such as dairy, fish, nuts, wine and chocolate. To ensure that dairy foods are well-positioned in this movement and that obstacles to this positioning are addressed, DCC convenes an annual Functional Foods Task Force, a group of industry experts representing dairy research, product development, marketing and education.

Dr. Joseph O'Donnell, CDRF executive director, is a member of this task force that meets to discuss the various areas of dairy research, public policy, regulations and consumer perceptions that impact dairy, and

identify strategies to optimize dairy's positioning.

"The Functional Foods Task Force is an effective format for the dairy industry to proactively maintain its position as an important vehicle to help children and adults achieve a healthy lifestyle," says Dr. O'Donnell.

Discussions at the recent 2008 FFTF meeting included:

- consumer acceptance and demand for products with probiotics and prebiotics and their burgeoning health benefits;
- building research that dairy—specifically whey protein—may play a role in satiety and weight management;
- increasing emphasis on nutrient-rich foods—foods that are a significant source of nutrients-per-calorie;
- addressing nutrition symbols used for the purpose of helping consumers make healthful dietary choices ... but which have the secondary result of labeling foods as "good" or "bad";
- addressing the growing push to limit sodium in food products;
- nutrition issues in schools, such as the use of high-fructose corn syrup to sweeten products such as flavored milks;
- the demand for a sustainable food supply and what this means to the dairy industry.

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Dairy cattle welfare workshop held in Tulare

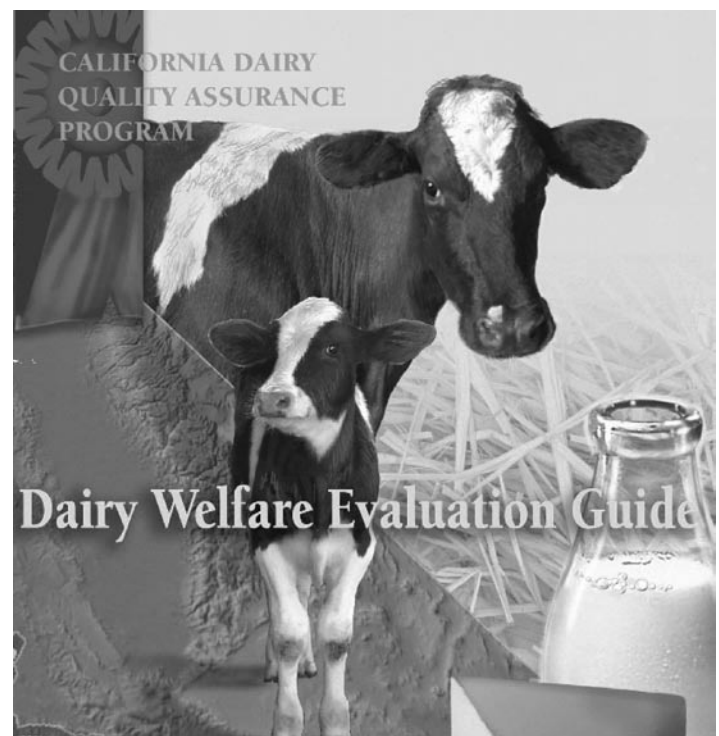
More than 60 dairy producers, cattlemen, as well as, government and private veterinarians learned new methods of caring for non-ambulatory cows during a dairy cattle welfare workshop on July 9, hosted by the University of California's Veterinary Medicine Teaching and Research Center in Tulare.

"This workshop provided the tools and knowledge to support the challenges in the care and handling of disabled cattle on the farm and in market channels," stated Dr. Carolyn Stull, Veterinary Medicine Cooperative Extension specialist and one of the workshop's organizers. "Attendees gained practical techniques that are easily utilized for the management of non-ambulatory animals in their care."

Speakers reviewed the prognosis, treatment, movement and handling of debilitated cattle. Faculty demonstrated a new large animal lift developed at the School of Veterinary Medicine and the use of flotation tanks to support recovering animals. Proper techniques for euthanasia of cattle on the farm were also discussed.

"Farm animal welfare has simmered on the back burner for a long time," Stull said. "This workshop gave us the opportunity to focus on individual topics, offer realistic approaches, and sow the seeds of future educational workshops for dairy and beef producers as well as veterinarians in the field."

More information about farm animal welfare, including the 2007 publication, *A Review of the Causes, Prevention and Welfare of Nonambulatory Cattle*, and the *Dairy Welfare Evaluation Guide* (shown below), which is published by California Dairy Quality Assurance Program, are available at www.vetmed.ucdavis.edu/vetext/animalwelfare/.



CMAB selects two outstanding graduates for internship program

The California Milk Advisory Board (CMAB) Career Internship Program has begun its fifth consecutive year of offering students an opportunity to gain a thorough understanding of California's dairy industry. The interns will work with a cheese processor,



From left, CDRF Executive Director Joseph O'Donnell, intern Sara Souza, CDRF Manager of Technology Transfer Corinne Esser and intern Nicole Borges. Sara and Nicole visited CDRF this summer to learn about its research projects and the CDQA program.

distributor and retailer, as well as industry and promotional groups.

