

South Dakota State University

# Open PRAIRIE: Open Public Research Access Institutional Repository and Information Exchange

---

The Jackrabbit Dairy & Food Review

Department of Dairy and Food Science

---

Winter 2020

## Jackrabbit Dairy & Food Review, Winter 2019-2020

Vikram V. Mistry

Follow this and additional works at: [https://openprairie.sdstate.edu/dairy\\_review](https://openprairie.sdstate.edu/dairy_review)



Part of the [Dairy Science Commons](#), and the [Food Science Commons](#)

---

# Jackrabbit Dairy & Food Review

Winter 2019-2020

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

## DAIRY & FOOD SCIENCE DEPARTMENT

### Faculty

**Sanjeev Anand**, Professor, Dairy Manufacturing  
**Howard Bonnemann**, Lecturer, Dairy Manufacturing  
**Clifford Hall**, Professor, Food Science  
**Srinivas Janaswamy**, Assistant Professor, Food Science  
**Padmanaban Krishnan**, Professor, Food Science  
**Sergio Martinez-Monteagudo**, Assistant Professor, Dairy Manufacturing  
**Lloyd Metzger**, Professor, Alfred Chair in Dairy Education, Dairy Manufacturing  
**Johan Osorio**, Assistant Professor, Dairy Production  
**Vikram Mistry**, David A. Thompson Endowed Department Head and Professor  
**Maristela Rovai**, Assistant Professor/SDSU Extension Dairy Specialist, Dairy Production  
**Isaac Salfer**, Assistant Professor, Dairy Production

### Emeritus Faculty

**Robert Baer** currently lives in the Black Hills area  
**David Henning** currently lives in Arizona  
**John Parsons** currently lives in Arizona  
**David Schingoethe** currently lives in Brookings

### Staff

**Matthew Badura**, Assistant Director, First Year Advising  
**Steve Beckman**, Manager, Institute of Dairy Ingredient Processing  
**Curtis Braun**, Extension Field Specialist, Food Safety  
**Tracey Erickson**, Extension Dairy Field Specialist III  
**John Haberkorn**, Manager, Davis Dairy Plant  
**Akimoto Ichinomiya**, Assistant Manager, Davis Dairy Plant  
**Peter Linke**, Manager, Dairy Research and Training Facility  
**Monica Markwed**, Secretary, Dairy Bar  
**Kristi Prunty**, Senior Secretary  
**Jayne Raabe**, Program Assistant I  
**Neha Singh**, Postdoctoral Research Associate  
**Vijay Sundaram**, Research Associate II  
**Danielle Tews**, Interim Assistant Manager, Dairy Research and Training Facility  
**Daniel Vander Plaats**, Agricultural Foreman

## MESSAGE FROM THE DEPARTMENT HEAD

Greetings from the Department of Dairy and Food Science at South Dakota State University. Compiled in this newsletter are departmental activities of 2019. Guided by Imagine 2023, the university's strategic plan, our department vision is to be a national and international leader in dairy and food education, research and extension. Continuing 100% placement of our graduates, generous scholarships, endowment and other support from donors help our faculty, staff and students achieve excellence. I am particularly grateful to alumnus David A. Thompson, who through a very generous gift, has endowed the position of department head. This endowment has permanently placed the department in a very strong position for excellence. Our outstanding faculty and staff help make for unique programs through their teaching, research, extension and service efforts. In fiscal year 2019, department faculty members expended over \$1.3 million in external grants through 21 projects to support research, graduate students and researchers. This reflects an approximately 7% increase over the previous year. Their work has direct impact on the industries we serve through the generation of new ideas as well as graduates who take on leadership roles in the industry. In addition, our students clearly demonstrated their excellence through success in national scholarships, judging and leadership activities. Examples include scholarships from the National Dairy Promotion and Research Board, National Dairy Shrine, Institute of Food Technologists, John Brandt Memorial, DFA and others. With the assistance of a committee that includes dairy farmers, industry and faculty, we are developing plans for comprehensive renovations/rebuilding of the Dairy Research and Training Facility with the goal of providing state-of-the-art education and research opportunities that will prepare students for the future. This project is in the early phases of development and planning and will include a major capital campaign in the coming months. Another major need is the renovation of food science laboratories within Berg Agricultural Hall. This will help us expand the food science program for which we now have received IFT approval. As we continue to strengthen our programs and facilities and progress toward fulfillment of the vision, I invite you to join us in spreading the word about the outstanding opportunities, and to visit us at [www.sdstate.edu/ds](http://www.sdstate.edu/ds) or better yet, on campus.

Vikram V. Mistry

David A. Thompson Endowed Department Head  
and Professor of Dairy and Food Science

## DAVID A. THOMPSON ENDOWMENT



The endowment from David A. Thompson was formally instituted in an investiture ceremony hosted by the SDSU Foundation at the South Dakota Agricultural Heritage Museum on campus in April 2019. Approximately 50 people attended the ceremony. This is the first and only endowed department head position at SDSU.



**SOUTH DAKOTA  
STATE UNIVERSITY**  
Department of Dairy and Food Science

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

Phone: 605-688-4116

Fax: 605-688-6276

Email: [vikram.mistry@sdstate.edu](mailto:vikram.mistry@sdstate.edu)

[www.sdstate.edu/ds](http://www.sdstate.edu/ds)

## NEW PERSONNEL

### FACULTY AND STAFF



Hall

**Clifford Hall** joined the department as a professor in food science. Hall holds a Ph.D. and M.S. in food science from the University of Nebraska, and a B.S. in food science from the University of Wisconsin-River Falls. Before SDSU, he was on the food science faculty at NDSU since 1996. At SDSU, his research work will be in the area of pulse quality. He will teach food safety and food product development. He is also director of the National Pulse Quality Program.



Salfer

**Isaac Salfer** joined the department as an assistant professor. Salfer holds a Ph.D. in animal science from Pennsylvania State University, and M.S. and B.S. degrees in animal science from the University of Minnesota. In recognition of his graduate work, he received the National Milk Producers Federation Richard M. Hoyt Award and the Alltech Graduate Student Publication Award from the American Dairy Science Association. Salfer will teach undergraduate and graduate classes and coach the dairy cattle and dairy challenge teams. His research is in dairy herd management.



Singh

**Neha Singh** joined the department as a postdoctoral research associate under Sanjeev Anand. Singh holds a Ph.D. in dairy manufacturing from SDSU, an M.S. in microbiology from Kurukshetra University, India, and a B.S. in bioinformatics from GVM Girls College, India. As a postdoc, her research is in the area of Listeria environmental control and food safety. She also assists with teaching Food Microbiology.



