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The Jackrabbit Dairy Review

Dairy Science

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Winter 2012

# The Jackrabbit Dairy Review

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# The Jackrabbit Dairy Review

Winter 2011-2012

Dairy Science Department, Alfred Dairy Science Hall, South Dakota State University, Brookings, SD 57007-0647

## DAIRY SCIENCE DEPARTMENT

### Faculty

Sanjeev Anand *Associate Professor*  
Jake Anderson *Dairy Plant Manager*  
Robert Baer *Professor Emeritus*  
Howard Bonnemann *Instructor*  
David Casper *Assistant Professor*  
Stephen Crego *Manager, Dairy Research and Training Facility/Lecturer*  
Alvaro Garcia *Professor/Extension Dairy Specialist*  
Ashraf Hassan *Associate Professor*  
David Henning *Associate Professor Emeritus*  
Kenneth Kalscheur *Associate Professor*  
Lloyd Metzger *Associate Professor, Alfred Chair in Dairy Education*  
Vikram Mistry *Professor and Head*  
John Parsons *Professor and Head Emeritus*  
David Schingoethe *Distinguished Professor Emeritus*

### Staff

Jayendra Amamcharla *Postdoctoral Research Associate*  
Jill Anderson *Research Assistant*  
Melinda Bennett *Secretary*  
Ananya Biswas *Research Associate*  
Fernando Diaz-Royon *Temporary Research Scholar*  
Akimoto Ichinomiya *Assistant Dairy Plant Manager*  
Pete Linke *Ag Foreman/Fresh and Sick Cows/Calf Care*  
Chenchaiah Marella  
*Manager, Institute of Dairy Ingredients Processing*  
Monica Markwed *Dairy Store Supervisor*  
Jayne Raabe *Senior Secretary*  
Tracey Renelt *Extension Field Specialist*  
Melissa Schmitt *Assistant Manager, Dairy Research and Training Facility*  
Brooks Varnum *Agriculture Foreman*

## GRADUATE STUDENTS

### Dairy Production

Ishwary Acharya  
Jacob Albrecht  
Jill Anderson  
Stephen Crego  
Fernando Diaz-Royon  
Kevin Herrick  
Peter Linke  
\*Angela Manthey  
Sanjeeva Ranathunga  
Javier Sabbia  
\*\*Ulises Salas Vega  
\*Adlai Schuler  
\*Megan Smith

### Dairy Manufacturing

\*\*Khilendra Bhanduriya  
Ananya Biswas  
Gagan Deep  
\*\*Nuria Garcia Fernandez  
Akimoto Ichinomiya  
Som Khanal  
\*\*Sowmya Marka  
\*\*Laura Mealy  
Prafulla Salunke  
Kartik Shah  
Diwakar Singh

\*New students in 2011 \*\*New students in 2012

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## MESSAGE FROM THE DEPARTMENT HEAD



2011 was a year of immense joy and sadness for the Dairy Science Department. It reminded us of the rich heritage of the department; it showed us how immensely dedicated our faculty, staff and students are; it showed us what the untimely loss of a dear faculty member means to us personally as well as to the program; it showed us how the stark realities of budget deficits can affect programs and people; and it also showed us how fortunate we are to have a dairy industry that is strongly committed to the future through support of education. Dr. Arnold Hippen passed away after 13 years of service. He treated faculty, staff and students as his own, and he always brought out the best in students. While we are fortunate to have the ability to fill his position, he will be sorely missed. Dr. David Schingoethe retired after 42 years of service of research and teaching, and Dr. Robert Baer after 28 years. The departure of these three faculty members represents 83 years of excellence and experience that will be difficult to replace.

We are very pleased to welcome Dr. David Casper, a new assistant professor in the dairy cattle nutrition area; Jacob Anderson, our new dairy plant manager; Assistant Farm Manager Melissa Schmitt; Extension Field Specialist Tracey Renelt; Secretary Melinda Bennett; and Ag Foreperson Brooks Varnum. These new individuals and the continuing faculty and staff are the beneficiaries of our new facilities—the Alfred Dairy Science Hall and the Davis Dairy Plant.

Renovations to the 51-year-old facilities are marks of foresight of dairy industry and producer leaders who over the past 10 years helped us with design, fundraising, and building. The new facilities will help us continue and expand upon the strong dairy education and research missions of SDSU. Opportunities for new students coming into the program are impeccable and will provide hands-on dairy processing experience on the type of equipment that students will use upon graduation in the industry. We are very thankful to all the donors for their generosity and their persistence. The demand for dairy science graduates and summer interns remains very high.

During fiscal year 2011 our faculty received almost \$850,000 of grant funds on research projects. These external funds were awarded to faculty through competitive grants and helped support research and salaries of scientists and graduate students. Faculty excellence was demonstrated through their teaching and service to the industry in various capacities. Faculty members were invited to speak at professional events in the U.S. and abroad. They were recipients of national awards and participated in professional service activities that assisted the dairy industry. We continue to be fortunate to receive support in the form of scholarships and other projects at admirable levels. We recognize this and continue to develop Extension and research programs that will benefit the industry in the long term. Most importantly this support has helped develop the future leaders of the industry. I invite you to browse through this newsletter, visit our website and stop by for a chat and tour.

Vikram Mistry

## 2011 GRADUATES

### B.S. Manufacturing

Rebecca Hanson  
Molly Paterson  
Morgan Petersen  
Nicole Stevens  
Todd Wight  
Cory Zelfel

### B.S. Production

Katelyn Crocker  
Heather Jons  
Melissa Lax  
Stephanie Nussbaum  
Rachel Patrick  
Brian Speltz  
Kaitlin Van Eck

### B.S. Manufacturing and Production

Michael Dunn

### Master of Science

Mallika Avadhanula  
Heidi Bruns  
Oliver Janevski  
Anil Kommineni  
Javier Sabbia

## IN MEMORIAM: Dr. Arnold Hippen



**Dr. Arnold Hippen**, professor of dairy science died July 9, 2011, at his home near Flandreau, South Dakota.

Arnold was born in Wellsburg, Iowa, and was a dairy farmer until 1987. He began college at Ellsworth Community College in 1988 then attended Iowa State in Ames where he earned his M.S. and Ph.D. degrees in dairy science. He joined the Dairy Science Department at SDSU in 1998 as assistant professor, holding the David H. Henry Sustained Professorship. In this position, Arnold was responsible for teaching and research in dairy cattle nutrition and dairy farm management, and working with dairy producers in the Midwest to assist them with nutritional issues. He rose through the ranks and earned the title of professor in dairy science.

