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The Jackrabbit Dairy Review

Department of Dairy and Food Science

Winter 2017

Jackrabbit Dairy & Food Review

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Jackrabbit Dairy & Food Review

Winter 2016-2017

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
Jill Anderson, Assistant Professor, Dairy Production
Howard Bonnemann, Lecturer, Dairy Manufacturing
Alvaro Garcia, Agriculture and Natural Resources Program Director/Professor
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, Professor and Department Head
Maristela Rovai, Assistant Professor/SDSU Extension Dairy Specialist, Dairy Production
Kristen Uilk, Assistant Director-First Year Advising
C. Y. Wang, Professor, Food Science

Emeritus Faculty

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

Staff

Steve Beckman, Filtration Technologist
Tasha Crane, Agricultural Foreperson, Dairy Research and Training Facility
Tracey Erickson, Extension Dairy Field Specialist
Nuria Garcia-Fernandez, Postdoctoral Research Associate
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, Secretary
Jayne Raabe, Senior Secretary
Melissa Schmitt, Assistant Manager, Dairy Research and Training Facility
Raunak Shukla, Industrial Food Engineering Technologist
Vijay Sundaram, Research Associate II

MESSAGE FROM THE DEPARTMENT HEAD



This newsletter reports on the activities of our students, staff and faculty members. We were particularly pleased in 2016 to welcome three new faculty members: Dr. Sergio Martinez-Monteagudo, assistant professor in dairy manufacturing; Dr. Johan Osorio, assistant professor in dairy production; and Dr. Srinivas Janaswamy, assistant professor in food science. The teaching and research expertise of these individuals will help us strengthen all three program areas. Our on-going recruiting efforts have been successful. In fall 2016 we had a record 116 undergraduate majors from 15 states around the U.S.

Every five to seven years the Dairy Club hosts the Annual Conference of the Midwest Regional American Dairy Science Association Student Affiliate Division. In 2016 the club made a successful bid for hosting the conference in 2017. Organizing the conference therefore took center stage for much of 2016, while still maintaining focus on regular activities such as Dairy Camp, cheese boxes, state fair, and many others. Ultimately, approximately 400 students from universities around the Midwest are expected to attend the conference.

The department as a whole has had a year of new challenges and opportunities that will help shape future directions in very rewarding ways. Student scholarship awards, courtesy of generous donors, were well over \$120,000 this year. Faculty productivity was impressive. In fiscal year 2016 dairy science faculty members secured over \$1.4 million in external grants through 27 projects to cover research and support graduate students and researchers. Student accomplishments were equally impressive, many of which are presented in this newsletter. One such example is National Dairy Promotion and Research Board Scholarships; since 2003, 101 of our students have been recipients of these scholarships, constituting approximately 38 per cent of all scholarships awarded nationally. In 2016 seven of our students were recipients out of 11 nationally. In addition, students received other national scholarships such as National Dairy Shrine, Lely and others. The new food science program is well integrated into the department, which has been renamed Dairy and Food Science Department to reflect the full range of offerings. We now have the ability to extend our teaching, research and extension programs from the dairy farm, to dairy processing and now to food processing.

We have now engaged a professional marketing agency to help us identify specific needs in dairy production teaching and research programs through a market study. This will ultimately lead to the development of relevant curriculum and facilities, in particular the dairy research and training facility. Employment opportunities for our graduates are outstanding. Placement is 100 percent. To further enhance recruiting we have launched a comprehensive social media marketing campaign to alert prospective students about the exciting opportunities in dairy and food science! Help us spread the word and do visit us at www.sdstate.edu/ds or, better yet, in person.

Vikram Mistry

2016 GRADUATES

Ph.D.

Nuria Garcia Fernandez, Manufacturing
Ishwary Acharya, Production
Angela Manthey, Production
Jon Pretz, Production

M.S.

Dikshi Bawa, Manufacturing
Harsh Dahiya, Manufacturing
Dustin Grossbier, Manufacturing
Kelly Froehlich, Production
Olivia Kuester, Production
Prakash Poudel, Production

Shruti Srivastava, Production
Ashley Adamski, Food Science
Jigyasha Mishra, Food Science

B.S. Manufacturing

Lauren Chirnside
Nicole Jax
Molly Kennedy
Kimberly Maassen
Hayden Palmer
Jae Young Sim
Michaela VanderWal
Mitchell Younie

B.S. Production

Joseph Hoffman
Laura McMartin
Sarah Post
Maggie Stiles
Kaylee Wegner

B.S. Food Science

Kirsten Anderson



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MARK YOUR CALENDAR

Central Plains Dairy Expo, March 28-30, 2017, Convention Center, Sioux Falls

Dairy and Food Science Scholarship Banquet, Monday, April 10, 2017, 6:00 p.m., Club 71, Dana J. Dykhouse Stadium

NEW FACULTY AND VISITORS

NEW FACULTY AND STAFF



Crane

Tasha Crane joined the Dairy Research and Training Facility in summer 2016 as ag foreperson. She serves as the lead person to feed cows and replacement heifers, maintain overall appearance of the farm including grounds maintenance and performs routine maintenance and general repairs on equipment.



Janaswamy

Srinivas Janaswamy joined the department in fall 2016 as assistant professor in food science. He holds a B.S. and a master's in physics. His Ph.D. is in crystallography from the Indian Institute of Technology, Madras, India. Prior to joining SDSU, Janaswamy was a research assistant professor at the Whistler Center for Carbohydrate Research at Purdue University. He has extensive experience in carbohydrate research and applications in novel functional foods. He is author or co-author of 51 scientific papers and has filed seven provisional patents. He will teach food science courses and initiate a research program in carbohydrates and food applications.



Martinez-Monteaquedo

Sergio Martinez-Monteaquedo joined the department in spring 2016. He holds a B.S. in chemical engineering and a master's in food science and technology from Autonomous University of Chihuahua, Mexico. He received his Ph.D. in food engineering and bioresources from the University of Alberta, Canada. With specialty areas in dairy manufacturing and food engineering, and academic interests in engineering technologies and nonthermal technologies, Martinez-Monteaquedo will be conducting research involving dairy processing unit operations. In his new role at SDSU, he will teach classes in dairy products processing and dairy chemistry.