The interns were selected for their academic achievement, along with a strong desire to pursue a career in the California dairy industry. The interns for this year are Nicole Borges and Sara Souza. Nicole received her Bachelor of Science degree in Agricultural Business from Cal Poly, Sal Luis Obispo, and has remained there to earn a master's degree in the same field.

She has been active at Cal Poly in the Los Lecheros Dairy Club, the Dairy Cattle Judging Team, the Alpha Zeta Fraternity and the Ag Ambassador Program. She currently works at the Cal Poly Dairy Products Technology Center.

Sara is currently a senior at California State University in Fresno, majoring in agricultural science with a minor in agricultural education. She graduated from Modesto Junior College with a degree in agricultural science. Sara has been active in the Dairy Club and was on the Modesto Junior College Dairy Cattle Judging Team. She was the 2007 intern with Agribusiness Publications.

CDR

IMGC Symposium *continued from page 1*

cules of the lactation process, its regulation and the health benefits produced by different mammals during lactation. Afternoon presentations will focus on insights from monotremes (such as the platypus, whose DNA sequencing was recently released) and marsupial milk production as models to study the evolution of lactation.

Speakers will include Monique Rijnkels of the Baylor College of Medicine in Houston, Texas, Danielle Lemay from the University of California, Davis, Tom Wheeler from AgResearch New Zealand, Ross Tellam of CSIRO Livestock Industries, Elizabeth Deane of the Australian National University, and Julie Sharp of Australia's Deakin University.

The second day will spotlight milk lipids and the regulation of milk production with presentations from Peggy Neville of the University of Colorado Denver, Ian Mather from the University of Maryland, ViaLactia's Steve Davis, Darryl Hadsell of Baylor College of Medicine, Herman Raadsma from the CRC for Innovative Dairy Products, and Paul Sheehy of the University of Sydney.

The symposium will wrap up Thursday with presentations on discoveries in human breastmilk from Mark

Cregan of the University of Western Australia, translating the dairy genome by Peter Williamson of the University of Sydney, and a final summary and discussion of future directions from Bruce German and Peter Williamson.

The program includes a poster session as well as presentations from graduate students conducting research on related topics and global highlights from additional researchers and research groups.

Symposium registration is \$450 through Sept. 3, 2008, and \$500 thereafter, and includes all program materials and daytime meals as well as a Tuesday evening reception. Sponsoring members of the International Milk Genomics Consortium can register at the rate of \$400 through Sept. 3, 2008, and \$450 thereafter. Student rates and special hotel room block discounts also are available. For more information visit www.milkgenomics.org, or to register online go to www.acteva.com/go/cdrf.

In addition to the CDRF, symposium sponsors include Dairy Management Inc., the International Dairy Federation, U.S. Dairy Export Council as well as IMGC sponsoring members – CMAB, CDRF, CNIEL, Dairy-Australia, Dairy Farmers of Canada, Dutch Dairy Association, Mead Johnson Nutritionals and Teagasc.

CDR

John Krochta chosen as IFT Fellow

John Krochta, professor of food science and technology at the University of California, Davis, was elected as a Fellow of the Institute of Food Technologists in 2008, for his research on food processing, food packaging and edible films, and for his contributions to the teaching of food science and engineering and mentoring of graduate students.

Fellow is a unique professional distinction conferred on individuals with outstanding and extraordinary qualifications and experience for their contributions to the food science and technology field. The nominee must have been an IFT member for 15 years and a professional member at the time of nomination. The 15-year member requirement may be waived by the Fellows Jury for those nominees who have spent all or a portion of their careers outside the United States.

Krochta's work includes fundamental and applied research on the utilization of the whey byproduct of cheese manufacturing. In particular, he has researched edible films and coatings to improve food quality and safety; whey protein-based coatings to improve barrier properties of paper and plastic; and lactose-based polymers. He has coordinated curricula development for the university's food science and food engineering programs.



Students have recognized Krochta for his teaching efforts, and the Department of Food Science and Technology has commended him for teaching-related service.

IFT has conferred the Fellow designation on a select number of professional members every year since 1970. A complete list of Fellows can be found on the IFT Web site at www.ift.org/cms/?pid=1000287.

In addition to his Fellow designation, Krochta received the IFT Packaging Division Riester-Davis Award at the annual meeting. The Riester-Davis Award recognizes lifetime achievement in food packaging technology, specifically developments that advance food packaging research, research that leads beyond current frontiers and ideas that spark students.



Dairy industry to reduce greenhouse gases

Dairy leaders announced in June an industry-wide commitment and action plan to reduce fluid milk's carbon footprint while increasing business value, from farm to consumer.

The action plan is an outcome of the industry's first Sustainability Summit for U.S. Dairy, an unprecedented gathering of 250 leaders representing producers, processors, non-governmental organizations, university researchers, and government agencies held in Rogers, Arkansas, June 16–19. The plan focuses on operational efficiencies and innovations to reduce greenhouse gas emissions while ensuring financial viability and industry growth.