Arnold was widely known in the dairy industry for his research work in dairy cattle nutrition and in particular for his research involving the use of agricultural byproducts in dairy cattle rations and metabolic conditioning of dairy cows. A landmark of his research work was

the collaboration with industry. His ultimate goal for research projects was always to provide practical value to the dairy farmer. Through this line of thought he was author or co-author of numerous publications, including one patent, reflecting his research work.

In recognition of his excellence he received the 2011 American Feed Industries Award of the American Dairy Science Association at its national meeting in New Orleans, La. He served as the faculty liaison to the SDSU Dairy Research and Training Facility. In this capacity he served in an advisory capacity to the dairy farm manager and helped the farm serve its teaching and research missions. His career passion however was students at both the undergraduate and graduate levels. He served as advisor to 10 graduate students and always integrated them into his research projects. He provided his students with a clear flavor of the complete spectrum of the life of a research project, from grant writing all the way to publication of work and ultimately application in the field. Consequently several of his students were award recipients and became leaders in their profession.

Arnold was consistently and widely cited by undergraduate students for his compassion, knowledge and an ability to teach at the basic level.

He served as advisor to many students, and was specifically sought out by incoming students. He also served as a mentor to many students for undergraduate research activities. Arnold took particular interest in coaching the SDSU Intercollegiate Dairy Challenge Team. He viewed this activity as one that added immense value to student education, and as a result, dedicated many hours working and traveling with students. Arnold's caring for students carried into Dairy Club activities. He served as advisor and travelled with students on numerous Club trips. The school year typically ended with a bonfire that Arnold and his wife, Pat, hosted for the students at their home. Arnold was a friend, an outstanding colleague, a dedicated mentor and teacher, and a prolific researcher. He will be greatly missed by the Dairy Science Department and all the students and friends that were acquainted with him.

Arnold is survived by his wife, Pat; son, Eric (Charlotte), Nevada, Iowa.; grandsons, Matthias and Nehemiah; mother, Mary Hippen, Wellsburg, Iowa, and sisters, Marilyn (Jerry) Adelmund, Parkersburg, Ia., and Donna Crosser, Iowa Falls, Iowa.

## RETIREMENTS



Schingoethe



Baer



Denison

**Dr. David Schingoethe**, who served SDSU and the Dairy Science Department for more than 42 years, retired in June 2011. He joined the department in 1969 as assistant professor, was promoted to associate professor in 1973, received tenure in 1975, and was promoted to professor in 1980. In 2003 he was named distinguished professor at SDSU. He received his bachelor's degree in agricultural science from the University of Illinois, master's in dairy science from the University of Illinois and Ph.D. in dairy and nutrition from Michigan State University. He has made major contributions to dairy education through teaching and mentoring of undergraduate and graduate students, and to dairy farmer groups. Dr. Schingoethe advised 10 to 30 undergraduate students every semester and was the major advisor for 34 master's and nine Ph.D. students. His Extension activities include more than 140 publications specifically targeted for outreach purposes. He presented 58 papers at regional, national and international conferences in Canada, Germany, Belgium, Netherlands, Mexico, Ukraine and Russia. Dr. Schingoethe is clearly recognized as one of the top dairy cattle nutrition researchers in the country. He received grants from a diverse range of funding sources, including the National Science Foundation, industry organizations, and commodity groups. His publications include more

than 130 peer reviewed papers, almost 200 abstracts of papers presented at scientific meetings, eight chapters in books and two patents. His research has covered the areas of dairy nutrition, enhancing the nutritional value of milk fat, optimization of forage use, and applications of byproducts in feeds. He has been a leader in the application of cheese whey in dairy cattle feeding and in the use of agricultural byproducts such as distillers grains and sunflower products in dairy cattle diets. He has studied the impact of cattle feeding techniques on the nutritional and processing characteristics of milk and milk products. He has been a member of The American Dairy Science Association (ADSA) since 1964 and served in numerous leadership capacities, including President. Dr. Schingoethe's excellence has been recognized through at least 12 university, national and international awards including the Award of Honor of ADSA, Fellow of ADSA and Fellow of ASAS.

**Dr. Robert Baer** retired in May 2011 after 28 years of service to the Dairy Science Department. He joined the department in 1982 as assistant professor and rose from the rank of assistant professor to professor by distinguishing himself in teaching and research. His research focused on dairy chemistry and frozen desserts. This work was supported by funds from industry and the MN-SD Dairy Foods Research Center and involved 19 funded research projects led to 43 refereed publications, 45 abstracts, 26 trade and Extension publications, one patent, one patent pending and three book chapters. He also mentored 14 graduate students.

Dr. Baer's work encompassed an integration of the science of milk production and milk processing. This collaborative work led to the devel-

opment of softer butter by altering the diet of dairy cattle; the enhancement of conjugated linoleic acid in milk products; leading to healthier dairy products, and the conclusion that the use of recombinant bovine growth hormone in dairy cattle had no impact on milk flavor or quality. He is nationally recognized for his work on the sensory attributes of milk and milk products. His work in the area of oxidation of milk and milk products and on the texture of ice cream has been applied by industry because of its practical value.

Dr. Baer and another faculty member in the department developed a new method for reversing oxidation in milk. Their patent titled Method for Reversing an Oxidized Off-Flavor from Milk is currently pending and has the potential for a significant impact on the fluid milk industry for eliminating this wide-spread flavor defect. He taught four classes in dairy science and is best known for his Dairy Products Judging class. Dr. Baer served as coach since 1988 and under his tutelage, the SDSU team won the national championship nine times. In addition, he led his team to the championship for three consecutive years from 2008 to 2010. In recognition of his excellence and accomplishments in teaching and research, Dr. Baer has been the recipient of at least three local and national awards.

**Valerie Denison** joined the Dairy Science Department in 2002 and retired in May 2011 after nine years of service as secretary. She managed department phone calls, student payroll, and as Extension secretary, also helped with the planning and execution of the I-29 Dairy Conference.

## NEW FACULTY AND STAFF



Anderson



Bennett



Casper



Renelt



Schmitt



Varnum

**Jacob Anderson** joined the department in January 2011 as manager of the new dairy plant. Jake holds a bachelor's degree in dairy science from SDSU and was employed at Davisco Foods International in Lake Norden, S.D., as production supervisor prior to becoming the new plant manager.

**Melinda Bennett** joined the department as secretary. She is responsible for managing department phone calls, payroll and many other duties.