Osorio

Johan Osorio recently joined the department faculty. He brings more than eight years of experience in animal nutrition research, with emphasis in dairy calf nutrition, dairy cow physiology during the transition period and dairy cattle nutrigenomics. He received his B.S. in agricultural sciences and production from Escuela Agrícola Panamericana Zamorano, Tegucigalpa, Honduras, and a master's and Ph.D. in animal sciences, both from the

University of Illinois. Osorio will be teaching three classes: Dairy Farm Operations I and II and Laboratory Techniques in Dairy Science. His research/scholarship responsibilities will focus on the utilization of advanced molecular biology and sensor systems techniques to improve dairy cattle health and performance.



Sundaram

Raunak Shukla joined the department in fall 2016 as industrial food engineering technologist and will be responsible for conducting and coordinating research in the Davis Dairy Plant related to the Institute of Dairy Ingredients Processing. Raunak holds a master's degree in structural engineering from SDSU.

Vijay Sundaram joined the department in summer 2016 as research associate. He will oversee research efforts in the Alfred Lab.

RETIREMENTS

Dr. Joan Hegerfeld-Baker was SDSU Extension food safety specialist at SDSU for an extended period. In July 2015 she moved to the Dairy and Food Science Department under the new food science program. In her new role she continued her very well established food safety programs and taught food science classes as well. She retired from SDSU in March 2016. While at SDSU she served as treasurer of the South Affiliate of the National Extension Family Consumer Sciences. She was a committee member of the SDSU Institute of STEM Education Enhancement and coordinator of the South Dakota FFA Food Science and Technology Career Event. She also served on the South Dakota Raw Milk Working Group that was led by South Dakota Secretary of Agriculture Lucas Lentsch. Plans are underway to fill this position.

VISITORS

Gerardo Caja, professor and animal scientist from the Department of Animal and Food Sciences, Veterinary Faculty at the Autonomous University of Barcelona (UAB), Spain, visited the department in June 2016. Dr. Caja chairs the Group of Research in Ruminants (G2R) at UAB. Maristela Rovai, assistant professor of dairy and food science, was his host during his visit.

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

Dinakar Panyam, M.S.'92, innovations partnerships and licensing manager, Nestle, Oakland, California, visited the department to discuss opportunities for collaborative work. He also presented a Nestle and Technology Innovations Seminar. Dr. Panyam received a master's in dairy science from SDSU in 1992 and a Ph.D. from Penn State.

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 of our classes and conducted individualized practice interviews for our students.

DAIRY CLUB



2016 Dairy Club officers were: Bernice Vander Wal, president; Chelsea Schossow, vice president and interim secretary; Brandon Hawkins, treasurer; Megan Schaefer and Brianna Lee, historians; Audrey Souza and Cole Hoyer, activities coordinators; and Megan Schaefer, Dairy Digest editor. Advisers are Jill Anderson, John Haberkorn, Sergio Martinez-Monteaquedo, Peter Linke and Melissa Schmitt. Club members attended the ADSA-SAD regional conference in Fort Wayne, Indiana, in February. The club was selected to host the 2017 ADSA-SAD regional conference and planning for the conference took place throughout the entire year. In June, club members hosted youth at the 13th annual Jackrabbit Dairy Camp and co-hosted the third annual Cow to Cup 5K. Other club activities throughout the past year included the South Dakota State Fair, Ag-Bio Ice Cream Social, National Ag Day, Relay for Life, World Dairy Expo and cheese boxes for which students cut, packaged and shipped almost 8,000 pounds of cheese around the country under the co-chairs Chelsea Schossow, Cole Hoyer and Erik Ode.

FOOD SCIENCE CLUB

Logan Johnson is the Food Science Club president and Dr. Padmanaban Krishnan is the adviser. Club members attended the Institute of Food Technologists Annual Meeting in Chicago in June. In September the club kicked off the 2016-2017 academic year with a pizza party to welcome new and returning club members. Additional activities this year will include attending the Minnesota Farm Fest, volunteering at Sanford's Its All About Science, demonstrating pasta production to elementary students at Ag Friday and Ag Saturday at The Washington Pavilion, Tru Shrimp visit of Shrimp Hatchery Research and Growth Tanks in Balaton, Minnesota, and attending various seminars.

JUDGING ACTIVITIES

DAIRY CATTLE EVALUATION



The Dairy Cattle Judging Team competed in the 23rd Annual Accelerated Genetics Intercollegiate Dairy Cattle Judging Contest in Viroqua, Wisconsin. The team—Kirby Krogstad, Cole Hoyer, Andrew Socha and Kristin Erf—placed third in high team overall, second in Guernsey, third in Holstein and fourth in Jersey. Krogstad finished first high individual in the

Holstein and 7th in high individual overall. Hoyer finished fourth in high individual overall. Fourteen teams participated in this year's contest representing California, Illinois, Iowa, Kansas, Minnesota, Ohio, Oklahoma, South Dakota and Wisconsin. They judged classes of Guernsey, Holstein, Jersey and Milking Shorthorns with each participant placing 10 classes and giving five sets of oral reasons. Dr. Jill Anderson is the team's coach.

DAIRY PRODUCTS



The Dairy Products Judging Team placed first in all products at the 2016 Midwest Regional Collegiate Dairy Products Judging Contest at Kraft Heinz Technology Center in Glenview, Illinois. The team—Bennet Baker, Katelyn Johnson, Krista Johnson and Steve Beckman—placed first in yogurt, cheddar cheese, cottage cheese, butter and ice cream.

