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The Jackrabbit Dairy & Food Review

Department of Dairy and Food Science

Winter 2021

Jackrabbit Dairy & Food Review, Winter 2020-2021

Dairy and Food Science Department

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Jackrabbit Dairy & Food Review

Winter 2020-2021

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
Joseph Cassady, Interim Department Head, Dairy and Food Science; Department Head, Animal Science
Clifford Hall, Professor, Food Science
Srinivas Janaswamy, Assistant Professor, Food Science
Padmanaban Krishnan, Professor, Food Science
Vikram Mistry, Interim Associate Dean, CAFES, David A. Thompson Endowed Department Head and Professor
Johan Osorio, Assistant Professor, Dairy Production
Maristela Rovai, Assistant Professor/SDSU Extension Dairy Specialist, 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
Steven 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
Bipin Rajpurohit, Research Associate I
Lane Speirs, Coordinator-Recruitment and Academic Services
Vijay Sundaram, Research Associate II
Danielle Tews, Assistant Manager, Dairy Research and Training Facility
Daniel Vander Plaats, Agricultural Foreman
Serap Vatansever, Post-Doctoral Associate

MESSAGE FROM THE DEPARTMENT HEAD

Greetings! I am Joe Cassady, interim Department of Dairy and Food Science department head. I am humbled to be asked to fill Dr. Mistry's shoes during this time of transition. He has graciously agreed to support the College of Agriculture, Food and Environmental Sciences by serving as interim associate dean for academics. His leadership is critical to meeting the needs of over 1,900 undergraduate student majors in CAFES as they pursue their education during the COVID-19 pandemic. I think we would all agree that it has been a challenging year. Despite these challenges there have been many successes. Our faculty members and staff have put forth a dedicated effort and assumed additional responsibilities to support the success of our students and stakeholders. I would like to highlight just a few of the accomplishments which you will learn more about in this newsletter. Sixteen undergraduate and 14 graduate students successfully completed their degrees in 2020. Several students received national recognition through scholarships. Margaret Socha and TJ Jacoby were two of only eleven students receiving National Dairy Promotion and Research Board Scholarships. Our faculty continue to excel in research. Dr. Sanjeev Anand received the IDFA Dairy Processing Research Award of the American Dairy Science Association, and Dr. Krishnan received the Edith A. Christensen Award for Outstanding Contributions in Analytical Methodology of Cereals & Grains Association. The COVID-19 pandemic created new challenges for the dairy industry. Dr. Maristela Rovai and Tracey Erickson developed Extension resources to support dairy producers facing pandemic-related challenges. Tracey also successfully led the I-29 Moo University-Dairy Beef Short Course Committee as it quickly pivoted to a virtual conference. While I am proud of our faculty, staff, and students, none of this would be possible without the continued support of our alumni and friends. As a result of generous support, we were able to award our students 110 scholarships totaling \$151,000. We anticipate filling several faculty positions in the coming months. These new hires will be critical to ensuring continued success. Thank you for supporting the Department of Dairy and Food Science. Please contact me with any questions or comments you may have.

Joe Cassady

Interim Department Head of Dairy and Food Science



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STATE UNIVERSITY**
Department of Dairy and Food Science

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NEW PERSONNEL

FACULTY AND STAFF



Cassady

Joseph Cassady was appointed as interim department head beginning June 2020. He also serves as professor and head of the Animal Science Department. Dr. Cassady holds a Ph.D. and M.S. in animal science from the University of Nebraska and B.S. in animal science from Iowa State University. Upon completing his Ph.D., Cassady was a research associate with the USDA-ARS U.S. Meat Animal Research Center in Clay Center, Neb. He spent 12 years on the animal science faculty at North Carolina State University earning the rank of professor. Cassady is a past-president of the National Swine Improvement Federation board of directors, and served in a volunteer role as the executive director of the Beef Improvement Federation from 2009 to 2015. His research focused on food animal genetics and genomics with special emphasis on the improvement of efficiency of production.