**David Casper** accepted a position as assistant professor in dairy science (production) and commenced his new position in November 2011. Dr. Casper received his bachelor's degree in animal science from the University of Wisconsin--Platteville, and master's and Ph.D. degrees in dairy production from SDSU. After completing his Ph.D. at SDSU, he was a research dairy scientist with the Agriculture Research Service of USDA at Beltsville, Md., where he researched the energy metabolism of dairy cows fed diets containing high fat feed ingredients, nonstructural carbohydrates or different forage sources using the respiration chambers at the Energy Metabolism Unit. He later joined

Cargill, Inc., as dairy innovation development manager researching and designing new feeding programs and products. He moved to Agri-King, Inc., in 1997 as consulting dairy nutritionist and was eventually promoted to vice president of nutrition. Dr. Casper has published widely in the area of dairy cattle nutrition. He received the ADSA National Milk Producers Federation's Richard M. Hoyt Award in 1989 in recognition of his graduate research at SDSU and recently was the overall program chair for the 2011 American Dairy Science Association/American Society of Animal Science Joint Annual Meeting. He will teach undergraduate and graduate classes in dairy production and will begin a research program focusing on the efficiency and profitability of nutrient digestion and utilization by dairy cattle when rations are formulated using different qualities and amounts of energy, protein and forages.

**Tracey Renelt** has joined SDSU Extension as Extension field specialist in dairy. She received her bachelor's in dairy manufacturing and production from SDSU in 1989. Tracey brings significant

Extension experience to the position, as immediately after graduation she worked for SDSU Cooperative Extension Service as the extension educator in Grant County from 1989 to 1993, and again from 1995 to 2000. She worked as a livestock production specialist for Land O'Lakes from 1993-1995. From 2000 until accepting her current position as a field specialist, Tracey served as Extension

educator/livestock in Kingsbury County. In her position as field specialist, Tracey will be based in the Watertown Regional Extension Center (605-882-5140), but will work with SDSU Extension dairy specialist Dr. Alvaro Garcia, to serve dairy producers throughout the state. Her areas of expertise and interest include employee management, nutrition, quality assurance and aspects of dairy production.

**Melissa Schmitt**, a 2011 dairy and animal science graduate of Iowa State University joined the Dairy Science Department as assistant manager for the Dairy Research and Training Facility. In this position, Melissa will assist the farm manager, Steve Crego, in all aspects of the dairy farm operation. She comes with prior experience from the Iowa State University Dairy Farm, Full Circle Jerseys in Dalhart, Tex., and study abroad in South Korea.

**Brooks Varnum**, joined the department as Ag Foreman for the Dairy Research and Training Facility. His duties include primarily feeding, but also include maintenance work at the unit.

## UNDERGRADUATE STUDENTS

Lee Alexander, Twin Brooks, S.D., Manufacturing  
 Kyle Anderson, De Smet, S.D., Manufacturing  
 Austin Asche, Stewart, Minn., Manufacturing  
 Jessica Becker, Eden Valley, Minn., Prod., Manufg.  
 Kevin Berg, Baltic, S.D., Manufacturing, Prod.  
 \*Samantha Berg, Pipestone, Minn., Manufg.  
 Bethany Chapman, Winfred, S.D., Production  
 Roxane Chapman, Winfred, S.D., Prod., Manufg.  
 \*Benjamin Choudek, Owatonna, Minn., Prod.  
 Carrie Ellefson, Princeton, Minn., Production  
 Jordan Evans, Pipestone, Minn., Manufacturing  
 Kyle Fischer, New Ulm, Minn., Production  
 Eric Flynn, N. Sioux City, S.D., Manufacturing  
 Megan Forst, Gibbon, Minn., Manufg., Production  
 Nathan Gollnick, Flandreau, S.D., Manufacturing  
 Jennifer Gunnink, Lake Benton, Minn., Production  
 Tom Hammink, Bruce, S.D., Production  
 Kaitlin Hartkopf, Howard Lake, Minn., Production  
 \*Kelly Hill, Burke, Va., Production  
 Renae Hinkeldey, Alta, Iowa, Production  
 Matthew Holdvogt, Eden Valley, Minn., Prod.  
 Megan Huegli, Hartford, Wis., Manufacturing  
 Cassandra Hulstein, Edgerton, Minn., Production  
 April Johnson, Heron Lake, Minn. Production  
 Taylor Jones, Huron, S.D., Manufacturing  
 Emily Jungemann, Wolsey, S.D., Production  
 \*Kaleb Juntunen, Courtland, Minn., Manufg.  
 Angela Klaers, Wabasso, Minn., Manufacturing  
 Lauren Kostello, Mason, Wis., Prod., Manufg.  
 Caleb Kottke, Owatonna, Minn., Production  
 \*Kevin Kral, Hanska, Minn., Manufacturing  
 Taylor Lais, Brandon, S.D., Manufacturing

\*Natasha Laska, Ponca, Neb., Manufacturing  
 Grace Liebenstein, Dundas, Minn., Production  
 \*Weina Liu, China: Production  
 \*Brigitte Louwagie, Cottonwood, Minn.,  
 Production, Manufacturing  
 Mitchell Maher, Nunda, S.D., Production  
 Laura McMartin, Gerber, Calif., Production  
 Eric McNeel, Blackfoot, Idaho, Manufacturing  
 Valerie Mohr, New Ulm, Minn., Production  
 Brittany Moore, Minneota, Minn., Production  
 Katie Nelson, Rice, Minn., Production  
 Larissa Neugebauer, Dimock, S.D., Production  
 Joshua Oakley, Dakota Dunes, S.D., Manufacturing  
 Justin Ochsner, New London, Minn., Manufg.  
 \*Lydia Olson, Owatonna, Minn., Production  
 Timothy Pennings, Saint Petersburg, Fla., Manufg.  
 \*Riley Pitman, Chatham, N.H., Production  
 Luke Rensink, Freeman, S.D., Manufacturing  
 Megan Rice, Firth, Neb., Production, Manufg.  
 \*Teresa Sandberg, Taylors Falls, Minn., Production  
 \*Samantha Schaefer, Lake Benton, Minn., Manufg.  
 Cody Schlecht, Canby, Minn., Production  
 Holly Schmitt, Thorp, Wis., Production, Manufg.  
 George Schoessler, Kimberly, Idaho, Production  
 Johnna Schuur, Sauk Center, Minn., Prod., Manufg.  
 Ana Schweer, Watertown, S.D., Production  
 Noah Sellner, Sleepy Eye, Minn., Production  
 Angela Sellner, Sleepy Eye, Minn., Production  
 \*Chelsey Shumski, Fairmont, Minn., Production  
 \*Olivia Siglin, Webster, S.D., Production  
 \*Jaeyoung Sim, S. Korea: Manufacturing  
 \*Sara Sontag, Shafer, Minn., Production

\*Della Stage, Vesta, Minn., Manufacturing  
 Danielle Tews, Hutchinson, Minn., Production  
 Cody Van Eck, Ruthton, Minn., Production  
 Alisha Vander Wal, Pipestone, Minn., Production  
 \*Megan Viland, Pipestone, Minn., Production  
 \*New students in 2011-2012

## VISITORS

**Randy Gross**, former president of Holstein Association, USA, and retired assistant branch manager of Northwest Farm Credit Services of Washington state, served as co-instructor in the Dairy Breeds and Breeding, Dairy Farm Management, and Cattle Judging classes. Randy's wealth of experience was most valuable to our students.