Thirty-seven undergraduate and graduate contestants from nine universities entered the contest. Krista Johnson placed first overall and first in butter, second in yogurt, ice cream and cottage cheese, and fifth in milk and cheddar cheese. As top judge at the regional contest, Johnson received the Carl Ziesemer Award. Baker placed second overall, first in cottage cheese and yogurt, second in cheddar cheese, and third in butter and ice cream. Katelyn Johnson was ninth overall and placed sixth in cottage cheese. In the graduate student contest, Beckman placed seventh overall and was first in ice cream and fourth in cheddar cheese. The contest was hosted by Kraft Heinz Company and sponsored by 24 dairy companies and suppliers. The team was coached by Lloyd Metzger, professor of dairy science and Alfred Chair in Dairy Education, and Natasha Laska, SDSU graduate student.

DAIRY CHALLENGE



The Dairy Challenge Team earned fourth place at the 2016 North American Intercollegiate Dairy Challenge competition held in Syracuse, New York. Thirty-two

college teams from across the U.S. and Canada participated in this event hosted by the NAIDC Northeast Region. The team—Brandon Hawkins, Brianna Lee, Maggie Stiles and Bernice Vander Wal—was among the eight teams on their farm, with four farms total for the contest. Each team received information from an area dairy, including production and farm management data. After an in-person inspection of the dairy, teams interviewed the herd owners and then developed a detailed farm analysis and recommendations for all areas of the farm including nutrition, reproduction, animal health, milking procedures, housing and financial management. The event culminated with team members presenting recommendations and then fielding questions from a panel of judges. These official judges included dairy producers and industry experts in dairy finances, reproduction, nutrition and animal health. Presentations were evaluated for accuracy of analysis and recommendations, with awards presented at a final banquet. The Dairy Challenge Academy was developed in 2013 to expand the NAIDC's educational and networking benefits to more college students. Participants analyze and make recommendations for operating dairies in mixed university teams with two advisers to help coach these younger students. SDSU's Academy participants included Megan Schaefer and Chelsea Schossow. The academy's Midwest Regional Contest was held in Platteville, Wisconsin. SDSU was represented by Brandon Hawkins, Brianna Lee, Chelsea Schossow and Maggie Stiles. The Dairy Challenge Team was coached by Melissa Schmitt, David Casper and Carl Kass.

STUDENT ACCOMPLISHMENTS

Angela Manthey received the 2016 IIC Pinnacle Award which recognizes outstanding graduate students in the field of nutrition. Her academic advisor was Jill Anderson.



Chelsea Schossow received a 2016-17 Griffith Undergraduate Research Award under Dr. Jill Anderson and initiated heifer nutrition research in fall 2016. She also received a Lely of North America Future of Dairy Scholarship, one of four awarded nationally and was also featured in Dairy Business and Holstein World Magazine (magazines.dairybusiness.com/dbenov16/)

Dairy Club elected new officers for 2017: Cole Hoyer, president; Audrey Souza, vice president; Kristin Erf, secretary; Katelyn Groetsch, treasurer; Abby Hopp and Erika Franzen-Akerman, historians; Jacob Weg and Angela Wick, activities coordinators. Abby Hopp is the Dairy Digest editor. Jill Anderson, John Haberkorn, Sergio Martinez-Monteaugado, Peter Linke and Melissa Schmitt are faculty advisers.

Devendra Paudel was the recipient of the outstanding teaching assistant award for his work in the Department of Biology and Microbiology.

Food science students participated in the Sanford Health Science Fair where they presented the exciting world of food science and processing to attendees.

Graduate students working towards their Ph.D. or M.S. degrees in dairy production, dairy manufacturing or food science presented their research work at the annual meetings of the American Dairy Science Association in Salt Lake City and the Institute of Food Technologists in Chicago.

Ishwary Acharya, a Ph.D. candidate, received a DFA Cares Graduate Scholarship. He also placed third in the Ph.D. category, SDSU Gamma Sigma Delta poster contest.

Kaylee Wegner was the top judge at the intercollegiate dairy products judging contest and was invited as an expert judge at the World Championship Cheese Contest, Madison, Wisconsin, which had 2,959 cheese entries from 23 countries and 31 states. This was followed up by an extensive radio interview on Heritage Radio Network with cheese monger Greg Blais.

Laura Frye received the American FFA Degree at the National Convention of FFA in Indianapolis.

Laura Frye, Audrey Souza and Jacob Bierstedt showed cattle at the World Dairy Expo in Madison, Wisconsin. Frye's Miami Hills Prize Dacey placed second in the senior 3-year-old-cow category for Brown Swiss and Souza's Covington Legend Nadine, placed first in the 6-year-old and older category for Jersey and sixth in the open-aged cow class. Bierstedt placed 12th out of 149 in the senior 2-year-old-cow category for Jersey.

Margaret Stiles was crowned Miss Central States Fair 2016. Her paper titled "Rhetorical Criticism of 'Farmland'" was chosen as one of the best submitted by Lambda Pi Eta Undergraduate Honor Society members at the National Communications Association (NCA) Annual Convention in Philadelphia.

Morgan Goche was one of only 20 undergraduate students selected nationwide to participate in the USDA Agricultural Outlook Forum Student Diversity Program in Washington, D.C. The program is designed to introduce students to contemporary agribusiness, future trends, scientific research and ag policy.

Nirosh Senevirathne won second place, graduate category, for the North America region, Alltech Young Scientist Competition. He is a second year Ph.D. student working with Jill Anderson on research related to dairy calf nutrition and performance. His winning paper was titled "Growth performance of calves fed microbially enhanced soy protein in starter pellets."

National Dairy Promotion and Research Board Scholarships were won by Lauren Chirnside, Morgan Goche, Kristin Mohr, Shayna Popkes, Audrey Souza, Margaret Stiles and Jacob Weg. SDSU students won seven of the 11 \$2,500 scholarships available nationwide. SDSU dairy students have an excellent record in this program with 101 having been recipients since 2003.

Taylor Aubrey received a Women and Giving Award from the SDSU Foundation to support her travel to a research conference to present of her work. She also received a John Brandt Memorial Scholarship from Land O' Lakes.