Rajpurohit

Bipin Rajpurohit has joined the department as a research associate. Bipin holds a M.S. in food science from SDSU, a M.Tech. in food technology and management from the National Institute of Food Technology Entrepreneurship and Management, Kundli, Sonapat, and a B.Tech. in biotechnology from the Vellore Institute of Technology, India.



Speirs

Lane Speirs has joined the department as coordinator of recruitment and academic services. Lane earned his M.Ed. in counseling and human resource development and B.S. in agricultural communications from SDSU. His responsibilities at SDSU consist of the promotion of the dairy and food science program and recruiting of students.



Sundaram

Vijay Sundaram has joined the department as a research associate. Vijay holds a M. Tech degree in agricultural engineering in bioenergy and a B. Tech in energy and environmental engineering from Tamil Nadu Agricultural University, Coimbatore, India. His research consists of the manufacture of natural and process cheese, dried milk protein concentrates, and other dairy based ingredients and the proximate, physiochemical, and functional analysis of dairy products.



Vatansever

Serap Vatansever has joined the department as a post-doctoral research associate under Dr. Hall. She holds a Ph.D. in cereal science from North Dakota State, and M.S. and B.S. degrees in food engineering from Pamukkale University, Turkey. Her post-doctoral research is in pulse biochemistry, chemistry and processing.



One of the last student field trips before COVID-19 pandemic struck.

JUDGING ACTIVITIES

DAIRY CATTLE



With the cancellation of collegiate dairy cattle judging contests, our teams were not able to compete. The SDSU Dairy Cattle Judging team anticipate the hopeful return of competition next year.

The very first Dairy Products and Cattle Judging Team, 1916.

DAIRY CHALLENGE



The SDSU Dairy Challenge team competed at the Western Regional Dairy Challenge contest in Modesto, Cal., from Feb. 18-22, 2020. Participants included Brooke Engstrom of Renville, Minn., Jenna Van Wyk of Remsen, Iowa,

Sanne de Bruijn of Vicksburg, Mich., and Calissa Lubben of Edgerton, Minn. Dr. Isaac Salfer coached the team. During the contest, students performed a full-farm analysis of Fiscalini Farms, a 1,400-cow herd in Turlock, Cal. They looked through herd health, production, and financial records as well as performing on-farm analysis of facility design, milking procedures, and cow well-being. Our students competed in aggregate teams with participants from California, Utah, Idaho, Texas and Washington. In addition to the contest, they toured the Hilmar Cheese Company plant and were able to take some extra time to visit Old Sacramento and the Sierra Nevada National Forest. Overall, it was a fun and rewarding experience for the students. They were able to not only enhance their skills in dairy consulting, but also learn about the California dairy industry and network with other current and future industry leaders.

DAIRY PRODUCTS



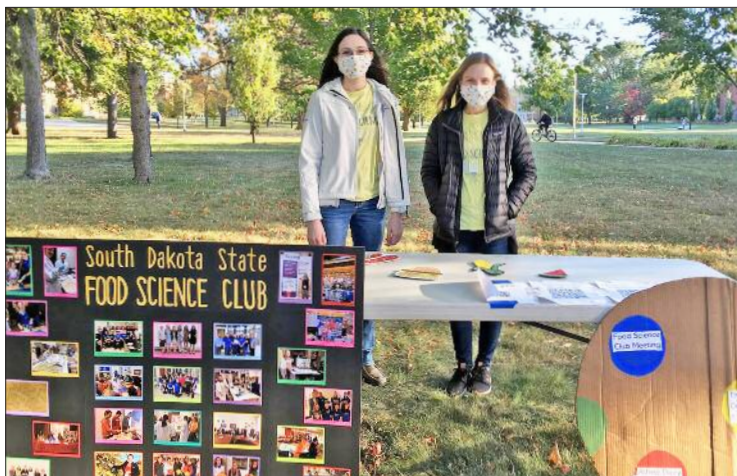
The SDSU Dairy Products Judging Teams began with daily practice every week upon returning from winter break in January in preparation for their regional and national contests in April. In March, however, due to the pandemic both the regional and national contests were canceled. The senior team consisted of Elizabeth Schwartzhoff, Jordan Zemlicka, Sydnie Peters and Margaret Socha and graduate students Maryam Enteshari and Khalid Alsalem. The junior team consisted of Ashley Maus, Meghan Hettinga, and Daniel Sharp. The teams were coached by Dr. Lloyd Metzger and assistant coach Ahmed Hammam. Hopefully, SDSU Dairy Products Judging Team members will be able to put their taste buds to the test soon when contests are resumed.