**Walt Wosje**, alumnus and retired CEO of Michigan Milk Producers served as a guest lecturer in several of our classes. Walt was also the recipient of a Distinguished Alumnus Award from the SDSU Alumni Association.

**Muhammad Afzal**, visiting doctorate student, dairy production. Muhammad is a Ph.D. student at the University of Veterinary and Animal Sciences in Lahore, Pakistan, and spent eight months with us under the direction of Dr. Kenneth Kalscheur on a project involving dairy calf feeding related to his Ph.D. work.



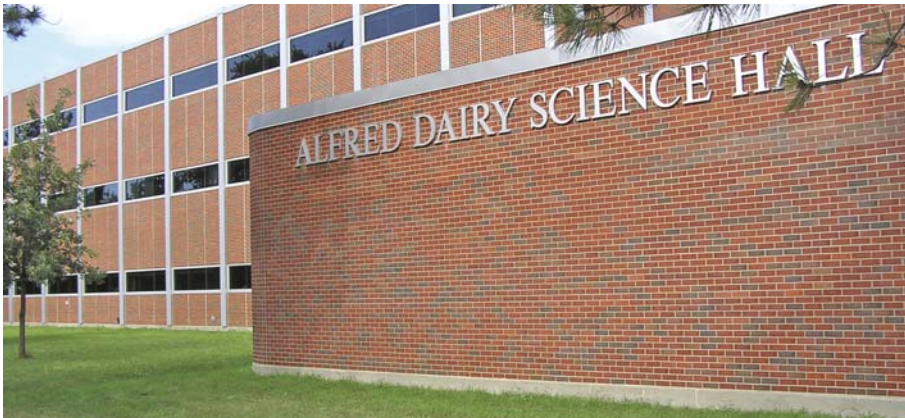
## FACILITIES RENOVATION

On October 21, 2011, University and dairy industry leaders, along with state officials, led the nearly 300-member audience in a toast to dedicate the Alfred Dairy Science Hall and the Davis Dairy Plant. The ceremony that was emceed by Walt Wosje, a dairy science alumnus, marked the completion of the first major updates to the dairy microbiology building and dairy manufacturing plant in 51 years. Speakers at the ceremony included President Chicoine of SDSU; Dean of the College of Agriculture and Biological Sciences, Barry Dunn; SD Secretary of Agriculture, Walt Bones; District 7 Sen. Larry Tidemann; Max Gonzenbach and Rudy Nef of Valley Queen Cheese; and Jon Davis of Davisco Foods. The renovated dairy microbiology building has been renamed the Alfred Dairy Science Hall in honor of the late Alfred Nef and Alfred Gonzenbach,

two Swiss immigrants who founded Valley Queen Cheese Factory in Milbank, S.D. Renovation of the building was funded by the students of SDSU and the state of South Dakota. The newly added manufacturing plant has been named Davis Dairy Plant in honor of the Davis family, owners of Davisco Foods International of Le Sueur, Minn. In addition to remodeling the existing dairy plant, the project added 10,850 square feet of space, creating a state-of-the-art plant totaling 17,900 square feet. The plant project, including equipment, cost \$9.3 million. All but \$1 million was privately funded by dairy processors, producers, suppliers, alumni and friends. The newly renovated facilities will allow the dairy science program to provide state-of-the-art training and research opportunities in dairy processing.



Milk was, of course, the drink of choice for a toast at the dedication of the Alfred Dairy Science Hall and Davis Dairy Plant on October 21, 2011.



## HEIFERS FOR STATE

The 2011 Heifers for State was held in conjunction with the annual South Dakota Central Plains Fall Sale October 29, 2010, at the Swiftel Center in Brookings. Dairy Club members worked all week to set up the arena, receive cattle, prepare, feed and milk them. On the day of the sale they showed the cattle to buyers. More than 60 animals were sold at the sale. Three generous producers also donated animals for the Heifers for State program. Donors included K. C. Dairy (Edward Kavanagh), Elkton, S.D.; Prairie Gold Dairy (Randy Gross), Flandreau, S.D.; and Marv and Joy Post, Volga, S.D., and \$5,150 was raised from the donated animals. This contribution will be used for supporting dairy education, research programs and providing scholarships to Dairy Science students at SDSU. The Heifers for State program started in 2006.

## RENOVATION DONORS

### \$2 million and more

Davisco Foods International Inc.

### \$500,000-\$999,999

American Dairy Association of South Dakota  
Valley Queen Cheese Factory  
Nef Family Foundation

### \$250,000-\$499,999

Agropur Inc.  
Ecolab  
Filtration Engineering Co. Inc.  
GEA Westfalia Separator Division  
Glanbia Foods  
Gonzenbach Family, Milbank  
Jerry and Jolene Lohr,  
San Jose, Calif., and Garretson, S.D.  
Midwest Ag Supplements  
SA Education Foundation  
Tetra Pak

### \$100,000-\$249,999

American Dairy Association,  
Midwest-Iowa Division  
ARAMARK  
SDSU College of Agriculture  
and Biological Sciences  
Daryl and Mary Ann Boddicker, Gurnee, Ill.  
Dahmes Stainless Inc.  
Hilmar Cheese Company Inc.  
SPX Corporation  
South Dakota Governor's  
Office of Economic Development  
David A. and Marilyn M. Thompson,  
Barrington, Ill.

### \$50,000-\$99,999

CFR  
DR Tech Inc.  
Fristam Pumps  
Land O'Lakes Foundation  
Wells Dairy Inc.  
Werner Electric Supply

### \$10,000-\$49,999

AGC Heat Transfer Inc.  
Associated Milk Producers Inc.  
Cass-Clay  
First District Association  
Kemps LLC  
Kraft Foods Foundation  
Neil and Rachel Kucker, Eagan, Minn.  
Milk Specialties Global  
Schock Family Foundation  
South Dakota Dairy Association  
Larry Tidemann and  
Gail Dobbs Tidemann, Brookings  
Walt and Yvonne Wosje, Brookings

### \$5,000-\$9,999

Sioux Valley Dairy Herd  
Improvement Association  
Bruce Unterbrunner, Abrams, Wis.