Jacob Johnson received two National Dairy Shrine scholarships: The Klussendorf Scholarship and NDS/DMI Education Communication Scholarship. Both are competitive national scholarships.

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 dissertation, and SDSU Extension presentations. All publications are listed on our website at www.sdstate.edu/ds.



Sanjeev Anand has been a faculty member in dairy and food science since 2006 and teaches and conducts research in the areas of dairy microbiology and food safety. He routinely mentors undergraduate researchers as well as graduate students working towards M.S. and Ph.D. degrees. He has mentored 21 undergraduate researchers, five Ph.D. and 16 M.S. 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, dairy products with enhanced health benefits, and general food safety education. He serves as the department representative to the Functional Genomics Core Facility (2007-present), the Van D. and Barbara B. Fishback Honors College (2013-present), Brigg's Library (2014-present), and member of the Ag Bio P&T Committee (2016-19).



Jill Anderson joined the department as assistant professor in 2012 and teaches several classes and has established a research program in calf and heifer nutrition. She serves on the Dean's Faculty Advisory Council for the College of Agriculture and Biological Sciences. Anderson has served as an academic advisor to seven graduate students and seven undergraduate researchers. She served in 2016 as chair of the Midwest ADSA Extension Symposium and is currently serving as secretary of Midwest ADSA.

Howard Bonnemann has been a faculty member in dairy science since 1997. He teaches a wide range of classes in dairy science as well as the introductory food science class. He serves as academic advisor to all undergraduate students in the department. He is the assessment coordinator for the department and the College of Agriculture and Biological Sciences representative on the University Assessment Committee. He is also the department curriculum coordinator and has conducted many FFA dairy products judging clinics across the state. He serves as the executive secretary for the South Dakota Dairy Association.



Tracey Erickson is SDSU Extension dairy field specialist based in the Watertown Regional Center. Tracey is the co-chair of the I-29 Dairy Outreach Consortium and the lead department person for iGrow activities. In addition to her extension work, she also served as the secretary of the South Dakota Dairy Fieldmen's Association. She serves on the Central Plains Dairy Association advisory board of directors overseeing the Central Plains Dairy Association Expo and yearly dairy events. She co-coordinates the youth

4-H Dairy Cattle Evaluation and serves as an adviser to the 4-H dairy cattle program in South Dakota. Tracey also serves on the Dairy Fest Committee, coordinating the youth events. She is also in her final year on the Professional Staff Advisory Council having served as vice chair and now serving as a member at large representing NFE SDSU/Extension employees.

John Haberkorn is the manager of the Davis Dairy Plant. In addition to managing the plant he also provided tours of the plant to numerous groups, initiated several new programs for the plant, including student edition cheeses, GMP program, development and production of a large range of flavored cheeses, and a positive release program. All initiatives involve student participation.



Padmanaban Krishnan conducts research in food science and teaches several food science classes. He is 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 area of wheat, corn and oats research and value-added processing. He directs the activities of the

Crop Quality Laboratory on the SDSU Innovation Campus.

Peter Linke is manager of the Dairy Research and Training Facility. While overseeing all aspects of farm operations, he also helps coordinate all research and teaching activities at the farm.



Lloyd Metzger served as director of the Midwest Dairy Foods Research Center and the executive secretary of the North Central Cheese Industries Association. He's a member of the ADSA Dairy Foods Milk Protein and Enzyme Committee and a member of the editorial board of the Journal of Dairy Science. Metzger has served as coach of the dairy products judging team and led the SDSU team to a record eighth national championship. He was invited to participate as an expert judge at the

World Cheese Contest. He was featured in a South Dakota Public Radio interview on process cheese. In April, Metzger traveled to Ireland to present a paper at the International Dairy Federation Conference. He is a member of the College of Agriculture and Biological Sciences Dean's Faculty Advisory Council.

Vikram Mistry served as the U.S. editor of the French Journal of Dairy Science and Technology and 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 as adviser to the North Central Cheese Association and the South Dakota Dairy Producers.

Maristela Rovai started as an SDSU Extension dairy specialist in 2014 and has already developed comprehensive programs including Dairy Tool Box Talks—An Educational Pilot Program. This program, sponsored by the High Plains Intermountain Center for Agricultural Health and Safety (HICAHS) from Colorado State University, offered an innovative training course for the dairy workforce in a context that follows the same structure used by the engineering and construction industries. She also taught a dairy Spanish class on campus in fall 2015 for both undergraduate and graduate students. The aim of this unique course, that covers basic grammar, cultural differences and dairy issues, is to increase Spanish fluency of our students and state dairy industry work force. In 2016 she conducted a program called "Semillas" for K-12 children to promote the dairy industry and educate them about career and other opportunities.

David Schingoethe, distinguished professor emeritus, retired in 2011. He resides in Brookings and continues to serve the department, most recently as chair of a faculty search committee that led to the hiring of a faculty member.

C.Y. Wang holds a part-time appointment in the food science program. He is also the associate dean of research and Extension in the College of Education and Human Sciences.

YEARS OF SERVICE



Sanjeev Anand was recognized for 10 years of service. Anand is a professor, with specialization in dairy and food microbiology and food safety.

Tracey Erickson was recognized for 30 years of service to SDSU. Erickson is an SDSU Extension field specialist.

Akimoto Ichinomiya was recognized for 10 years of service. Ichinomiya is the assistant dairy plant manager.

Peter Linke was recognized for 15 years of service. Linke is manager of the Dairy Research and Training Facility.

Vikram Mistry completed 30 years of service to SDSU. He joined the department as assistant professor of dairy manufacturing in 1986 and became department head in 2002.



Linke

ONGOING FUNDS FOR SUPPORTING RESEARCH

Completed projects are listed on our website: www.sdstate.edu/ds.