DAIRY CLUB



2020 Officers: Ethan Johnson, president; Calissa Lubben, vice president; Lukas Pierson, secretary; Ashley Maus, treasurer; Adison Evans and Elizabeth Krienke, historians; Rebecka Hoffman and Kelsey Erf, activities coordinators; Abigail Hopp, Dairy Digest editor; Sophia Linnemann, Elizabeth Krienke, Rebecka Hoffman, Anna Marie Sachs and Tiffany Van Buren, Dairy Digest assistant editors. Advisers were John Haberkorn, Kristi Prunty, Lane Spiers and Dani Tews. In January, club members attended ADSA-SAD regional conference hosted by Iowa State University. Approximately 400 other students and advisors from universities across the Midwest attended. Other club activities included the CAFES Ice Cream Social, National Ag Day, ditch cleaning, pumpkin painting, guest speakers from the industry, and club tours of farms and food processing facilities. 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. The annual Dairy Camp for K-12 grade students, which is normally held in June was not conducted because of the pandemic. During the fall semester, the Dairy Club conducted regular meetings through social distancing procedures.

FOOD SCIENCE CLUB



2020 Officers: Dana Edleman, president; Elizabeth Steever, vice president; Allison Kolbe, secretary; Josephine Moor, treasurer; Leona Meyer, Prexy Council rep; Jessica Christoffer, activities coordinator; Dr. Padmanaban Krishnan, advisor; Dr. Srinivas Janaswamy, co-advisor. In September, the club kicked off the 2020-2021 academic year with a trivia night welcoming new and returning members. In October, the club painted pumpkins to celebrate autumn after the monthly meeting. Members also participated in a fundraising activity that involved sewing and selling food-themed face masks to the SDSU and Brookings community. The club is currently working on sewing additional face masks to donate to the Brookings community. In November, the club hosted a Virtual Bake Along: Pumpkin Mug Cake Edition and is looking forward to planning virtual activities with their Institute of Food Technologists Student Association (IFTSA) Chapter Buddy, the University of Georgia, in the spring semester.

STUDENT ACCOMPLISHMENTS

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

Sanne de Bruijn and **Calissa Lubben** received scholarships from the National Dairy Herd Improvement Association.

Sanne de Bruijn was awarded a National Dairy Shrine Student Recognition Scholarship, which is presented to a graduating senior, and the Lon and Kathy Tonneson Scholarship of the Central Plains Dairy Foundation.

Dana Edleman was the recipient of the National Pork Producers Council scholarship.

TJ Jacoby received the 2020 Wisconsin Cheese Makers Association Cheese Industry Supplier Student Scholarship.

Maryam Enteshari was the MN-IFT Scholarship Award and MN-IFT Travel Award winners. Maryam was also the recipient of the Outstanding Volunteer Award.

Mohamed Elfaruk received the IFT Travel scholarship sponsored by the IFT Foundation.

Kaavya Rathnakumar received the John Brandt Memorial Scholarship from the Land O' Lakes Foundation.

Meghan Hettinga received the Paul Jackson Memorial scholarship of the American Jersey Cattle Association.

Margaret Socha and **TJ Jacoby** were recipients of National Dairy Promotion and Research Board Scholarships. A total of only eleven scholarships were presented nationwide.