"Sustainability is a challenge that requires industry-wide solutions, and our efforts establish a new standard for industry collaboration," says Thomas Gallagher, CEO of Dairy Management Inc. (DMI), the nonprofit organization that manages the national dairy checkoff program on behalf of America's dairy producers. "Decision makers from across the dairy value chain are working together to commit to concrete, innovative solutions. This will ensure an economically, environmentally, and socially sustainable industry."

Summit attendees recommended a number of actions, including to:

- Reduce energy use in the milk supply chain by developing technologies for next generation milk

processing on the farm and in the plant.

- Establish a mechanism to optimize returns to the dairy industry from a carbon credit trading system that encourages the reduction of greenhouse gas emissions.
- Reduce carbon emissions and increase energy efficiency for dairy farmers and processors through financially viable best management practices and tools that calculate individual farm energy and alternative energy opportunities.
- Supply green power to communities by expanding the use of methane digesters.
- Stimulate development of low-cost, low-carbon, consumer-acceptable packaging.
- Reduce cooling costs and emissions associated with refrigeration by expanding economically feasible, environmentally responsible, and consumer-accepted dairy products.

“Sustainability practices have long been part of common practices on dairy farms, from recycling water and manure to crop technologies that improve soil and prevent erosion,” says Jerry Kozak, NMPF’s CEO. “In an era of record high energy prices and a changing global climate, we must do more. It makes economic sense to find ways to conserve energy and reduce production costs, while recognizing that a growing number of consumers care deeply about the health and environmental impact of the products they buy.”

“Consumers rely on dairy as one of the best foods nature provides,” says IDFA President Connie Tipton. “They need to know that the dairy industry contributes not only to their own health and wellness, but that the industry is also committed to preserving the health of the earth. This effort will improve the environment and the lives of our customers. It will also position our industry for future growth.”

The Sustainability Summit, held in conjunction with the University of Arkansas’ Applied Sustainability Center, was the first major step in a comprehensive dairy industry-wide initiative bringing together producers, processors, and others to identify and address sustainability opportunities. Leading the initiative along with DMI are the International Dairy Foods Association (IDFA), representing processors and manufacturers, and the National Milk Producers Federation (NMPF), representing dairy cooperatives.

The innovative ideas and initiatives advanced by the Summit participants will be further refined for possible testing and evaluation. The goal, according to Gallagher,

will be to field-test several prototype projects to determine their real-world viability as ways to reduce greenhouse gas emissions.

“Now is the time to harness our combined talents to address these issues,” Gallagher says. “Through the Sustainability Summit, we were able to identify common interests and establish a realistic action plan that has the potential to transform the industry.”

Excerpted from IDFA SmartBrief June 27, 2008

CDFA’s Dairy Marketing Branch rolls out new database

The January 2008 issue of the *Dairy Information Bulletin* is the first issue produced by data input into the New Statistics Database System. The reports all include the same basic information, with additional information and data tables in some areas. The *Dairy Information Bulletin* tables are also available in an Excel format at www.cdfa.ca.gov/dairy. Click on Data/Statistics under the “Dairy Programs” heading. For more information or assistance, call Karen Dapper or Candace Gates at (916) 341-6988.

Dairy resource archives available online

CDRF-managed research projects from 1998 to 2007 can be accessed at our Web site, www.cdrf.org. On our Home page under “Research,” click on “Research Portfolios.” The research projects are organized into portfolios, titled Education, Research and Development and Communications, Planning and Evaluation, with more specific category subtitles.



National dairy research projects funded by Dairy Management Inc. (DMI) are available at www.innovatewithdairy.com. The upper left corner of the DMI Home page has a menu bar titled “Product Research & Technologies.” Under it, you will find “Product Research Projects.” Click on that link to access DMI-supported product research/applications projects (last five years). Also available is market trend data across multiple categories. The service is free, but first-time users, will be asked for registration information.

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Calendar of **EVENTS**

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 one 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.

October 14–15, 2008

Dairy Technology 101. This course emphasizes the basics of milk quality and basic unit operations in milk handling and processing. Location: TBA. For more information, visit www.dptc.calpoly.edu, or contact Laurie Jacobson at ljacobso@calpoly.edu.

October 14-16, 2008

The 5th International Symposium on Milk Genomics and Human Health. Location: Sydney, Australia. See article on page 1, visit www.milkgenomics.org for details.

November 18–21, 2008

9th Annual Frozen Dairy Desserts Manufacturing Short Course. 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

For the latest information, please contact Laurie Jacobson at ljacobso@calpoly.edu.

Date set for 2009 dairy ingredients Symposium

The 11th Cal Poly Dairy Ingredients Symposium will be held March 10-11, 2009, at the Hotel 480 in San Francisco. The event spotlights 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. For more information, contact Laurie Jacobson at ljacobso@calpoly.edu or visit www.calpoly.edu/~dptc for details.