Anand, S. K. Spores in Milk Powder, National Dairy Council.
 Anand, S. K. Reduction of biofilms, National Dairy Council.
 Anand, S. K. Spore germination in milk powder, National Dairy Council.
 Anand, S. K. Biofilms on modified stainless steel, National Dairy Council.
 Anand, S. K. Biofilm removal, National Dairy Council.
 Anand, S. K. Listeria Control, Midwest Dairy Foods Research Center.
 Anand, S. K. Pathogen Control, Midwest Dairy Foods Research Center.
 Anand, S. K. Spore Detection Evaluation, Midwest Dairy Foods Research Center.
 Anderson, J. L. Revalidating Brewers Grain Yeast, Emmert
 Anderson, J. L. Schossow undergraduate research, Griffith Undergraduate Research Award.
 Anderson, J. L. Heifer Development, HydroGreen
 Anderson, J. L. Carinata meal for dairy heifers, Agrisoma and South Dakota Oilseed Initiative
 Krishnan, P. K., Oat Production, General Mills
 Krishnan, P. K. Oat Production, Grain Millers

Krishnan, P. K. Food Grade DDG, MCR&PC
 Krishnan, P. K. End Use Functionality, Wheat Commission
 Martinez-Monteagudo, S. R&D-Innovation, South Dakota Board of Regents
 Martinez-Monteagudo, S. Seed grant, Sanford Health
 Metzger, L. E., Institute for Dairy Ingredients Processing, National Dairy Council.
 Metzger, L. E., Institute for Dairy Ingredients Processing Applications Scientist, National Dairy Council.
 Metzger, L. E., Permeate Applications, National Dairy Council.
 Metzger, L. E., SSPS in Lactose Manufacturing, National Dairy Council.
 Metzger, L. E., Coatings on PHE, National Dairy Council.
 Metzger, L. E., Pharmaceutical Applications of Dairy Ingredients, Midwest Dairy Foods Research Center.
 Metzger, L. E., Bacillus in Dairy Processing, Daisy Brands.
 Metzger, L. E., Liquid Dairy Ingredients, National Dairy Council.
 Metzger, L. E., Single Droplet Drying, National Dairy Council.
 Metzger, L. E., Clean Labels for Dairy Ingredients, Midwest Dairy Foods Research Center.
 Wang, C. U. Aronia Berry, South Dakota Department of Agriculture

DAIRY FACILITIES

The **Davis Dairy Plant** attracts tours from a wide range of visitors, including schools, alumni, prospective students, professionals and many others, including those that are curious about the manufacture of dairy products. A virtual tour of the plant is available at www.sdstate.edu/ds/plant/video.cfm. The Davis Dairy Plant processes approximately 1 million pounds of milk annually, converting it to 25,000 pounds of cheese, 20,000 gallons of fluid milk, 40,000 gallons of ice cream and 1,600 pounds of butter. One day a week is set aside for maintenance and repair inventory, and environmental cleaning. Through the very comprehensive programs developed by the plant manager, John Haberkorn, students receive excellent hands-on training for product manufacture, quality assurance, product development and general plant management. Approximately 40 students are employed part-time and receive this training. The Student Edition Cheese program developed earlier gives students firsthand experience in the development and marketing of a new product. In this program the idea for the cheese flavor is developed by a dairy science student and the cheese is produced at the Davis Dairy Plant. It undergoes quality tests to make sure it meets standards. Once the cheese completes a positive release it is cut, wrapped and labeled. The label features the type of cheese and the name of the originating student. In spring 2016, students travelled to the Wisconsin Cheese Industry Conference in Madison to participate in the conference and industry evaluation of their cheeses. Assistant plant manager Akimoto Ichinomiya spent a few days in Monroe, Wisconsin, to learn how to make Swiss cheese. Davis Dairy Plant cheese is now available in the Empire Mall in Sioux Falls at a joint SDSU-USD store.

In 2016, all Jackrabbit Dairy Council members and donors for the dairy plant project we were invited to come to campus for conduct interviews for summer internships and permanent positions. In all, 15 companies visited the department and conducted 150 interviews and follow-up onsite interviews. Job offers for permanent positions and summer internships are being finalized.

Our **Dairy Research and Training Facility** has approximately 130 certified and registered milking cows and a total of 300 animals. This includes approximately 50 Brown Swiss. The herd is used for research projects primarily in nutrition and also for teaching. In addition, K-12 students also benefit from it through the Dairy Camp and cattle judging contests that are hosted at the farm. Brennan Albrecht and Olivia Bartel serve as student managers. Manager Peter Linke and assistant manager Melissa Schmitt manage the farm and have undertaken extensive facilities upgrades. Tasha Crane serves the facility as ag foreman and has the duty of feeding and maintenance. Facility staff and students showed our Holstein and Brown Swiss at the state fair, receiving high placings. The department is now embarking on a project of fully evaluating the dairy production program, which will include renovating and remodeling the facility to help meet the teaching and research goals of the future. For planning of the new facility, dairy producers and other industry groups will be invited to provide input over the next year.



Ice cream making equipment at the Davis Dairy Plant.



Chelsea Smith with the award winning Brown Swiss at the South Dakota State Fair.

SCHOLARSHIPS

Our students were once again the beneficiaries of the generosity of many alumni, friends, and industry. At the spring 2016 banquet approximately \$123,539 in scholarships were awarded for the 2016-2017 academic year.