Kelsey Erf, Ethan Johnson, Morgan Kohl, Shelby Kuechle and **Calissa Lubben** were selected to serve as S.D. Dairy Ambassadors under Midwest Dairy. Throughout the year they promoted the dairy industry at various venues and developed creative virtual programs for after the pandemic began.



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.

Dr. Sanjeev Anand teaches and conducts research in dairy microbiology and food safety in the areas of biofilm development and control, control of spores in dairy processing, non-thermal methods for improving product quality, encapsulated dairy products with enhanced health benefits, Listeria control in ice cream, and general food safety education. He mentors undergraduate researchers, and graduate students. He serves as the department representative to the Functional Genomics Core Facility, Fishback Honors College and Brigg's Library. He is on the editorial board for the *Journal of Dairy Science* and is a member of the Dairy Foods Division, ADSA and ADSA Foundation board. In 2020, he received the ADSA IDFA Dairy Processing Research Award and the SDSU Van D. and Barbara B. Fishback Honors College Advocate of the Year Award.

Howard Bonnemann teaches a wide range of classes, serves as academic advisor to all undergraduate students and is also the department curriculum coordinator. He is the assessment coordinator for the department and the CAFES representative on the University Assessment Committee. Howard conducted FFA dairy products judging clinics across the state. He serves as the executive secretary for the S.D. Dairy Association.

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. Presently, she is on the Central Plains Dairy Foundation board helping to build the newly formed 501(C)3 Foundation investing in positive, proactive programming to support the I-29 corridor dairy industry. She serves as the secretary of the S.D. Dairy Field Representatives Association and serves on the Dairy Fest committee, coordinating the youth education events. She is the coordinator for the S.D. Dairy Ambassador program for SDSU students sponsored by Midwest Dairy.

John Haberkorn, manager of the Davis Dairy Plant, developed and led several new programs involving extensive student training for the plant including student edition cheeses, GMP program, development, and production of a large range of flavored cheeses, and a positive release program. He also provided tours of the plant and is co-adviser to the Dairy Club.

Dr. Clifford Hall conducts research on pulse chemistry and processing and teaches food safety and food science courses. He oversees the completion of the annual U.S. Pulse Quality Survey for pulse growers. His current research focus is the removal of off-flavors from pulses, primarily pea, and the impacts of storage on the nutrient composition and functional properties. He co-chairs the Pulse Technical Committee for the Cereals and Grains Association and, as a member of the Pulse Division, assisted in organizing the Pulse Webinar series for the Cereal and Grains Association. He advises a postdoctoral researcher, a master's student and 7 undergraduate researchers.

Akimoto Ichinomiya, assistant manager of the Davis Dairy Plant, oversees operation of the plant and provides training to students.

Dr. Srinivas Janaswamy, assistant professor, teaches several food science classes. He leads a research program on "functional carbohydrates" with an emphasis on the design and development of novel carriers of bioactive compounds. Janaswamy's program also focuses on using agricultural residues in biodegradable packaging and water purification materials. His research is supported through USDA, state and industry research grants. Janaswamy has published international peer-reviewed journal articles, edited a book and special journal issue, and advised four graduate students and three visiting scholars. In 2019, he received the SDSU faculty award for Global Engagement in recognition of his international collaborative research efforts.

Dr. Padmanaban Krishnan conducts research in food science and teaches several food science courses and is a co-advisor to the Food Science Club. 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 collaborates with university and food industry scientists in wheat, corn and oats research and value-added processing. He directs the activities of the Crop Quality Laboratory on the SDSU Innovation Campus. Krishnan has received several USDA-NIFA research grants, has served on grant review panels for NIFA and NSF, and received the Edith A. Christensen Award for Outstanding Contributions in Analytical Methodology of Cereals & Grains Association.

Peter Linke is manager of the Dairy Research and Training Facility. While overseeing all aspects of farm operations, he also helps coordinate research and teaching activities at the farm. He planned and oversaw numerous upgrades to the farm facilities. The farm normally hosts hundreds of K-12 grade students for activities such as Little I and FFA judging, and Dairy Camp but these activities were very limited in 2020 due to the pandemic. Pete has been with the department in various capacities since starting as a freshman in 2000, graduating in 2004, and serving currently as manager.