Tews

**Danielle Tews** joined the department as interim assistant manager of the Dairy Research and Training Facility. Tews received a B.S. in dairy production from SDSU. Prior to this position, she worked at various dairies in north central Minnesota and at Accelerated Genetics. Her responsibilities at SDSU include assistance to the farm manager in all aspects of dairy farm operations.



Vander Plaats

**Daniel Vander Plaats** joined the department as an agricultural foreman at the Dairy Research and Training Facility. In this role, he assists the manager and assistant manager in DRTF operations. Vander Plaats held a similar position at the DRTF for six years followed by operating his own livestock operation before returning to SDSU.

### VISITORS

**Randy Gross**, former president of Holstein Association, USA and retired assistant branch manager of Northwest Farm Credit Services of Washington state, served as visiting instructor in dairy production classes. His wealth of experience was most valuable to our students.

**Sergio David Lasso Ramirez, Jessica Halfen, Martha Flores Mancha, Juan Osorio, Josue Carvalho, Luis Moses Sanchez Contreras, Miriam Cabello Olmo, Sheetal Jha and Dely Chavez Garay** visited the department for various periods as interns under Johan Osorio, Sanjeev Anand, Maristela Rovai and Sergio Martinez-Monteagudo.

**Dani Reinhart**, Oklahoma State University, was an undergraduate researcher under the mentorship of Sanjeev Anand and funded by a USDA grant during the summer.

**Walt Wosje**, alumnus and retired CEO of Michigan Milk Producers and retired manager of the CWT program of the National Milk Producers Federation, served as guest lecturer in several classes and conducted individualized practice interviews for students.

Many other visitors from industry and alumni visited the department as guest lecturers, for collaborative work with faculty or just to visit.

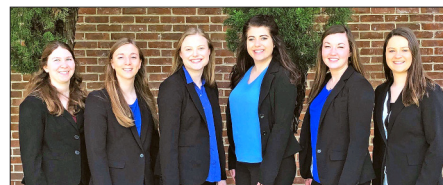
## JUDGING ACTIVITIES

### DAIRY CATTLE



Our Dairy Cattle Judging teams competed in four contests. The first team, consisting of Abigail Hopp, Sanne de Bruijn, Colten Carlson and Ashley Maus, competed at the Eastern States contest in West Springfield, Mass., Sept. 14. Out of 11 teams, SDSU placed eighth overall, seventh in oral reasons. They placed fifth in Ayrshires, fifth in Brown Swiss, and third in Milking Shorthorns. Individually, Hopp placed seventh overall, first in Brown Swiss, and second in Milking Shorthorns. A second team competed at the 26th Annual Accelerated Genetics contest in Viroqua, Wis., Sept. 15. This team included Margaret Socha, Andrew Wilwerding, Rebecka Hoffman and Morgan Kohl. Out of 15 teams, SDSU placed sixth overall, placing third in Guernseys and fifth in Holsteins. Kohl placed fifth in Guernseys individually. At the Eastern States contest in Harrisburg, Penn., Sept. 16, a team including de Bruijn, Carlson and Maus placed 13th overall out of 18 teams. On Sept. 30, team members competed at the 99th National Intercollegiate Dairy Cattle Judging Contest at the World Dairy Expo in Madison, Wis. The contest featured 12 classes from all seven of the major dairy breeds, with six sets of oral reasons. The team competed valiantly in a very difficult contest and placed 15th overall out of 18 teams. de Bruijn placed 31st individually. The teams were coached by Isaac Salfer and Danielle Tews.

### DAIRY CHALLENGE



SDSU students participated in the 2019 North American Intercollegiate Dairy Challenge Academy held March 28-30 in Tifton, Georgia. The team consisted of Abigail Hopp, Calissa Lubben, Jenna Van Wyk, Brooke Engstrom, Alexandra Preszler and Josie Kindwall. Danielle Tews and Johan Osorio coached the team. The main objectives are to provide dairy education and networking for four-year dairy programs as well as further engage university and industry professionals in teaching contemporary dairy issues. The event began with students learning from industry experts on milking protocols, feed center management, cow comfort and other areas related to dairy management. Later that day, students received training on software and financial analysis of dairy farms. On the next day, students performed an on-farm evaluation. On the final day, students presented their farm evaluations and conclusions to the judging panel and fielded questions from the judges. Presentations were evaluated based on the analysis and recommendations. The evening concluded with a reception and awards banquet. Earlier in the year, the team also participated in the 15th Midwest Regional Dairy Challenge held in Freeport, Illinois. The SDSU team consisted of Engstrom, Hopp, Preszler and Van Wyk.

### DAIRY PRODUCTS



The SDSU Dairy Products Judging Team placed second in All Products at the 2019 Collegiate Dairy Products Evaluation Contest, held April 17 at the Cheese Industry Conference in Madison, Wis. Students evaluated the appearance, texture and flavor of six dairy products (milk, butter, Cheddar cheese, ice cream, yogurt and cottage cheese). Team members were Erika Franzen-Ackerman, Han Si, Madison Okerstrom, Sanne de Bruijn and Mohamed Elfaruk. Lloyd Metzger and Ahmed Hammam coached the team. The team placed first in butter, Cheddar cheese and ice cream, second in milk, third in yogurt and eighth in cottage cheese. In the graduate student contest, Elfaruk placed second overall. SDSU won All Products at the 2019 Midwest Regional Collegiate Dairy Products Judging Contest, held April 6 at Continental Dairy Facilities in Coopersville, Mich.

The team placed first in Cheddar cheese, butter, cottage cheese and yogurt. Franzen-Ackerman placed first overall and first in butter, yogurt and cottage cheese. de Bruijn placed second overall, and second in milk, Cheddar cheese and cottage cheese. In the graduate student contest, Elfaruk won overall and also was first in milk, Cheddar cheese and cottage cheese.

## DAIRY CLUB



**2019 Officers:** Jenna Van Wyk, president; Sanne de Bruijn, vice president; Ethan Johnson, secretary; Brooke Engstrom, treasurer; Rebecka Hoffman and Whitney Ten Napel, historians; Calissa Lubben and Cassidy Hacker, activities coordinators; and Abigail Hopp, Dairy Digest editor. Sophia Linne-mann, Elizabeth Krienke, Rebecka Hoffman, Anna Marie Sachs, Tiffany Van Buren, Dairy Digest assistant editors. Advisers were John Haberkorn, Sergio Martinez-Montegudo, Peter Linke and Danielle Tews. In January, club members attended the ADSA-SAD regional conference hosted by North Dakota State University. Approximately 400 students and advisers from universities across the Midwest attended. In June, club members hosted 62 participants ranging in age from 8 to 18 at the 15th annual Jackrabbit Dairy Camp. Other club activities included the South Dakota State Fair, College of Agriculture, Food and Environmental Sciences Ice Cream Social, National Ag Day and ditch cleaning. The club was also busy with cheese boxes for which students cut, packaged and shipped almost 8,000 pounds of cheese around the country under the leadership of co-chairs Ethan Johnson, Ashley Maus and Whitney Ten Napel.