UPPER CLASS SCHOLARSHIPS

Agropur Inc. Dairy Manufacturing, \$1,000
 Agropur Inc. Dairy Production, \$1,000
 Alan and Jeraldine Rogers, \$1,000
 Alfred Herman Rishoi Memorial (2/\$600), \$1,200
 Associated Milk Producers Inc., \$1,000
 Bel Brands USA, \$3,000
 Clyde Helsper Memorial, \$1,000
 Dairy Club (3/\$500), \$1,500
 Dairy Connection, \$1,000
 Dairy Farmers of America, \$400
 Dairy Fest (2/\$500), \$1,000
 Dairy Manufacturing, \$2,375
 Dave Clark North Central Cheese Ind. Assoc., \$1,000
 David H. Henry Memorial in Ag & Bio Sciences, \$250
 David J. Schingoethe, \$1,000
 Davisco Foods/Jay Headley Memorial, \$1,500
 Dean Foods—Sioux Falls, \$1,250
 Derald, \$500
 Emery Bartle Memorial, \$7,500
 George Marx, \$1,100
 Gibert T. and Olga Gilbertson Memorial, \$450
 H. C. Olson, \$550
 Idaho Milk Processors Association (2/\$2000), \$4,000
 J. J. Yee, \$500
 James Marvel Memorial, \$400
 Jessica Goens, \$500
 Joan (Hegerfeld) and Alan Baker—Food Science, \$1,000

John Anderson Memorial, 2/\$2,000
 John C. Gross, \$1,000
 Joseph Van Treeck, \$1,500
 Kempes, LLC, \$1,500
 Kenneth I. Gross, \$1,000
 Kirk Mears Memorial, \$1,050
 Land O'Lakes—Region 65, \$300
 Leprino Foods, \$4,000
 Midwest Dairy Association, 2/\$3,500
 North Central Cheese Industries Association,
 1/\$1,000, 2/\$2,000
 Ode Family, \$500
 Pete Behrends Memorial, \$3,000
 Ralph Rogers Memorial, \$400
 Robert Chamberlain Scholarship in Food Science, \$1,550
 Ross Baker, \$500
 Royal and Helen Doner in Dairy Production, \$350
 Ryan Graber Memorial, \$1,000
 Saputo Cheese, \$2,000
 Schuch Family, 2/\$1,000
 South Dakota State Dairy Association, 2/\$1,500
 Shirley Seas Memorial, \$500
 Susan Hawkins, \$2,000
 T. M. Olson, \$700
 Todd and Erica Stahl, \$1,000
 Valley Queen Cheese Factory, \$7,500
 Walt and Yvonne Wosje, \$1,000
 WOW Logistics Donald E. Utschig, \$1,000

Dairy Judging Production, \$150
 Forbes Leadership, \$300
 Graber-Ford, \$300
 Howard Voelker Memorial, 4/\$250
 Non-Dairy Science Student Dairy Club, \$500

INCOMING DAIRY STUDENTS

Clyde G. Helsper Dairy Fieldmen's Association, \$1,000
 Dairy Science Faculty, \$650
 Dr. S. K. Dash, \$1,000
 Howard Voelker Freshman Dairy Production, \$1,000
 Midwest Dairy Association, 3/\$1,000
 North Central Cheese Industries Assoc. Recruiting,
 \$1,250
 South Dakota Dairy Fieldmens Association,
 5/\$1,000
 South Dakota State Dairy Association, 2/\$1,000
 Valley Queen Cheese Factory Freshmen, \$1,000
 William and Marge Kallemeyn & Sons, \$1,250

INCOMING STUDENT SCHOLARSHIPS

Campanile, \$750
 Jackrabbit Achievement, \$1,000
 Yellow and Blue, 1/\$3,000, 3/\$2,000

GRADUATE STUDENT SCHOLARSHIPS

Dairy Recognition and Education Foundation,
 2/\$3,600
 Delbert and Robert Breazeale Memorial, \$1,100
 Dr. S. K. Dash Graduate, \$2,000
 Wade Eisenbeisz Graduate Dairy Production, \$1,000

AWARDS

Alfred Tobkin Memorial, 4/\$125)
 Dairy Challenge, \$800
 Dairy Judging Manufacturing, \$150

DAIRY AND FOOD SCIENCE STUDENTS

GRADUATE STUDENTS

Dairy Production

Rehab Alhajar, Saudi Arabia*
 Taylor Aubrey, Amherst, N.H.
 Carl Kass, Bruce
 Rhea Lawrence, Aurora
 Kali Linville, Cleburne, Texas
 Karla Rodriguez-Hernandez, Mexico
 Sonia Rodriguez-Jimenez, Spain*
 Juan Sanchez-Duarte, Mexico
 Niros Senevirathne, Sri Lanka
 Lauren Shearer, Brookings*
 Fernanda Trindade, Brazil*

Dairy Manufacturing

Taghreed Almalki, Saudi Arabia*
 Khalid Alsalem, Saudi Arabia*
 Nancy Awasti, India
 Steven Beckman, Lincoln, Neb.
 Pratibha Chaudhary, India*
 Maryam Enteshari, Iran*
 Ahmed Hammam, Australia*
 Megan Huegli, Hartford, Wis.
 Shivali Jindal, India
 Dalia Khan, Saudi Arabia
 Natasha Laska, Canton
 Dipakkumar Mehta, India
 Neha, India
 Venkateswarlu Sunkesula, India
 Hiral Vora, India

Food Science

Patra Akaya, Nigeria*
 Ahmed Almunawir, Saudi Arabia*
 Tanvee Deshpande, India*
 Theodore Mohr, New Ulm, Minn.
 Devendra Paudel, Nepal
 Bipin Rajpurohit, India
 Aliza Sigdel, Nepal*

UNDERGRADUATE STUDENTS

Manufacturing

Joshua Blasé, Twin Lakes, Wis.
 Jared Bowers, Hayti
 Rebecca Cantwell, New Lenox, Ill.
 Cord Cnossen, Hereford, Texas*
 Kaelyn Dammann, Mitchell

Kristin Erf, Oakdale, Minn.
 Erika Franzen-Ackerman,
 Frederickburg, Iowa*
 Morgan Goche, Burt, Iowa
 Parker Grieme, Valley Springs*
 Cole Halvorson, New Ulm, Minn.
 Anna Hemenway, Huron
 Mitchell Jazdzewski, Gilman, Wis.
 Jacob Jewett, Glencoe, Minn.
 Gramm Johnson, Fulton
 Krista Johnson, Russell, Minn.
 Rachel Larson, Beresford
 Alysha Madsen, Corona
 Kristin Mohr, New Ulm, Minn.
 Shayna Popkes, Rock Rapids, Iowa
 David Ramirez, Modesto, Calif.*
 Gregory Reeter, Volga
 Shelby Riddle, Sioux Falls*
 Mariah Schafer, Jasper, Minn.*
 Zachary Sousa, Milbank
 Denver Stage, Vesta, Minn.*
 Mitchell Timp, Le Mars, Iowa