Dr. Vikram Mistry is temporarily serving as the interim associate dean for academic programs in the College of Agriculture, Food and Environmental Sciences. He served on the boards of the American Dairy Association of South Dakota, South Dakota Dairy Producers, and advisor to the North Central Cheese Association and the South Dakota Dairy Producers. In 2020 he was selected to serve on the board of the National Dairy Shrine. In 2019, he was named the David A. Thompson Endowed Department Head and Professor of the department.

Dr. Johan Osorio, assistant professor, came to the department with expertise in nutrigenomics. Particularly notable is his invitation to serve as co-chair for an ADSA Discover Conference. He served as an advisor to four graduate students and hosted several interns. He also co-teaches the Dairy Farm Operations and Ruminology classes and is a member of the IACUC Committee.

Kristi Prunty was promoted to senior secretary in 2019. Her numerous duties include receptionist, monitoring of accounts and the department Facebook page. She also assists the Dairy Club and Food Science Club in their financial operations and is a co-adviser to the Dairy Club.

Jayne Raabe was promoted to program assistant in 2019. She manages numerous aspects of department operations, including scholarships, student placement processes, department budgets and more.

Dr. Maristela Rovai started as an Extension dairy specialist in 2014 and has developed comprehensive programs including Dairy Toolbox Talks, an educational pilot program. She teaches Dairy Spanish and Physiology of Lactation to both undergraduate and graduate students. She conducted workshops related to training farm employees in South Dakota, Minnesota and Iowa. In the absence of another faculty member, she also taught the Dairy Production section of Introduction to Dairy Science. She served as adviser to one graduate student. She served on the CAFES Dean's Faculty Advisory Committee and was elected as secretary for the Midwest ADSA.

VISITORS

Alberto Josue Trimino visited the department as an intern under Dr. Johan Osorio, and worked on a research project in nutrigenomics.

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 a guest lecturer in several of our classes and conducted individualized practice interviews for our students.

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

DAIRY FACILITIES

DAIRY RESEARCH AND TRAINING FACILITY

Our Dairy Research and Training Facility has approximately 130 certified and registered milking cows. Of the 300 animals in total, about 50 are Brown Swiss. The herd is used for research projects primarily in nutrition and for teaching. In addition, K-12 grade students also benefit from it through Dairy Camp and cattle judging contests that are normally hosted at the farm.

Laura Holt and Taelyn Virus serve as student managers. Manager Peter Linke and assistant manager Danielle Tews continued extensive facilities upgrades to address cow comfort. Daniel Vander Plaats serves the DRTF as ag foreman and parlor manager. Faculty members and graduate students routinely use the facility to conduct research projects that involve calves, heifers, and lactating cows. A Brown Swiss heifer from our herd was the top seller at the recent 74th Annual Minnesota Brown Swiss Association Sale. We have embarked on a process for extensive renovations on the Dairy Research and Training Facility that will involve a major capital campaign.



DAVIS DAIRY PLANT



The Davis Dairy plant has three objectives: education, research and development, and manufacturing dairy products. A virtual tour is available at www.sdstate.edu/ds/. 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 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. The plant employs and trains approximately 40 students part-time. Akimoto Ichinomiya serves as assistant plant manager. The Student Edition Cheese program gives students firsthand experience in new product development and marketing. Students develop the idea for a cheese flavor. Students manufacture the new cheese at the dairy plant and ensure that 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 as well as numerous tours for the public.