## FOOD SCIENCE CLUB



**2019 Officers:** Jessica Christoffer, president; Dana Edleman, vice president; Elise Emmick, secretary; Elizabeth Steever, treasurer; Allison Kolbe, Prexy Council rep; Padmanaban Krishnan, adviser; Srinivas Janaswamy, co-adviser. In September, the club kicked off the 2019-2020 academic year with a pizza party meeting to welcome new and returning members. In October, the club painted pumpkins. The November meeting consisted of a Thanksgiving pot-luck and games. Members also participated in a fundraising activity, which involved making and selling Jackrabbits cookies to employees and students in the College of Agriculture, Food and Environmental Sciences. Members volunteered with Feeding Brookings, and overall, the club saw an increase in membership and participation.

## STUDENT ACCOMPLISHMENTS

Our students participated and competed in numerous activities throughout the year. Below are a few examples of their excellent accomplishments.

**Kayla Biel** and **Elizabeth Krienke** were selected to be Princess Kay finalists in Minnesota.

**Sanne de Bruijn** received the Priority One IAC Scholarship, and S.D. Bankers Association Scholarship. She also served as an Ag Ambassador for the college and traveled to various high schools in the region to promote college programs.

**Sanne de Bruijn** and **Erika Franzen-Ackerman** received National Dairy Shrine Scholarships. These were presented at the annual banquet of the National Dairy Shrine at the World Dairy Expo in Madison, Wisconsin.

**Sanne de Bruijn**, **Margaret Socha**, **TJ Jacoby** and **Ashley Maus** each received a National Dairy Promotion and Research Board Scholarship. A total of 11 scholarships were presented nationwide.

**Dairy Digest**, an annual publication of the Dairy Club, placed first at the annual meeting of the American Dairy Science Association. Abigail Hopp served as the editor.

**Brooke Engstrom**, **Morgan Kohl**, **Shelby Kuechle**, **Calissa Lubben** and **Sanne de Bruijn** were selected to serve as S.D. Dairy Ambassadors under Midwest Dairy. They promoted the dairy industry at various venues throughout the year.

**Maryam Enteshari**, a Ph.D. student under Sergio Martinez-Montegudo, received a MN-IFT Scholarship and Scholarship America.

**Ahmed Hammam**, a Ph.D. student under Lloyd Metzger, received a John Brandt Memorial Scholarship.

**Meghan Hettinga** was selected to participate in the sixth Jersey Youth Academy in Columbus, Ohio. She was one of 36 participants from 17 states.

**Jenna Kerkaert** participated in the National FFA convention in Indianapolis. Her team received gold placings and was in the top 10 from among 42 teams.

**Achyut Mishra**, **Pratibha Chaudhary**, **Shayanti Minj** and **Shouyun Cheng**, all graduate students, placed fourth in the Idaho Milk Processors Association dairy products contest.

**Bipin Rajpurohit**, a master's student under Padmanaban Krishnan, received a MN-IFT Scholarship and a Travel Award. He also received second place in the Quality Assurance Division Graduate Poster Competition at the IFT19 Annual Meeting and Food Expo in New Orleans.

**Fernanda Rosa**, a Ph.D. candidate under Johan Osorio, received the Midwest ADSA Young Scholar Award.

**Neha Singh** received a Graduate Teaching Award from the Graduate School in recognition of her excellence in teaching as a GTA under Sanjeev Anand for food microbiology labs (MICR 311L).

**Karl Vallin** received the Orville and Enolia Bentley undergraduate research award to conduct research under the mentorship of Srinivas Janaswamy.

**Tiffany Van Buren** was the recipient of a DFA Scholarship. She also served as a counselor for New Student Orientation.

**Maisie Walter** and **Brooke Engstrom** each received a MDI scholarship.

## CAREER OPPORTUNITIES

Our majors continue to offer outstanding career opportunities for internships and permanent positions. To help, we invite prospective employers to interview students and also send student resumes to employers. In 2019, we invited our Jackrabbit Dairy Council members and Davis Dairy Plant donors to visit and conduct interviews for summer internships and permanent positions. Prospective employers specifically for dairy production and food science majors were also invited. Eighteen companies visited the department and conducted 158 interviews and follow-up onsite interviews. Job offers for permanent positions and summer internships are being finalized.



## 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, theses or dissertations and extension presentations. All publications are listed on our website at [www.sdsu.edu/ds](http://www.sdsu.edu/ds).*

**Dr. Sanjeev Anand**, a faculty member since 2006, teaches and conducts research in the areas of dairy microbiology and food safety. He mentors undergraduate researchers as well as graduate students. Anand's research is in the areas of biofilm development and control, control of spores in dairy processing, nonthermal methods for improving product quality, encapsulated dairy products with enhanced health benefits, Listeria control in ice cream, and food safety education. He serves as our representative to the Functional Genomics Core Facility, the Van D. and Barbara B. Fishback Honors College, Briggs Library, and member of CAFES P and T Committee. He also serves on the editorial board for the *Journal of Dairy Science*, and is a member of the Dairy Foods Division, and Foundation Board of ADSA. He received the 2019 SDSU Chapter of Gamma Sigma Delta teaching award.

**Dr. Jill Anderson** joined the department as assistant professor in 2012 and received tenure and promotion to associate professor in 2018. She taught several classes, and established a research program in ruminant nutrition, with an emphasis on calves and heifers and coached the dairy cattle judging team. After 15 years of service and a productive career, Anderson left the department and returned to Ohio.

**Howard Bonnemann** has been a faculty member since 1997 and teaches a wide range of classes. He serves as academic adviser to all undergraduate students in the department. He is the assessment coordinator for the department and the College of Food, Agriculture and Environmental Sciences representative on the University Assessment Committee. He is also the department curriculum coordinator. Bonnemann has conducted FFA dairy products judging clinics across the state and serves as the executive secretary for the S.D. Dairy Association. Howard and Dr. Padmanaban Krishnan led the effort to prepare the application for Institute of Food Technologists (IFT) Approval of the Food Science major.