### \$1,000-\$9,999

Bob and Becky Baer  
Brian and Deborah Bonebright  
Dairy Farmers of America  
Gertrude Hawk Ingredients  
Scott Halverson  
Ann Hardegger  
Gregory Holtquist  
Isanti Foods LLC  
Keough Ledman Associations Inc.  
Eugene and Dolores Metzger  
Keith Murfield  
Rochester Cheese  
Roger and Kay Scheibe  
Vernon and Cathy Voelzke

## JUDGING ACTIVITIES



### DAIRY CATTLE EVALUATION & DAIRY CHALLENGE

The 91st National Intercollegiate Dairy Cattle Judging Contest was held in conjunction with the World Dairy Expo in Madison, Wis., on October 3, 2011. There were 21 teams and 81 contestants present from across the country. The SDSU team was represented by April Johnson, Heron Lake, Minn.; Johnna Schuur, Sauk Centre, Minn.; Angela Sellner, Sleepy Eye, Minn.; and Jennifer Vander Wal, Pipestone, Minn. The contest included 12 classes with six sets of reasons. The SDSU team tied for 11th place overall. April Johnson placed 13th as an All-American Judge and was ranked 12th overall and 9th with Guernsey. In the Milking Shorthorn Classes the top 11 students had a tied score with Angela Sellner placing 10th, two points from a perfect score. The team also placed eighth overall with Milking Shorthorns, Holsteins and Brown Swiss classes. The SDSU team was coached by Stephen Crego, dairy farm manager and lecturer.

Earlier in the year students also participated in the Accelerated Genetics Intercollegiate Judging Contest in Viroqua, Wis., where 16 teams competed in four different dairy breeds with five sets of reasons. The SDSU team was represented by April Johnson (dairy production/ag education major), Angela Sellner (dairy production major), Johnna Schuur (dairy production/dairy manufacturing major), and Jennifer Vander Wal (ag journalism major). The team placed third overall, second in Jerseys and fifth in Guernsey's and fifth overall in



reasons. Angela Sellner was the third highest individual as well as third in Jerseys. Chelsey Johnson (ag communication/English education major), Alisha Vander Wal (dairy production major) and Holly Schmitt (dairy production/dairy manufacturing major) were other team members that attended the judging contest.

In January 2011 a team consisting of Katie Nelson, April Johnson, Jennifer Vanderwal, and Johnna Schuur participated in the Fort Worth Stock Show Dairy Judging Contest. The team traveled to Oklahoma where they met and practiced together with judging teams from Kansas State, Oklahoma State and North Dakota State. The teams traveled together and visited five farms in the Stillwater, Okla., area. They had the opportunity to judge Guernseys, Jerseys, Aryshires and Holsteins. The Fort Worth contest took place January 16 and consisted of 10 classes and four sets of reasons. The SDSU team placed sixth just missing fifth place by four points. Individually, Jennifer placed as the second highest individual within the Holstein breed and fifth overall and April was awarded fourth highest individual in Oral Reasons.

Drs. Arnold Hippen and Kenneth Kalscheur coached the 2011 Intercollegiate Dairy Challenge Team that consisted of Melissa Lax, Katelyn Crocker, Heather Jon, and Cory Zelfel. The team traveled to Hickory, N.C., to participate in the intercollegiate contest and received silver placing.

## STUDENT ACCOMPLISHMENTS

**Samantha Erickson**, top dairy products judge in the nation in 2010, participated along with coach Dr. Bob Baer in the 2011 Quality Check Dairy Leadership Conference in St. Louis, Mo.

**Kevin Herrick** received the John Brandt Fellowship for his Ph.D. program. Dr. Hippen was Kevin's advisor but Dr. Kenneth Kalscheur has taken over those duties. Kevin received the first place award in the Land O'Lakes, Purina Feed LLC Graduate Student Poster Contest-Ph.D. Division at the American Dairy Science Association annual meetings in New Orleans.

**Angela Manthey**, was the recipient of the Alltech Fellow for supporting her M.S. program under the guidance of Dr. Kalscheur.

**Kamal Mjoun**, who gained his Ph.D. under the guidance of Dr. Kalscheur, received the National Milk Producers Federation Richard M. Hoyt Award from the American Dairy Science Assn.

**Morgan Petersen** won the undergraduate research award under the Griffith and Bentley undergrad-

uate research program 2010-11. Dr. Sanjeev Anand serves as her research advisor.

**Javier Sabbia**, who received his master's under the guidance of Dr. Kalscheur, was an Alltech Fellow in dairy science.

**Ana Schweer** and **Austin Asche**, dairy production and manufacturing majors, respectively served as Ag-Bio Ambassadors.

**Kartik Shah**, **Ananya Biswas**, **Diwakar Singh**, **Som Kanhal**, **Rebecca Hanson** and **Taylor Lias** participated in the Idaho Dairy Technology Society Dairy Product Development Contest in Sun Valley, Idaho.

Numerous students participated in internships during summer 2011. Organizations and locations included Alta Genetics, Baraboo, Wis.; Kemps LLC, Minnesota; Glanbia Foods USA, Idaho; Davisco Foods, South Dakota; Kraft Foods, IL; First District Association, Minnesota; Saputo Cheese, Black Creek, Wis.; and several others, including home farms.

## DAIRY PRODUCTS

SDSU's Dairy Products Judging Team placed first in All Products in the 2011 90th Collegiate Dairy Products Evaluation Contest, held November 5 at Kraft Technology Center in Glenview, Ill. This was the fourth year in a row that the Dairy Products Judging Team won the national championship. The team placed first in milk, butter, yogurt and Cheddar cheese. A total of 40 undergraduate and graduate contestants from 11 U.S. and Canadian universities participated in the contest. SDSU team members were Luke Rensink, Freeman, S.D.; Justin Ochsner, New London, Minn.; Angie Klaers, Wabasso, Minn.; and Som Khanal, Putalisadak Kathmandu, Nepal. Rensink placed first overall and first in ice cream, second in butter and third in yogurt and Cheddar cheese. As top judge in the nation, Rensink received the Robert Rosenbaum Award. Ochsner placed fourth overall, second in Cheddar cheese and fourth in yogurt and butter. Klaers was fifth overall, and he placed first in butter and second in milk. As the top butter judge, Klaers received the Bert Aldrich Award. In the graduate student contest, Khanal placed first overall and was first in yogurt, Cheddar cheese, ice cream and cottage cheese. As top judge in the graduate contest, Khanal received the Genevieve Christen Award. For placing first overall, the SDSU team won the Shirley Seas Memorial Scholarship. This scholarship is in memory of Shirley Seas, who coached the SDSU team for 21 years. The team was coached by Dr. Lloyd Metzger, associate professor of dairy science and Alfred Chair in Dairy Education, and Eric McNeel, SDSU student. Dr. Metzger also received the Aurelia and George Weigold Coach of the Year Award. The contest was sponsored by the U.S. Department of Agriculture, the Food Processing Suppliers Association, Chr. Hansen Inc., and the American Dairy Science Association.