2020 GRADUATES

Bachelor of Science

Dairy Manufacturing
Ryan Christie
Erika Franzen-Ackerman
Sarah Rossbach
Hersain Cancino
Elizabeth Schwartzhoff
Jordan Zemlicka

Dairy Production
Theodore Czech
Brooke Engstrom
Taylor Gilmore
Jennifer Thill
Jenna Van Wyk
Maisie Walter

Food Science

Karl Vallin
Maria Velazco Fasce
Claire Olson

Dairy Production & Manufacturing
Sanne de Bruijn

Master of Science

Food Science
Patra Akaya,
Beatrice Manu
Lily Schimke
Cecilia Wanjuu
Most Farzana Yesmin

Dairy Production
Nathaly Carpinelli

Dairy Production
Lee Alexander
Collette Nyuydze
Jae Young Sim
Pratishtha Verma

Ph.D.

Dairy Manufacturing
Maryam Enteshari,
Achyut Mishra
Venkateswarlu Sunkesula
Hiral Vora



WHERE ARE THEY NOW?

Daryl Berg, B.S.'89, Dairy Manufacturing. COO, GAT Farms-Taylor Holdings, Mankato, Minn.

Katie Halgerson (Norling), B.S.'10, Dairy Manufacturing. Mini Baby Bel Development Account Manager, Bel Brands, Chicago, Ill.

Jacob Hammerly, B.S.'04, Dairy Manufacturing. Plant Manager, Saputo Cheese, Big Stone City

Krista Johnson, B.S.'17, Dairy Manufacturing. Plant Manager, Dairy Farmers of America, Hummelstown, Pa.

Kirby Krogstad, B.S.'18. Dairy Production. Candidate for Ph.D., Michigan State University.

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

Gopinathan Haridas Meletharayil, Ph.D.'15, Dairy Manufacturing. V.P.-Dairy Product Research. Dairy Management, Inc., Rosemont, Ill.

Jacob Post, B.S.'18. Dairy Production. Territory Sales Manager, Alltech, Brookings

Karla Rodriguez-Hernandez, Ph.D.'18, Dairy Production. Head, La Laguna Experimental Station, INIFAP, Coahuila, Mexico

Nicole Skroch, B.S.'11. Dairy Manufacturing. Financial Officer, Compeer Financial, Waite Park, Minn.

Jenna Van Wyk, B.S.'20. Dairy Production. Robotics Manager, Orland Ridge Dairy, Madison

Lance Whitlock, Ph.D.'02. Dairy Production. Nutrition Consultant, Progressive Dairy Solutions, Inc., Oakdale, Cal.

SCHOLARSHIPS

Our students were once again the beneficiaries of the generosity of many alumni, friends, and industry, receiving approximately \$151,000 in the form of 110 scholarships and awards for the 2020-2021 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@\$600) \$1,200
 Associated Milk Producers, Inc., \$1,000
 Bel Brands USA, \$3,000
 Clyde G. Helsper Memorial, \$2,000
 Dairy Club (7@\$500), \$3,500
 Dairy Connection, \$1,500
 Dairy Farmers of America, \$400
 Dairy Fest (2@\$500), \$1,000
 Dairy Science Scholarships, \$6,800
 David A. Thompson—Manufacturing/Food Science, \$5,000
 David A. Thompson—Manufacturing, \$5,000
 David H. Henry Memorial in Ag & BioSciences, \$950
 David J. and Darlene K. Schingoethe, \$1,000
 Dean Foods – Sioux Falls, \$2,000
 Derald, \$750
 Dr. Vikram Mistry Endowment, \$2,100
 Ed and Jennifer Bick—Food Science, \$1,000
 Emery Bartle Memorial, \$7,500
 George Marx Scholarship in Dairy Production, \$1,100
 Gilbert T. and 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 Scholarship, \$2,000
 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, \$1,000
 Land O'Lakes, \$250
 Leprino Foods, \$4,000
 Midwest Dairy Association, (2@\$3,500) \$7,000
 Minnesota Institute of Food Technologists, \$1,000
 North Central Cheese Industries Assoc., (3@\$1,500, 1@\$2,000) \$6,500
 Ode Family, \$500
 Pete Behrends Memorial, \$2,950
 Ralph Rogers Memorial, \$350
 Robert Chamberlain—Food Science, \$950
 Rogers Dairy, \$1,000
 Ross Baker, \$500
 Royal D. Doner and Helen B. Doner in Dairy Production, \$400
 Ryan Graber Memorial, \$1,000
 Saputo Cheese, \$2,000
 Schreiber Foods, \$5,000
 South Dakta State Dairy Association, (2@\$1,500) \$3,000
 Shirley Seas Memorial, \$450
 Susan Hawkins, \$2,000
 T. M. Olson, \$650
 Todd and Erica Stahl, \$1,000
 Valley Queen Cheese Factory, \$7,500
 Walt and Yvonne Wosje, \$2,000