**Tracey Erickson** is Extension dairy field specialist based in the Watertown Regional Center. She is a member of the I-29 Moo University Consortium, a collaborative outreach program for dairy education in South Dakota, North Dakota, Minnesota, Iowa and Nebraska. She serves as the secretary of the South Dakota Dairy Field Representatives Association. She is serving on the Central Plains Dairy Foundation board of directors, which is helping to build the newly formed 501(C)3 Foundation with a mission of investing in positive, proactive programming to support the dairy industry in the I-29 corridor. Erickson serves on the Dairy Fest Committee and is the coordinator for the S.D. Dairy Ambassador program sponsored by Midwest Dairy. In June 2019, she completed her final term on the Professional Staff Advisory Council, having served 10 years representing SDSU/NFE Extension employees.

**John Haberkorn** is the manager of the Davis Dairy Plant where he developed and led several new programs for the plant, including student edition cheeses, GMP program, development and production of a range of flavored cheeses, and a positive release program. All initiatives involve extensive student training. He provides tours of the plant and is co-adviser to the Dairy Club.

**Akimoto Ichinomiya**, assistant manager of the Davis Dairy Plant, oversees operations and provides training to students. He and his wife, Tomoko, were recognized with the Dorothy and Eugene Butler Human Rights Award in recognition of their work in the Brookings community.

**Dr. Srinivas Janaswamy** joined the department as assistant professor in 2016. He teaches several food science classes and leads a research program on functional carbohydrates with an emphasis on the design and development of novel carriers of bioactive compounds. His program also focuses on agricultural residues toward biodegradable packaging and water purification materials. He has published 60 peer-reviewed journal articles, edited one book and one special journal issue, and advised two graduate students and three visiting scholars. In 2019, Janaswamy received SDSU's faculty award for Global Engagement for his international collaborative research efforts.

**Dr. Padmanaban Krishnan** conducts research in food science and teaches several food science classes. He is past president of the Great Plains subsection of the Institute of Food Technologists and co-chair of the Vitamins, Lipids and Minerals Technical Committee of the American Association of Cereal Chemists International. Krishnan works collaboratively with university and food industry scientists in the areas of wheat, corn and oats

research and value-added processing. He directs the activities of the Crop Quality Laboratory at the Research Park at SDSU. He has received several USDA-NIFA research grants and has served on grant-review panels for NIFA and NSF. He has a patent pending for Vacuum Dough Expansion System for predicting bread dough rheological behavior. He serves as adviser to the Food Science Club. Krishnan and Howard Bonnemann led the effort for acquiring IFT Approval of the food science major. Krishnan introduced high school students to food science during the summer scholars' program.

**Peter Linke** is manager of the Dairy Research and Training Facility overseeing all aspects of farm operations and helping coordinate research and teaching activities. He planned and oversaw numerous upgrades to the farm facilities. The farm hosted hundreds of K-12 students for activities such as Little I and FFA judging, and Dairy Camp. He organized and led efforts for showing our cows/heifers at the Minnesota and South Dakota state fairs and World Dairy Expo. Linke has been with the department in various capacities since starting as a freshman in 2000, graduating in 2004.

**Dr. Sergio Martinez-Monteagudo** joined the department in 2016 and added expertise in unit operations, including high-pressure homogenization and cavitation, to the manufacturing program. He teaches Dairy Chemistry and Dairy Product Processing classes and Lab Techniques and Seminar for graduate students. He is co-adviser to the Graduate Student Safety Committee and Dairy Club. He served as adviser to five graduate students and two visitors.

**Dr. Lloyd Metzger** served as director of the Midwest Dairy Foods Research Center and the executive secretary of the North Central Cheese Industries Association. He is a member of the ADSA Dairy Foods Milk Protein and Enzyme Committee and of the editorial board of the *Journal of Dairy Science*. He coached the dairy products judging team and was an expert judge at the World Cheese Contest. SDSU placed first at the regional and second at the national contests in 2019. He is chair of the Dairy Products Judging Committee that oversees the national dairy products judging contest. He conducted workshops on cheese making for several groups. He served as adviser to four graduate students. For excellence in teaching, Metzger received the IDFA Teaching Award of the ADSA.

**Dr. Vikram Mistry** served as associate director of the Midwest Dairy Foods Research Association. He served on the boards of the American Dairy Association of South Dakota, South Dakota Dairy Producers, American Dairy Science Association Foundation, and adviser to the North Central Cheese Association and the South Dakota Dairy Producers. In 2019, he was named the David A. Thompson Endowed Department Head and Professor of Dairy and Food Science.

**Dr. Johan Osorio** joined the department in 2016 with expertise in nutrigenomics. He was an invited speaker to events in China, Portugal, Mexico, Brazil and the U.S. Particularly notable is his invitation to serve as co-chair for an ADSA Discover Conference. He served as adviser to four graduate students and hosted several interns. He co-taught the Dairy Farm Operations and Ruminology classes and is a member of the IACUC Committee.

**Kristi Prunty** joined the department as secretary in 2015 and was promoted to senior secretary in 2019. She has numerous duties, including receptionist and monitoring of accounts and the department Facebook page. She also assists the Dairy Club and Food Science Club in their financial operations.

**Jayne Raabe** joined the department in 1987 as secretary. She was promoted to senior secretary, and in 2019, she became program assistant I. She manages numerous aspects of department operations, including scholarships, student placement processes, department budgets and more.

**Maristela Rovai** started as Extension dairy specialist in 2014 and has developed comprehensive programs including Dairy Tool Box Talks – An Educational Pilot program. She teaches Dairy Spanish and Physiology of Lactation to both undergraduate and graduate students. In 2019, she started a Dairy Spanish Club with the aim of covering basic grammar, cultural differences and dairy issues, and to increase Spanish fluency of our students. She conducted numerous workshops throughout the year related to training farm employees in South Dakota, Minnesota and Iowa. In the absence of a faculty member, she also taught the dairy production section of Introduction to Dairy Science. She served as adviser to one graduate student and two visiting students. She served on the College of Agriculture, Food and Environmental Sciences Dean's Faculty Advisory Committee and was elected as secretary for the Midwest ADSA.