## DAIRY CLUB

2011 Officers: April Johnson, President; Mitchell Maher, vice president; Katie Nelson, secretary; Megan Rice, treasurer; Grace Liebenstein and Chelsey Johnson, historians; Alisha Vander Wal and Megan Forst, activities coordinators; and Chelsey Johnson and Jennifer Vander Wal, *Dairy Digest* editors. Advisors were Jake Anderson, Howard Bonnemann, Steve Crego, Drs. Arnold Hippen, Kenneth Kalscheur and Lloyd Metzger. Club members attended ADSA-SAD Regional Conference in River Falls, Wis., in February. In June, club members hosted 35 youth at the eighth annual Jackrabbit Dairy Camp. Other club activities throughout the past year included the Fall Central Plains Dairy Sale, Hobo Day festivities, trip to the World Dairy Expo in October and cheese boxes.





## PROFESSIONAL ACTIVITIES OF FACULTY AND STAFF

Faculty and students together presented numerous papers including refereed publications in scientific journals, abstracts, presentations, book chapters, Extension publications, thesis or dissertations, and Extension presentations. All publications will be listed on our new website at [www.sdstate.edu/ds](http://www.sdstate.edu/ds).

**Dr. Sanjeev Anand** was granted tenure in July 2010. Dr. Anand is the South Dakota State resource person in food safety and was added in the "Food Safety Contacts Directory" of USDA, CSREES, July 2007-present.

**Howard Bonnemenn** served as secretary/treasurer of the South Dakota Dairy Association. He conducted several dairy product judging clinics for South Dakota high schools. Beginning in January 2011 Howard became full-time instructor and dairy plant research manager.

**Dr. Alvaro Garcia** was promoted to professor of dairy science in July 2011. He has been a faculty member in dairy science since 2001 and has developed a strong highly recognized dairy Extension program. Dr. Garcia was invited to speak in Peru, Turkey and El Salvador. He was also appointed by

the U.S. Secretary of Agriculture to the Agricultural Advisory Committee (ATAC) for international trade in animals and animal products.

**Dr. Ashraf Hassan** is a member of the International Animal Agriculture Committee of the American Dairy Science Association, an expert panel on low fat cheese research of the Dairy Management Inc., and member of the editorial board of the *Journal of Dairy Science*. He returned to his faculty position after a year-long sabbatical with the dairy industry in Egypt.

**Dr. Arnold Hippen** was posthumously awarded the American Feed Industry Association Award of the American Dairy Science Association at the annual meetings in New Orleans, La., in recognition of his leadership and research work in dairy cattle nutrition.

**Dr. Kenneth Kalscheur** was an active participant on a NC multistate research project; NC 1042, Management Systems to Improve the Economic and Environmental Sustainability of Dairy Enterprises. He was invited to speak on distillers grains at conferences in Japan and Italy.

**Stephen Crego** served his first full year as manager of the Dairy Research and Training Facility. He also coached the Dairy Cattle Judging Team.

**Dr. Lloyd Metzger** serves as the director of the Midwest Dairy Foods Research Center and the executive secretary of the North Central Cheese Industries Association. He is a member of ADSA Dairy Foods Milk Protein and Enzyme Committee, president of the ADSA Dairy Foods division, and member of the editorial board of the *Journal of Dairy Science*.

**Dr. Vikram Mistry** served as the U.S. editor of the French journal of dairy science and technology, *Le Lait*, and associate director of the Midwest Dairy Foods Research Association. He also serves on the Boards of the American Dairy Association of South Dakota, South Dakota Dairy Producers, and advisor to the North Central Cheese Association and the South Dakota Dairy Producers. He was the recipient of the first Dr. Harold and Barbara Bailey Award for Excellence in Academic Department Leadership at SDSU.

## SCHOLARSHIPS

Our students were once again the beneficiaries of the generosity of many alumni and industry. At the spring 2011 banquet, 189 attendees witnessed the award of 83 scholarships and awards totaling \$69,490 as follows:

Alfred Hermann Rishoi (2 @ \$550 each), \$1,100  
 Associated Milk Producers Inc., \$1,000  
 Clyde Helsper Memorial, \$500  
 Dairy Club (2 @ \$500 each), \$1,000  
 Dairy Connections, \$1,000  
 Dairy Science Department, \$400  
 Danisco (2 @ \$1,000 each), \$2,000  
 David H. Henry Memorial, \$200  
 Davisco Foods International,  
 and Jay Headly Memorial, \$1,500  
 Dean Foods-Land O'Lakes, \$1,000  
 Derald, \$500  
 Emery Bartle Memorial, \$5,000  
 Gilbert T. and Olga Gilbertson Memorial, \$550  
 H. C. Olson, \$500  
 Heifers for State, \$500  
 I-29 Dairy Extension, \$500  
 James Marvel Memorial, \$450  
 John Anderson Memorial, \$2,000  
 John C. Gross, \$1,000  
 Joseph Van Treeck, \$1,300  
 Kemp's LLC, \$1,500  
 Kirk Mears Memorial, \$950  
 Land O'Lakes-Region 65, \$250  
 Midwest Dairy Association  
 (2 @ \$1,500 each), \$3,000  
 North Central Cheese Industries Association  
 (2 @ \$1,800, 1 @ \$1,400), \$5,000  
 North Central Cheese Indust. Assn.-Recruiting  
 (2 @ \$500), \$1,000  
 Ross Baker Memorial, \$600  
 Ryan Graber Memorial, \$1,000  
 Saputo Cheese, \$1,000  
 Schreiber Foods, \$1,500  
 Shirley Seas Memorial, \$500

## UPDATE: DAIRY RESEARCH & TRAINING FACILITY



Our dairy farm has approximately 150 certified and registered milking cows, including approximately 50 Brown Swiss, and a total herd of 300 animals. The rolling herd average attained a record of just over 26,400 pounds per year. The herd is used for research projects primarily in the cattle nutrition area and also for teaching. In addition, K-12 students also benefit through the Dairy Camp and cattle judging contests that are hosted at the farm. Mitch Maher and Matthew Holdvogt serve as student managers. Several personnel changes occurred in 2011. Steve Crego completed his first year as manager, Melissa Schmitt became assistant manager, and Brooks Varnum is the ag foreman.