AWARDS

Alfred and Hilde Tobkin Memorial (5@\$140), \$700
 Arnold Hippen Dairy Challenge (4@\$200), \$800
 Dairy Judging Production, \$150
 Dairy Judging Manufacturing, \$150
 Forbes Leadership, \$300
 LeRoy Graber-Ford, \$300
 Howard Voelker Memorial, (4@\$133) \$532
 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, (3@\$1,000) \$3,000
 Horatio Alger Assoc., Mark and Mary Davis, \$5,000
 Howard Voelker Freshman Dairy Production, \$1,000
 Midwest Dairy Association, (1@\$2,000, 1@\$1,000) \$3,000
 South Dakota Dairy Field Rep funded by Central Plains Dairy Foundation, (3@\$1,000, 1@\$2,000) \$5,000
 South Dakota State Dairy Association (3@\$1,000) \$3,000
 Valley Queen Cheese Factory Freshman, \$2,000
 William and Marge Kallemeyn & Sons, \$1,300

GRADUATE STUDENT SCHOLARSHIPS

Delbert and Robert Breazeale Memorial, \$2,100

DAIRY AND FOOD SCIENCE STUDENTS

GRADUATE STUDENTS

Dairy Production, M.S.
 Tainara Cristina de Abreu Michelotti, Brazil
 Leyby Guifarro Rodriguez, Honduras
 Kevin Kamau, Kenya*
 Miguel Suazo Medina, Honduras*
 Anita Paz, Honduras*

Dairy Production, Ph.D.

Carl Kass, Bruce
 Roshin Mohan, India

Dairy Manufacturing, M.S.

Kritika Gaba, India*
 Sheetal Jha, India*
 Ratul Kalita, India*
 Bhaswati Choudhary, India*
 Haliyadde Kottegodra Gedara Hiran Ranaweera, Sri Lanka*
 Natasha Scherber, Canton

Dairy Manufacturing, Ph.D.

Taghreed Almalki, Saudi Arabia
 Steven Beckman, Lincoln, Neb.
 Khalid Alsalem, Saudi Arabia*
 Shayanti Minj, India
 Suresh Sutariya, India*
 Kaavya Rathnakumar, India
 Ahmed Hammam, Egypt

Food Science, M.S.

Anjana Adhikari, Nepal
 Abdulmalik Albu Tuwayban, Saudi Arabia*

Hussain Al Nasser, Saudi Arabia*

Brady Bury, Webster
 Sushmita Karki, Nepal*

Food Science, Ph.D.

Raed Alayouni, Saudi Arabia*
 Said Badshah, Pakistan*
 Mohamed Elfaruk, Libya

UNDERGRADUATE STUDENTS

Manufacturing

Makayla Arendt, Mazeppa, Minn.
 Hannah Berg, Pipestone, Minn.
 Arlinna Bowen, Le Mars, Iowa
 Hersain Cancino, Saint Peter, Minn.
 Emily Cole, Battle Lake, Minn.
 Madison Dahna, Bingham Lake, Minn.
 Joseph Donnay, Kimball, Minn.
 Parker Grieme, Valley Springs
 Becca Hermann, Manchester, Iowa*
 Seth Hinsch, Goodhue, Minn.*
 Laura Holt, Taylors Falls, Minn.
 Theodore Jacoby, Ballwin, Mo.
 Ethan Johnson, Heron Lake, Minn.
 Jenna Kerkaert, Pipestone, Minn.
 Sophia Linnemann, Hephzibah, Ga.
 Charles Marshall, Brookings*
 Lydia Meredith, Cokato, Minn.
 Brennen O Reilly, Wayne, Neb.
 John Oakley, Dakota Dunes
 Somtochukwu Onyekwe, Pearland, Tex.
 Joey Otta, Sioux Falls
 Sydney Peters, Winner,