## DAIRY FACILITIES

Our **Dairy Research and Training Facility** has approximately 130 certified and registered milking cows. Of the DTRF's 300 animals, approximately 50 are Brown Swiss. The herd is used for research projects primarily in nutrition and for teaching. K-12 students also benefit from it through Dairy Camp and cattle judging contests with the DRTF hosting at least 200 students in 2019. Bennet Gathje, Abigail Hopp and Emily Rogers serve as student managers. This year, Peter Linke, manager, and Danielle Tews, interim assistant manager, continued extensive facility upgrades to address cow comfort. Daniel Vander Plaats is its ag foreman and parlor manager. DRTF staff and students showed our Holstein and Brown Swiss at the South Dakota State Fair, earning high placings. We also showed at the Minnesota State Fair and the World Dairy Expo. Our Brown Swiss heifer Cutting Edge D Nadine ETV placed eighth at the Expo in the Fall Yearling Class. Freshman Kelsey Erf had the honor of leading her in the ring. The DRTF was recognized by Holstein Association USA as a Progressive Genetic Herd for the second consecutive year. Faculty members and graduate students routinely use the facility to conduct research projects that involve calves, heifers and lactating cows. We have embarked on a process for extensive renovations on the DRTF that will involve a major capital campaign.

The **Davis Dairy Plant** has three objectives: education, research and development, and manufacturing dairy products. The plant processes approximately 1 million pounds of milk annually, converting it to 25,000 pounds of cheese, 40,000 gallons of ice cream, 1,600 pounds of butter and dried skim milk powder for the ice cream. One day each week is set aside for maintenance and repair, inventory and environmental cleaning. Through the very comprehensive programs developed by plant manager John Haberkorn, students receive excellent hands-on training for product manufacturing, quality assurance, product development and general plant management. The plant employs and trains about 40 students part time. Akimoto Ichinomiya serves as assistant plant manager. The Student Edition Cheese program gives students firsthand experience in the development and marketing of a new product. Students develop the idea for a cheese flavor, manufacture the new cheese at the plant and ensure it meets standards. Once the cheese completes a positive release, it is packaged and labeled with the type of cheese and the name of the originating student. Throughout the year, the plant hosted numerous processing companies for research projects. The plant was honored by the SDSU Students' Association resolution to commemorate April 12, 2019 as Cookies n' Cream Ice Cream Day at SDSU in honor of the flavor created 40 years ago. Approximately 1,000 visitors toured the plant in 2019 and a virtual tour of the plant is available at [www.sdsu.edu/ds](http://www.sdsu.edu/ds).

## SDSU DAIRY FEATURED ON ESPN'S GAMEDAY!



SDSU hosted ESPN GameDay in October. During the lead up to the live broadcast, the Dairy Research and Training Facility and the Davis Dairy Plant were prominently featured through on-site coverage by the ESPN crew.

## 2019 GRADUATES

### B.S. Food Science

Maggie Becher  
Rachel Hepfner  
Uday Mishra  
Emily Resch

### B.S. Manufacturing

Jared Bowers  
Jennifer Domanski  
Daniel Domenichini  
Cole Halvorson  
Jacob Jewett  
Mohit Manoj Kotkar  
Alysha Madsen  
Rebecca Roberson  
Han Si

Zachary Sousa  
Mitchell Timp

### B.S. Production

Katie Hendrickson  
Madison Okerstrom  
Chelsea Smith  
Kyle Tews

### B.S. Production & Manufacturing

Carla Bromenschenkel  
Laura Frye  
Kayla Post

### M.S. Food Science

Tanvee Deshpande  
Kara Konst

Bipin Rajpurohit  
Aliza Sigdel

### M.S. Production

Michaela Della  
Lydia Olagunju  
Chelsea Schossow

### M.S. Manufacturing

Khalid Alsaleem  
Pratibha Chaudhary  
Ahmed Hammam  
Megan Aubrey

### Ph.D. Production

Rhea Lawrence  
Fernanda Trinidad Rosa



Our Brown Swiss heifer Cutting Edge D Nadine ETV shown by freshman Kelsey Erf at the World Dairy Expo.

## WHERE ARE THEY NOW?

**Jacob Anderson**, B.S.'04, Dairy Manufacturing. Plant Director, Bel Brands, Brookings

**Panna Agrawal**, M.S.'06, Dairy Manufacturing. Plant Manager, Saputo Dairy Foods, Gustine, Calif.

**Steve Bacon**, B.S.'87, Dairy Manufacturing. Vice President of Food Safety and Quality, Michael Foods, Gaylord, Minn.

**Holly Bode (Brunns)**, B.S.'10, Dairy Production. District Manager, Ecolab, Gibbon, Minn.

**Annie (Milbrandt) Christensen**, B.S.'03, Dairy Manufacturing. Chief Information Officer, Cargill Animal Nutrition, Hutchinson, Minn..

**Wade Gustafson**, B.S.'00, Dairy Production. Dairy Management Instructor, Ridgewater College, Wilmar, Minn.

**Rich Hardegger**, B.S.'80, Dairy Manufacturing. Senior Environmental Engineer, Barr Engineering Co., Minneapolis, Minn.

**Megan (Schaefer) Hill**, B.S.'17, Dairy Production. Operator, Evergreen Acres, Paynesville, Minn.

**Brianna Lee**, B.S.'17, Dairy Production. Quality Manager, Prairie Farms, Rochester, Minn.

**Mike Noble**, B.S.'97, Dairy Manufacturing. Director of Engineering, Dairy Farmers of America, Sioux Falls

**Ashish Pandit**, M.S.'09, Dairy Manufacturing. Director – Food Safety, Quality Assurance and Sanitation. POM Wonderful, Del Ray, Calif.

**Vinith Poduval**, M.S.'97, Dairy Manufacturing. Senior Vice President, Enterprise Quality and Food Safety, Schreiber Foods, Green Bay, Wis.

**Chelsea Schossow**, B.S.'17, M.S.'19, Dairy Production. Nutrition and Production Specialist, Form A Feeds, Cold Spring, Minn.

**Maggie (Stiles) Stensaas**, B.S.'16, Dairy Production. Communications Specialist, Animal Science Department, University of Minnesota.

## SCHOLARSHIPS

Our students were once again the beneficiaries of the generosity of many alumni, friends and industry partners, receiving approximately \$154,000 in the form of 127 scholarships and awards for the 2019-2020 academic year.