Production

Brennen Albrecht, Stewart, Minn.
 Olivia Bartel, New London, Wis.
 Jacob Bierstedt, Pipestone, Minn.
 Caleb Blaisdell, Starbuck, Minn.
 Hudson Bos, Bakersfield, Calif.
 Hersain Cancino, Saint Peter, Minn.
 Kaitlyn Carlson, Kirkland, Ill.*
 Zachary Carlson, Murdock, Minn.
 Colten Carlson, Willmar, Minn.*
 Theodore Czech, Watertown*
 Brody Forst, Gibbon, Minn.
 Taylor Gilmore, Dillsburg, Pa.
 Katelyn Groetsch, Albany, Minn.
 Brandon Hawkins, New Ulm, Minn.
 Abigail Hopp, Chatfield, Minn.*
 Cole Hoyer, West Salem, Wis.
 Marco Jacobo, Syracuse, Kan.*
 Jacob Johnson, Heron Lake, Minn.
 Joseph Kalina, Montgomery, Minn.
 Tyler Kiefer, Taopi, Minn.
 Kirby Krogstad, Eyota, Minn.
 Brianna Lee, West Union, Iowa
 Laura McMartin, Gerber, Calif.
 Eric Metzger, Lester, Iowa

Jaden Mickelson, Springfield, Minn.*
 Dennisen Nelson, Lonsdale, Minn.
 Tyler Pieper, Davis, Ill.
 Jacob Post, Chandler, Minn.
 Alexandra Preszler, Roscoe*
 Madison Okerstrom, Chisago City, Minn.
 Kaylee Rosenkranz, Bingham Lake, Minn.*
 Julius Sachs, Eyota, Minn.
 Madeline Scalise, Albion, Pa.*
 Megan Schaefer, Paynesville, Minn.
 Chelsea Schossow, Houston, Minn.
 Cody Schroeder, Marshall, Minn.
 Han Si, China
 Chelsea Smith, Chesterfield, Mass.
 Audrey Souza, Milbank
 Jacob Stadick, New Ulm, Minn.
 Megan Struss, Courtland, Minn.
 Jackson Sudbeck, Harrington, Neb.*
 Kyle Tews, Hutchinson, Minn.
 Paige Thielen, Eden Valley, Minn.*
 Jennifer Thill, Forest Lake, Minn.*
 Jenna Van Wyk, Remsen, Iowa*
 Jacob Weg, Worthington, Minn.
 David Wick, Jordan, Minn.
 Angela Wick, Jordan, Minn.
 Austin Winberg, Walnut Cove, N.C.*

Production and Manufacturing

Bennet Baker, Kasota, Minn.
 Carla Bromenschenkel, Brownton, Minn.

Laura Frye, Logansport, Ind.
 Sam Fuchs, Eureka
 Katelyn Johnson, Sleepy Eye, Minn.
 Mohammad Khawaja, Pakistan
 Mohit Manoj Kotkar, India
 Kayla Post, Chandler, Minn.
 Makayla Reed, Porterville, Calif.
 Walker Sundstrom, Lynden, Wash.

Food Science

Maggie Becher, Somerset, Wis.
 Brady Bury, Webster
 Jill Folsland, Baltic
 Rachel Hepfner, New Hope, Minn.
 Katelyn Hillson, Austin, Minn.*
 Logan Johnson, Rosholt
 Andrew Krebs, Goshen, Mass.
 Alexandra Leckband, Ocheyedan, Iowa*
 Clay Newton, Echo, Minn.*
 Clarissa Ober, Glencoe, Minn.
 Emily Resch, Spirit Lake, Iowa
 Lily Schimke, Stewartville, Minn.*
 Katelyn Smith, Canby, Minn.
 Alexander Snyder, Dell Rapids
 Maria Velazco Fasce, Venezuela
 Joshua vonWinckelmann Belrose,
 Sioux Falls
 Jinhao Zhao, China

*New students in 2016-2017



OUTREACH

Area Dairy Expos



Alumni, students, staff and faculty of the Dairy and Food Science Department participated in Central Plains Dairy Expo in Sioux Falls, World Ag Expo in Tulare, California, and the World Dairy Expo in Madison, Wisconsin. Faculty and students also participated in the Washington Pavilion Ag Day events in Sioux Falls, demonstrating various dairy activities to participants.

North Central Cheese Industries Association

Dr. Lloyd Metzger serves as executive secretary and Dr. Vikram Mistry as adviser to the NCCIA. The annual meeting was held in Sioux Falls in October and attracted over 130 cheesemakers and suppliers from the upper Midwest.

Jackrabbit Dairy Drive

Roger Scheibe, industry relations director of the Midwest Dairy Association and alumnus, collaborated with SDSU athletics and industry for the third Jackrabbit Dairy Drive at a football game on campus. The purpose of the event was to honor dairy producers and promote the dairy industry.

Faculty Hosts Teachers-in-Training

Howard Bonnemann hosted Erin Otte-Meyer and Anavi Ngo, high school chemistry teachers in training, in June 2016 while they received training in the chemistry of dairy products. Otte-Meyer and Ngo were participants in the chemistry teacher training program in the SDSU Chemistry and Biochemistry Department. They will use their dairy chemistry training to deliver information to their students in Wisconsin.

K-12 STUDENTS

Dairy Camp

The Dairy Club hosted the 13th annual Dairy Camp in June for youth ages 8-18. Activities included training on care of heifers, judging, exploring the reproduction tract and digestive system, a visit to the SDSU dairy plant, making ice cream, clipping and showing cattle, and entertainment. Participants showcased what they learned at a showmanship contest on the final day of the camp. Parents were invited to attend the show.