SD State Dairy Association  
 (4 @ \$1000 each), \$4,000  
 Susan Hawkins, \$1,000  
 T. M. Olson, \$600  
 Todd and Erica Stahl, \$1,000  
 Valley Queen Cheese Factory, \$4,000  
 Walt and Yvonne Wosje, \$1,000  
 WOW Logistics' Donald E. Utschig, \$1,000  
 J.J. Yee, \$500

### Awards

Dairy Challenge (4 @ \$150), \$600  
 Dairy Judging Manufacturing, \$150  
 Dairy Judging Production, \$150  
 Forbes Leadership, \$300  
 Graber-Ford, \$100  
 Students Employee Excellence (2 @ \$250), \$500  
 Alfred Tobkin Memorial (4 @ \$110 each), \$440  
 Howard Voelker Memorial (3 @ \$200 each), \$600

### Incoming Students Scholarships

Dairy Science, \$500  
 Dairy Science Faculty (2 @ \$800 each), \$1,600  
 Royal and Helen Donor in Dairy Prod., \$550

Clyde G. Helsper Dairy Fieldmen's, \$1,000  
 Midwest Dairy Association/SD Division  
 (2 @ \$1,000), \$2,000  
 SD Dairy Fieldmen's Association  
 (5 @ \$1,000), \$5,000  
 SD Dairy Association, \$1,250  
 William and Marge Kallemeyn and Sons, \$850  
 Valley Queen Cheese Factory, \$1,000

## NATIONAL DAIRY PROMOTION & RESEARCH BOARD SCHOLARSHIPS

SDSU dairy science students won five of the 19 scholarships awarded by the National Dairy Promotion and Research Board in nationwide competition. Students were Cassandra Hulstein, April Johnson, Emily Jungemann, Molly Paterson and Ana Schweer.

## NEW AND ONGOING FUNDS FOR SUPPORTING RESEARCH

Anand, S. K., Hegerfeld, J., Krishnan, P., Muthukumarappan, K., Wang, X. Recruitment and retention of a diverse population of food safety students using novel approaches to market enhanced programs. 09/01/2008 to 08/31/2012. USDA/CSREES EPT North Dakota State University. \$88,866.

Anand, S. K., Muthukumarappan, K. Inactivation of aerobic spore formers in nonfat milk and nonfat milk concentrate by ultrasonic transmission. 12/01/2010 to 12/31/2011. Dairy Management Inc. \$42,000.

Anand, S. K. A study to evaluate the effectiveness of modified CIP for cleaning of bacterial biofilms on whey RO membranes. 01/01/2011 to 12/31/2011. Midwest Dairy Foods Research Center. \$31,169.

Anand, S. K., Hassan, A. 2010 Literature Review: Development and control of membrane biofilms in dairy/food/water industry. 06/01/2010 to 12/31/2011. Midwest Dairy Foods Research Center. \$4,998.

Anand, S. K., Hassan, A. Evaluation of different cleaning agents for the removal of membrane biofilms. 01/01/2010 to 06/30/2011. Midwest Dairy Foods Research Center. \$42,400.

Anand, S. K., Hassan, A. Evaluation of different cleaning agents for the removal of membrane biofilms. 01/01/2010 to 12/31/2010. Midwest Dairy Foods Research Center. \$39,996.

Garcia, A. D., Kalscheur, K. F., Rosentrater, K., and Wright, C. Producer surveys and outreach/Extension programs for livestock producers. 05/01/2007 to 04/30/2012. USDA/Agricultural Research Service. \$72,000.

Hassan, A. Role of bacterial cell-dairy separation membrane interaction on biofilm formation. 01/01/2011 to 12/31/2011. Midwest Dairy Foods Research Center. \$28,831.

Hassan, A. Suitability of commercial strains of lactic acid bacteria for reduced-fat cheese making. 01/01/2011 to 11/30/2011. Kraft Sponsored Research Program. \$45,446.

Hippen, A. R., Herrick, K., Kalscheur, K. F. Abomasal infusion of butyrate in dairy cattle. 09/01/2011 to 09/01/2013. Nutriad Inc. \$35,856.

Hippen, A. R., Kalscheur, K. F. Methionine and lysine supplementation to dairy cows. 09/01/2010 to 10/01/2013. Kemin Industries Inc. \$77,627.

Hippen, A. R., Kalscheur, K. F., Schingoethe, D. J. Monensin in dairy cow diets containing high RUFAL from corn distillers grains and low fractions of physically effective fiber. 12/01/2010 to 12/31/2012. Elanco Animal Health. \$121,059.

Hippen, A. R., Kalscheur, K. F., Schingoethe, D. J. Protocol for Steam-Flaked Soybeans in Dairy Cow Diets. 12/17/2009 to 12/17/2011. Midwest EnRG Flakes, LLC. \$52,000.

Hippen, A. R., Schingoethe, D. J., Kalscheur, K. F. Examination of Butyrate as a feed supplement for dairy cattle. 07/01/2010 to 06/30/2012. Nutriad Inc. \$35,358.

Kalscheur, K. F. Alltech Fellowship in Dairy Science. 08/01/2010 to 07/31/2012. Alltech. \$55,200.

Kalscheur, K. F. Evaluation of commercial-scale pelleted DDGS in dairy cattle diets. 08/01/2010 to 07/31/2012. USDA-ARS. \$25,000.

Kalscheur, K. F. Rotational dryland cropping to reduce fossil fuel inputs. 09/01/2010 to 08/31/2012. USDA/NIFA. \$34,000.

Kalscheur, K. F. Ruminal protein degradability of processed soybean meals. 01/01/2011 to 12/31/2011. South Dakota Soybean Processors (SDSP) LLC. \$11,340.

Kalscheur, K. F., Schingoethe, D. J. New uses of distillers grains products in dairy cattle feeding. 05/01/2007 to 04/30/2012. USDA/Agricultural Research Service. \$306,859.

Metzger, L. E. Development of modified milk protein concentrates and native casein concentrates that can be utilized as an alternative to rennet casein in process cheese product applications. 01/01/2011 to 12/31/2012. Dairy Management Inc. \$105,000.

Metzger, L. E. Manufacture of modified MPC utilizing injection of carbon dioxide. 01/01/2011 to 12/31/2011. Dairy Management Inc. \$63,000.

Metzger, L. E., Hassan, A. Evaluation of NFDM and MPC in yogurt formulations. 10/01/2008 to 12/31/2011. Dairy Management Inc. \$70,791.

Metzger, L. E., Mistry, V. V. Institute for Dairy Ingredient Processing (IDIP Application Lab). 01/01/2011 to 12/31/2011. Dairy Management Inc. \$166,950.

Schingoethe, D. J., Hippen, A. R., Kalscheur, K. F. Maximize the use of canola meal in dairy feeds: amino acid nutrition and metabolism. 07/01/2010 to 03/31/2013. Canola Council of Canada. \$299,000.