### UPPER CLASS SCHOLARSHIPS

Agropur Inc. Dairy Manufacturing, \$2,000  
 Agropur Inc. Dairy Production, \$2,000  
 Agropur/Jay Headley Memorial, \$750  
 Alfred Herman Rishoi Memorial (2@ \$550), \$1,100  
 Alltech Scholarship in Dairy Science, \$1,500  
 Associated Milk Producers Inc., \$1,000  
 Bel Brands USA, \$3,000  
 Clyde G. Helsper Memorial, \$2,000  
 Dairy Club (5 @ \$500), \$2,500  
 Dairy Connection, \$1,500  
 Dairy Farmers of America, \$350  
 Dairy Fest (2 @ \$500), \$1,000  
 David A. Thompson—manufacturing/  
 food science, \$5,000  
 David A. Thompson—manufacturing, \$5,000  
 David H. Henry Memorial in  
 Ag & Bio Sciences, \$2,000  
 David J. and Darlene K. Schingoethe, \$650  
 Dean Foods—Sioux Falls, \$1,250  
 Derald, \$750  
 Dr. Vikram Mistry Endowment, \$2,100  
 Ed and Jennifer Bick Scholarship in Ag. Eng.  
 and Food Science, \$1,000  
 Emery Bartle Memorial, \$7,500  
 George Marx Scholarship in Dairy Production, \$1,100  
 Gilbert T. & Olga Gilbertson Memorial, \$450

H. C. Olson, \$500  
 Harbarth (2 @ \$2,000), \$4,000  
 Horatio Alger Assoc.—Mark and Mary Davis, \$5,000  
 Idaho Milk Processors Assoc., (2 @ \$2,000), \$4,000  
 James Marvel Memorial, \$350  
 Joe E. Schuch, \$750  
 John Anderson Memorial (2 @ \$3,000), \$6,000  
 John C. Gross, \$1,000  
 Joseph Van Treeck, \$1,500  
 Kempes, LLC, \$1,500  
 Kenneth I. Gross, \$1,000  
 Kirk and Dorothy Mears Memorial (\$1,050 &  
 \$1,100), \$2,150  
 Land O'Lakes—Region 65, \$300  
 Leprino Foods, \$4,000  
 Midwest Dairy Association (2 @ \$3,500), \$7,000  
 Minnesota Institute of Food Technologists, \$1,000  
 North Central Cheese Industries Assoc. (1 @ \$500,  
 1 @ \$1,000, 3 @ \$1,500, 2 @ \$2,000), \$10,000  
 Ode Family, \$500  
 Pete Behrends Memorial, \$3,000  
 Ralph Rogers Memorial, \$400  
 Robert Chamberlin—Food Science, \$750  
 Rogers Dairy, \$1,000  
 Ross Baker, \$500  
 Royal D. Doner and Helen B. Doner  
 Dairy Production, \$350  
 Ryan Graber Memorial, \$1,000  
 Saputo Cheese, \$2,000  
 Schreiber Foods, \$5,000  
 S.D. State Dairy Association  
 (1 @ \$1,500, 1 @ \$2,000), \$3,500

Shirley Seas Memorial, \$450  
 Susan Hawkins, \$2,000  
 T. M. Olson, \$700  
 Todd and Erica Stahl, \$1,000  
 Valley Queen Cheese Factory, \$7,500  
 Walt and Yvonne Wosje (2 @ \$1,000), \$2,000

### AWARDS

Alfred and Hilde Tobkin Memorial (5 @ \$128), \$640  
 Arnold Hippen Dairy Challenge (4 @ \$199), \$796  
 Dairy Judging Production, \$150  
 Dairy Judging Manufacturing, \$150  
 Forbes Leadership, \$300  
 LeRoy Graber-Ford, \$300  
 Howard Voelker Memorial (4 @ \$179), \$716  
 Non-Dairy Science Student Dairy Club (3 @ \$500),  
 \$1,500

### INCOMING STUDENT SCHOLARSHIPS

Clyde G. Helsper S.D. Dairy Field Rep funded by  
 Central Plains Dairy Foundation, \$1,000  
 Dairy Science Scholarships (4 @ \$1,000), \$4,000  
 Howard Voelker Freshman Dairy Production, \$1,000  
 Midwest Dairy Association (3 @ \$1,000), \$3,000  
 S.D. Dairy Field Rep funded by Central Plains  
 Dairy Foundation (5 @ \$1,000), \$5,000  
 S.D. State Dairy Association (3 @ \$1,000), \$3,000  
 Valley Queen Cheese Factory Freshman \$2,000  
 William and Marge Kallemeyn and Sons, \$1,200

### GRADUATE STUDENT SCHOLARSHIPS

Delbert and Robert Breazeale Memorial, \$2,100

## DAIRY AND FOOD SCIENCE STUDENTS

### GRADUATE STUDENTS

*Production, Master of Science*  
 Nathaly Carpinelli, Brazil  
 Tainara Cristina de Abreu  
 Michelotti, Brazil\*  
 Leyby Guifarro Rodriguez, Honduras

#### *Production, Ph.D.*

Carl Kass, Bruce  
 Roshin Mohan, India

#### *Manufacturing, Master of Science*

Lee Alexander, Twin Brooks  
 Ratul Kalita, India  
 Collette Nyuydze, Cameroon  
 Hiran Ranaweera, Sri Lanka  
 Natasha Scherber, Canton  
 Jae Young Sim, South Korea  
 Prathistha Verma, India

#### *Manufacturing, Ph.D.*

Taghreed Almalki, Saudi Arabia\*  
 Khalid Alsaleem, Saudi Arabia\*  
 Steven Beckman, Lincoln, Neb.  
 Maryam Enteshari, Iran  
 Ahmed Hammam, Egypt\*  
 Shayanti Minj, India  
 Achyut Mishra, Nepal  
 Kaavya Rathnakumar, India  
 Venkateswarlu Sunkesula, India  
 Suresh Sutariya, India  
 Hiral Vora, India

#### *Food Science, Master of Science*

Anjana Adhikari, Nepal\*  
 Patra Akaya, Nigeria  
 Brady Bury, Webster  
 Most Farzana Yesmin, Bangladesh

Sushmita Karki, Nepal  
 Beatrice Manu, Ghana  
 Lily Schimke, Stewartville, Minn.\*  
 Cecilia Wanjuu, Kenya

#### *Food Science, Ph.D.*

Said Badshah, Pakistan  
 Mohamed Elfaruk, Libya

### UNDERGRADUATE STUDENTS

#### *Manufacturing*

Makayla Arendt, Mazeppa, Minn.\*  
 Hannah Berg, Pipestone, Minn.  
 Arlinna Bowen, Le Mars, Iowa\*  
 Jared Bowers, Hayti  
 Hersain Cancino, St. Peter, Minn.  
 Ryan Christie, Sioux Falls  
 Emily Cole, Battle Lake, Minn.\*  
 Madison Dahna, Bingham Lake, Minn.\*  
 Joseph Donnay, Kimball, Minn.  
 Kelsey Erf, Oakdale, Minn.\*  
 Moriah Flanagan, Garretson  
 Alexandra Fox, Sioux City, Iowa\*  
 Erika Franzen-Ackerman,  
 Fredericksburg, Iowa  
 Parker Grieme, Valley Springs  
 Laura Holt, Taylors Falls, Minn.\*  
 Theodore Jacoby, Ballwin, Mo.  
 Ethan Johnson, Heron Lake, Minn.  
 Jenna Kerkaert, Pipestone, Minn.\*  
 Sophia Linnemann, Beatrice, Neb.  
 Lydia Meredith, Cokato, Minn.  
 John Oakley, Dakota Dunes  
 Brennen O'Reilly, Wayne, Neb.  
 Joey Otta, Sioux Falls\*  
 Sydney Peters, Winner  
 Thijs Reuvekamp, Elkton