High School Visits

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

EXTENSION

Dairy Fest

The third annual Dairy Fest was held in June at the Swiftel Center in Brookings. This two-day event was hosted by the Dairy Fest steering committee made up of dairy industry representatives and dairy producers. The mission of the steering committee was "to help educate consumers about the dairy industry and the future of Dairy Youth Education." Proceeds from the event were used in the form of two scholarships in the SDSU Dairy and Food Science Department at \$500 each to support the future of youth in the dairy industry. The festival began with a "Got Milk" Gala on June 2, hosting 180

participants and featured various dairy products in food entrées, while educating the attendees about the region's dairy industry. On June 3, 150 youth from area after-school/summer programs participated in the inter-active dairy workshops making ice cream and learning about the industry. June 4 began with the Cow to Cup 5K run followed by a dairy Youth Carnival. Volunteers included SDSU Dairy Club, SDSU dairy science faculty, dairy producers, and dairy industry professionals to coordinate the event's hands-on activities, teaching youth and their parents about dairying, where the milk goes, how it is turned into dairy products, and the nutritional value of dairy products. The carnival also included tours to a local dairy farm and the Davis Dairy Plant. This carnival was open to the public on Saturday morning through early afternoon. There were an estimated 1,480 consumers who went through the carnival learning about the dairy industry.

I-29 Moo University

I-29 Moo University includes Extension from SDSU, NDSU, ISU, UMN, UNL, and dairy producer organizations in the five states, along with the Minnesota Dairy Initiative representatives. They were very active during 2016 with a wide range of programs and tours. The group also started the I-29 Moo University e-Newsletter, as a joint effort of Extension articles and latest happenings. They are presently, reaching people across the globe with their newsletter. The programs have been very well attended and are detailed on their Facebook page; <https://www.facebook.com/I29MooUniversity/> as well as at www.iGrow.org.

Semillas

Semillas, an educational pilot program led by Maristela Rovai, was held in the spring and again in the fall to provide K-12 youth, especially the children of dairy workers, exposure to the numerous opportunities in the dairy industry. The program was set up in a fun and learning environment and approximately 30 children attended each time. Faculty, staff and students assisted with the program.



World Dairy Expo

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



50th Anniversary World Dairy Expo.



SDSU dairy science major Audrey Souza and her Jersey, Covington Legend Nadine.



CHANGE SERVICE REQUESTED

RESEARCH HIGHLIGHTS

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

Utilization of Advanced Molecular Biology and Sensor Systems Techniques to Improve Health and Performance in Dairy Cattle Drs. Johan Osorio and Jill Anderson. Improve the health and consequently the postpartal performance of transition dairy cows through either nutrigenomic approaches or sensor systems. Validate the activation of peroxisome proliferator-activated receptor (PPAR) via specific fatty acids and determine new transcription factors (TF) that have greater direct activation by fatty acids through advanced molecular techniques such as gene reporter technology (GRT). Determine novel transcription factors (TF) 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 (TF) uncovered in Objectives 1 and 2 at a whole animal level through in vivo experiments in lactating dairy cows. Improve automated sensor systems for early detection of postpartal diseases or disorders at the subclinical stage by combining sensor data with biomarkers of health status.

Engineering Technologies for Novel Applications in Dairy Manufacturing Drs. Sergio Martinez-Monteaquedo and Sanjeev Anand. The overall objective of this research program is to generate scientific understanding of the 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 selected quality parameters of dairy beverages. To evaluate the role of pressure on emulsion stability within a wide range of processing conditions.

Management Systems to Improve the Economic and Environmental Substantiality of Dairy Enterprises (Rev. NC-1119) Dr. Jill Anderson. Optimize calf and heifer performance through increased understanding of feeding strategies, management systems, well-being, productivity and environmental impact for productivity and profitability. Improve dairy cow management decisions through nutrient utilization, well-being and profitability. Analyze whole farm system components and integrate information into decision-support tools to improve efficiency, enhance profitability and environmental substantiality.

Evaluation of Different Dietary Energy Sources on Growth Performance and Metabolism of Replacement Dairy Heifers Dr. Jill Anderson. Determine how different dietary energy sources impact calf and heifer growth, nutrient digestion, metabolism, and reproductive development. Determine if energy and protein from distillers grains can replace energy and protein from forage sources in growing dairy heifer rations in precision feeding scenarios. Determine how particle size of the ration forage with slowly degradable concentrate sources influences total tract digestion of feedstuffs in precision-fed rations for dairy heifers. Determine how much supplemental fat can be fed in replacement of starch from corn in moderate forage (> 50 percent) heifer diets. Longterm goal: Determine if manipulation of the energy sources in diets of

dairy heifers can decrease age at puberty and breeding, and therefore shorten the time it takes to initiate lactation without negatively impacting milk production of primiparous cows.

Manufacture of Dairy-based Ingredients Dr. Lloyd Metzger. This project will focus on the manufacture of modified milk protein concentrates and their utilization as ingredients and will include several related research projects. The objectives of the projects are: determine the impact of carbon dioxide injection on membrane performance, mineral content, and functionality of milk protein concentrate; and to evaluate the effectiveness of transilluminates to modify the functionality of native casein concentrate and milk protein concentrate when they are used as ingredients in process cheese products and to evaluate the commercial feasibility of a novel process for producing a unique dairy based ingredient that is targeted for process cheese product applications.

Safety and Quality Improvement of Milk and Cheese Dr. Sanjeev Anand. Objective 1: To study the role of thermophilic bacteria in influencing shelf life of milk products such as cheese. Objective 2: Reducing the cross contamination in dairy processing environments by controlling bacterial biofilms.

Value Enhancement of Health, Nutrition and Economic Traits of Cereal Grains Dr. Padmanaban Krishnan. Objectives: 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. The efforts will be geared toward improved and enhanced food production and increased monetary and health value cash crops such as wheat, oats and corn.