## OUTREACH

### Area Dairy Expos

Alumni, students, staff and faculty of the Dairy Science Department were involved in various activities of the 2011 Central Plains Dairy Expo. Dairy Club and staff assisted with registration and other duties. Faculty provided presentations on various topics and conducted a cheese tasting contest. Faculty also participated in the World Dairy Expo in Madison, Wis.

### North Central Cheese Industries Association

Dr. Lloyd Metzger serves as executive secretary and Dr. Vikram Mistry as advisor to the NCCIA. The annual meeting was held in Rochester, Minn., in October and attracted more than 130 cheese makers and suppliers from the upper Midwest.

## K-12 STUDENTS

### Dairy Camp

The Dairy Club hosted the eighth annual Dairy Camp in June 2011 for youth ages 8-18. The 35 participants visited a commercial dairy, Crosswinds Jersey Farm and SDSU dairy plant, received training on care of heifers, judging, making ice cream, and clipping and showing cattle. Campers showed what they learned in a showmanship contest on the final day of the camp. Parents were invited to attend, and Randy Gross served as a judge for the show.

### High School Visits

Recruiting students is a year-round activity and a priority. Dairy Science Ag-Bio Ambassadors visited high schools in South Dakota, Iowa and Minnesota. In addition, the department visited schools in Iowa, Minnesota and South Dakota.

## EXTENSION

### Sixth Annual I-29 Dairy Conference

More than 200 dairy farmers improved their understanding of sustainability concepts at an I-29 Regional Dairy Conference held in Sioux Falls. The theme was "Sustaining Our Dairy Families, Farms and Rural Communities," with a focus on Animal Well Being. Temple Grandin, Colorado State University, was the featured keynote presenter on the issue of Animal Well Being.

### Milk Quality Workshop

Dr. Alvaro Garcia led a milk quality workshop at a large local dairy as well as several milk quality clinics for dairy employees. Milk quality workshops were also conducted in Central America through Winrock International and USAID.

### Dairy Science at World Dairy Expo

The Dairy Science Department and the South Dakota Department of Agriculture jointly displayed at the World Dairy Expo in Madison, Wis., in October. The booth highlighted dairy development efforts, dairy education, research activities and opportunities in South Dakota. Many interested people and alums stopped by to learn about our dairy industry and education and to say hello.

### On-farm Processing Workshop

SDSU Extension and the South Dakota Value-Added Agriculture Development Center hosted an on-farm processing workshop for dairy producers interested in processing milk at the farm. Speakers included experts from the Dairy Science Department, South Dakota Department of Agriculture and experienced on-farm processors from Minnesota and Wisconsin.

### Alums and Students

Visit the careers section of our website ([www.sdstate.edu.ds](http://www.sdstate.edu.ds)) for job opportunities in dairy science. Give us a call for details on positions that interest you.

## YEARS OF SERVICE

Vikram Mistry completed 25 years of service to the SDSU Dairy Science Department. He joined the department in 1986 as assistant professor. He was subsequently promoted to associate professor, and professor and became department head in 2002.





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## RESEARCH HIGHLIGHTS



Faculty research activities are supported by the Agricultural Experiment Station and external grants. The broad areas of research are as follows:

### **Metabolic Relationships in Supply of Nutrients for Lactating Cows**

*Drs. Arnold Hippen, David Schingoethe and Kenneth Kalscheur.* The long-term goal is to improve the efficiency of milk production, cow health and longevity, and thus promote environmental and economic sustainability in the U.S. dairy industry. The approach to achieve this goal is to systematically identify those biological and nutritional management processes that will provide the greatest improvements in milk production and sustainability of dairy systems.

### **Management Systems to Improve the Economic and Environmental Sustainability of Dairy Enterprises**

*Drs. Kenneth Kalscheur and Arnold Hippen.* The purpose of this project is to develop decision support systems that address nutrition, management, environmental impacts and economics of 1) calves and heifers and 2) lactating and dry cows.

### **Enhancement of Quality, Safety and Health Attributes of Milk and Dairy Products**

*Dr. Sanjeev Anand.* The purpose of the present investigation is to study the persistence of spoilage and pathogenic microflora under dairy farming environments and develop HACCP-based system approach to control the pathogens. The study also aims at establishing cross contamination between

dairy farms and dairy processing plants due to the presence of certain infectivity cycles. Another purpose of the study is to enhance the health attributes of dairy products by enriching them with functional components like bioactive peptides, conjugated linoleic acid and riboflavin to enhance health attributes.

### **Manufacture, Functionality, and Application of Protein Based Dairy Ingredients**

*Drs. Lloyd Metzger, Vikram Mistry, Ashraf Hassan and Kasiviswanath Muthukumarappan.* This project will develop manufacturing processes for protein-based dairy ingredients that can serve domestic and export markets.

### **Strategies to Increase the Utilization of Coproduct and Traditional Feeds by Lactating Cows**

*Drs. David Schingoethe, Arnold Hippen, Kenneth Kalscheur and Alvaro Garcia.* This research will evaluate the use of new ethanol coproducts and other byproduct feeds in diets of lactating cows.

### **Use of Biofuel Coproducts to Improve Nutrient Utilization in Dairy Cattle**

*Drs. Kenneth Kalscheur, Arnold Hippen, David Schingoethe and Alvaro Garcia.* This project examines nutrient utilization of dairy-cattle-fed diets using biofuel coproducts to reduce losses to the environment.

### **Flavor, Texture, and Nutritional Enhancement of Milk and Dairy Products**

*Dr. Robert Baer.* A method that inhibits and reverses light-induced oxidized off-flavor in milk will be developed. A method to reduce pink discoloration, a defect in Cheddar and colby cheeses, will be evaluated. Frozen desserts will be produced with improved nutrition and texture.

### **Metabolic Conditioning of Early Lactation Dairy Cows**

*Drs. Arnold Hippen, Kenneth Kalscheur and David Schingoethe.* The approach of these investigations focuses on regulatory mechanisms of blood glucose concentrations and aids for more rapid attainment of normal carbohydrate status through dietary intervention.

### **Role of Exopolysaccharides-producing Cultures in Biofilm Formation and as a Texturizing Agent**

*Drs. Ashraf Hassan and Vikram Mistry.* The objective of this work is to optimize manufacturing conditions for the production of 50 percent reduced-fat and low-fat cheddar cheeses with characteristics similar to those in the full fat types using exopolysaccharide-producing cultures, to develop novel functional ingredients from whey containing exopolysaccharides, and to study the formation of biofilms on whey reverse osmosis membranes as a cause of membrane fouling.