Sarah Rossbach, Hanska, Minn.  
 Elizabeth Schwartzhoff, Lansing, Iowa  
 Daniel Sharp, Bath  
 Kyle Swanson, Pukwana  
 Whitney Ten Napel, Ireton, Iowa  
 Sijin Wang, Binhaixinqu Tianjin, China  
 Jordan Zemlicka, Watertown

#### *Production*

Kenson Boelke, Cologne, Minn.  
 Colten Carlson, Willmar, Minn.  
 Lizzie Chapa, Little Rock, Iowa\*  
 Theodore Czech, Watertown  
 Isabel Davidson, Eagan, Minn.  
 Michael Donnay, Kimball, Minn.\*  
 Brooke Engstrom, Renville, Minn.  
 Carter Espinoza, Kasson, Minn.  
 Emma Friauf, Glencoe, Minn.\*  
 Tyler Gilliland, Wayne, Neb.\*  
 Taylor Gilmore, Dillsburg, Pa.  
 Hailey Hendrickson, Cambria, Wis.\*  
 Bailey Henschen, Correctionville, Iowa  
 Meghan Hettinga, Orange City, Iowa  
 Chase Hirsch, Goodhue, Minn.  
 Rebecka Hoffman, Dolton  
 Taylor Jerde, Northfield, Minn.  
 Elizabeth Krienke, Lester Prairie, Minn.  
 Shelby Kuechle, Eden Valley, Minn.  
 Hope Lewandowski, Cincinnati, Ohio\*  
 Chloe Lien, Spicer, Minn.  
 Calissa Lubben, Edgerton, Minn.  
 Johannah Nielsen, Russell, Minn.  
 Lukas Pierson, Butterfield, Minn.  
 Kaleigh Powell, Liberty, Ill.  
 Bethany Rennich, Bruce\*  
 Emily Rogers, Marshall, Minn.

Courtney Schams, Dakota, Minn.  
 Margaret Socha, Rogers, Minn.  
 Jennifer Thill, Forest Lake, Minn.  
 Hayden Thole, Saint Peter, Minn.\*  
 Tiffany Van Buren, Waupun, Wis.  
 Jenna Van Wyk, Remsen, Iowa  
 Taelyn Virus, Hebron, Neb.  
 Maisie Walter, Montrose, Minn.  
 Andrew Wilwerding, Freeport, Minn.

#### *Production and Manufacturing*

Christina Boogerd, Hull, Iowa  
 Sanne de Bruijn, Vicksburg, Mich.  
 Anna Donnay, Kimball, Minn.  
 Laura Frye, Logansport, Ind.  
 Ashley Maus, Freeport, Minn.  
 Claire Plapp, Malta, Ill.  
 Denver Stage, Vesta, Minn.  
 Emily Tisler, Green Bay, Wis.\*

#### *Food Science*

Max Camerer, Sergeant Bluff, Iowa  
 Jessica Christoffer, Round Lake, Minn.  
 Tanner Davis, Fresno, Calif.  
 Kate Eastlund, Bloomington, Minn.  
 Dana Edleman, Cambridge, Iowa  
 Allison Kolbe, Sac City, Iowa  
 Josephine Moor,  
 White Bear Lake, Minn.\*  
 Claire Olson, Austin, Minn.  
 Somtochukwu Onyekwe, Chamberlain  
 Elizabeth Steever, Lennox  
 Karl Vallin, Eagan, Minn.  
 Maria Velazco Fasce, Barquisimeto,  
 Venezuela

\*New students in 2019-2020

## OUTREACH

### Area Dairy Expos



Alumni, students, staff and faculty of the department participated in Central Plains Dairy Expo in Sioux Falls, World Ag Expo in Tulare, Calif., and the World Dairy Expo in Madison, Wis. Faculty and students also participated in the Washington Pavilion Ag Day events in Sioux Falls, demonstrating various dairy and food activities to participants. The department hosted a reception for alumni and friends at the 2019 World Dairy Expo and the annual meeting of the American Dairy Science Association in Cincinnati.

### Jackrabbit Dairy Drive

Tom Peterson, industry relations director of Midwest Dairy, collaborated with SDSU athletics and industry for the fifth Jackrabbit Dairy Drive at a football game on campus. The event honors dairy producers and promotes the dairy industry.

### North Central Cheese Industries Association

Lloyd Metzger serves as executive secretary and Vikram Mistry as an adviser to the NCCIA. The annual meeting was held in Rochester, Minnesota in October. Over 130 cheese makers and suppliers from the upper Midwest attended. Our alumni routinely serve in leadership positions in this organization. A large number of alumni in the dairy industry typically attend the NCCIA.

### Dairy Camp

The Dairy Club hosted the 16th annual Dairy Camp in June for youth ages 8-18. Activities included training on care of heifers, judging, exploring the reproductive tract and digestive system, a visit to the SDSU Davis Dairy Plant, making ice cream, clipping and showing cattle, and entertainment. Participants displayed what they learned at a showmanship contest on the final day of the camp. Parents were invited to attend the show. A record number of 61 campers participated.



Dairy Camp participants learned many aspects of the dairy industry from experts, including a session on fitting cattle.

## EXTENSION

Dairy Extension activities led by Maristela Rovai, assistant professor and Extension specialist, and Tracey Erickson, Extension field specialist III, had a productive year. In its 15th year, the **I-29 Moo University** collaboration has established a widespread learning community. This is a cooperative effort of South Dakota, Minnesota, Iowa, North Dakota and Nebraska University Extension personnel along with producer associations in these states. The objective is to bring relevant and impactful research-based information to the dairy industry. Offerings included farm tours, webinars, a Dairy Beef Short Course, a Winter Workshop Series and a monthly e-newsletter.

For the fourth consecutive year, a **Spanish Workshop** was offered at Central Plains Dairy Expo with the theme "Oxytocin and the 3 A's: aim, applicability and advice". It provided around 60 attendees knowledge to enhance herd management.

Led by Rovai, the **Semillas Program** was held in collaboration with Julie Tkach, professor at the SDSU hospitality management program and Ann Taecker, SDSU Extension community vitality field specialist. The program included a hands-on educational learning experience for children of dairy farm employees. There were 7 chaperones and 40 participants ranging in age from 7 to 16 years old and included numerous activities.

The fifth Annual **Dairy Fest** was held in June. Featured topics included increasing public awareness about careers in the dairy industry, sustainability of the dairy industry, economic impact of the dairy industry and dairy nutritional product information. Attendance was estimated at: Got Milk Gala – 240 +; Dairy Leadership Training – 30+; Picowasa Dairy Art Painting Contest – 29 participants, three volunteers; Fork to Farm – 87 youth + 8 volunteers; Dairy Fest Carnival – 1,510 +, 68 volunteers, SDSU Davis Dairy Plant Tour, 200 participants, 5 volunteers. Youth and adults of Latino heritage who were a part of the Semillas program and from dairies in the I-29 Corridor also attended. Crosswinds Jersey Dairy Farm Tour: 700 + people with 16 volunteers. John Vosters, dairy producer and co-founder of Milk Source, was the featured speaker at the Got Milk Gala.

SDSU Dairy and Agronomy Extension field specialists collaborated with the Southeast Research Farm and personnel from the University of Minnesota and University of Wisconsin-Madison to deliver the second biannual **Forage Field Day**. The program, which is supported by a SARE grant and industry sponsorship, provided 39 participants an engaged learning experience targeting harvest timing and management, feed quality retention, a hands-on case study and hay storage demonstration, along with instruction on tractor/baler equipment safety.

Tracey Erickson, dairy field specialist, collaborated as a co-coordinator with Midwest Dairy for the **S.D. Dairy Ambassador Program** for SDSU students. The 2019 ambassadors were Shelby Kuechle, Brooke Engstrom, Morgan Kohl, Calissa Lubben and Sanne de Bruijn. They received consumer education and leadership training, networked with peers and industry experts and shared their dairy story with consumers throughout the year. They each received a \$1,000 awarded and per diem.



Dr. Maristela Rovai speaking to a Spanish Workshop.

## DISTINGUISHED ALUMNUS



**Larry Tidemann '70/'73 M.S.** received an honorary doctorate in public service in recognition of his outstanding contributions in public service spanning over 40 years at the 2019 SDSU commencement. Tidemann's distinguished career with SDSU Extension started as an agent in 1972. He became a program leader in 1983 and then director in 1998. After retiring in 2004, he was elected to serve as S.D. District 7 representative and then as senator.





# SOUTH DAKOTA STATE UNIVERSITY

## Dairy and Food Science Department

Alfred Dairy Science Hall 136  
Brookings, SD 57007

RETURN SERVICE REQUESTED

NON-PROFIT ORG  
US POSTAGE PAID  
BROOKINGS, SD  
PERMIT 24

## RESEARCH HIGHLIGHTS



The South Dakota Agricultural Experiment Station and external grants support faculty research activities. The broad areas of research are as follows. Department faculty have approximately \$1 million in research expenditures annually.

### Manufacture of Dairy Based Ingredients

Lloyd Metzger. The overall goal of the project is to develop and improve manufacturing processes to produce dairy-based ingredients that have an extended shelf life and for utilization in domestic and international markets. *Objective 1:* Model the drying characteristics of dairy-based ingredients to maximize the efficiency of the drying process

and accelerate the development of new dairy-based ingredients. *Objective 2:* Develop a lab scale crystallization system and analysis protocols that are for evaluation of modified manufacturing processes that improve the efficiency of lactose and permeate manufacture. *Objective 3:* Develop and evaluate membrane-based manufacturing processes for isolating or concentrating components in various dairy products including milk, whey, permeate and delactosed permeate.

### Carbohydrate Based Carriers of Bioactive Compounds

Srinivas Janaswamy. 1) Preserve the structural form of a BC until the time of delivery, and 2) effectively deliver the preserved form to the physiological target. The following two objectives will provide a comprehensive evaluation of the proposed research strategy: 1) Explore the effectiveness of various carbohydrate-based carriers in encapsulating BCs and 2) Assess the stability and bioavailability of encapsulated BCs.

### Process Interventions for Enhancing Microbial Quality, Safety, and Nutrition of Dairy Foods

Sanjeev Anand. *Goal 1:* To improve microbial quality and shelf life of milk and dairy products. *Objective 1.1:* To understand sporulation behavior of common spore formers during milk powder manufacture.

*Objective 1.2:* To apply non-thermal technologies, such as cavitation, to control common dairy spore formers. *Goal 2:* To improve microbial safety of dairy processes. *Objective 2.1:* To control dairy pathogens such as Listeria by risk analysis through response surface models. *Goal 3:* To develop novel dairy products containing probiotics. *Objective 3.1:* To develop a spray-dried health formulation based on whey protein hydrolysate and probiotics encapsulation.

### Utilization of Advanced Molecular Biology and Sensor Systems Techniques to Improve Health and Performance in Dairy Cattle

Johan Osorio. Improve the health and consequently the postpartum performance of transition dairy cows through nutrigenomic approaches or sensor systems. Validate the activation of peroxisome proliferator-activated receptor (PPAR) via specific fatty acids and determine new transcription factors that have greater direct activation by fatty acids through advanced molecular techniques such as gene reporter technology. Determine novel transcription factors that respond directly to other dietary nutrients or compounds such as amino acids, trace minerals, vitamins, etc. Validate and confirm the in vitro novel transcription factors uncovered in Objectives 1 and 2 at a complete animal level through in vivo experiments in lactating dairy cows. Improve automated sensor systems for early detection of postpartum diseases or disorders at the subclinical stage by combining sensor data with biomarkers of health status.

### Engineering Technologies for Novel Applications in Dairy Manufacturing

Sergio Martinez-Monteagudo and Sanjeev Anand. The objective of this research is to generate an understanding of behavior of dairy systems and their individual components during manufacturing. *Specific objectives:* To characterize engineering parameters of high-pressure homogenization. To investigate the efficacy of combined pressure-temperature on safety and quality parameters of dairy beverages. To evaluate the role of pressure on emulsion stability within a wide range of processing conditions.

### Value Enhancement of Health, Nutrition, and Economic Traits of Cereal Grains

Padmanaban Krishnan. The goals of this project are to enhance the health, food functional, nutritional and economic value of cereal grain crops grown in the state and region. Improved and enhanced food production and increased monetary and health value cash crops such as wheat, oats and corn will result from the effort.