Rhaegyn Petersen, Tyler, Minn.*

Thijs Reuvekamp, Elkton
 Elizabeth Schwartzhoff, Lansing, Iowa
 Daniel Sharp, Bath
 Noah Steinlicht, Milbank*
 Kyle Swanson, Pukawana
 Whitney Ten Napel, Ireton, Iowa
 Sijin Wang, Binhaixinqu Tianjin, China
 Morgan Wingert, Harmony, Minn.*

Food Science

Max Camerer, Sioux City, Iowa
 Jessica Christoffer, Round Lake, Minn.
 Kate Eastlund, Bloomington, Minn.
 Dana Edleman, Cambridge, Iowa
 Allison Kolbe, Sac City, Iowa
 Josephine Moor, White Bear Lake, Minn.
 Claire Olson, Austin, Minn.
 Kaylee Sartell, Des Moines, Iowa*
 Elizabeth Steever, Lennox

Production

Colten Carlson, Willmar, Minn.
 Kelsey Erf, Oakdale, Minn.
 Carter Espinoza, Kasson, Minn.
 Franklin Even, Burke*
 Tyler Gilliland, Wayne, Neb.
 Hailey Hendrickson, Cambria, Wis.
 Bailey Henschen, Correctionville, Iowa
 Ross Herber, Utica, Minn.*
 Meghan Hettinga, Orange City, Iowa
 Chase Hinsch, Goodhue, Minn.
 Rebecka Hoffman, Dolton

Ashley Holst, Kellogg, Minn.*

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.
 Jose Martinez-Gomez, El Nido, Cal.*
 Margaret Molitor, St. Cloud, Minn.*
 Johannah Nielsen, Russell, Minn.
 Lukas Pierson, Butterfield, Minn.
 Stephanie Post, Volga*
 Kaleigh Powell, Liberty, Ill.
 Bethany Rennich, Bruce
 Emily Rogers, Marshall, Minn.
 Jacob Schaefer, Fairfax, Minn.*
 Margaret Socha, Rogers, Minn.
 Tiffany Van Buren, Waupun, Wis.
 Taelyn Virus, Hebron, Neb.
 Maisie Walter, Montrose, Minn.
 Andrew Wilwerding, Freeport, Minn.

Manufacturing and Production

Christina Boogerd, Hull, Iowa
 Anna Donnay, Kimball, Minn.
 Michael Donnay, Kimball, Minn.
 Ashley Maus, Freeport, Minn.
 Claire Plapp, Malta, Ill.
 Denver Stage, Vesta, Minn.
 Emily Tisler, Green Bay, Wis.

*New students in 2020-2021

OUTREACH

North Central Cheese Industries Association

Dr. Lloyd Metzger served as Executive Secretary and Dr. Vikram Mistry as Advisor to the NCCIA. During 2020 the annual meeting was in virtual format with alumnus Sam Metzger presiding. Our alumni routinely serve in leadership positions in this organization.

Dairy Camp

The Dairy Club had planned for the 17th annual Dairy Camp in June for K-12 youth but because of the pandemic, the event was canceled. Normally, activities at the camp include training on care of heifers, judging, exploring the reproductive tract and digestive system, a visit to the SDSU dairy plant, making ice cream, clipping and showing cattle, and entertainment. Participants display their newly learned showmanship skills at a contest on the final day of the Camp in the presence of parents and other guests. The Camp typically attracts 55 to 60 participants.

EXTENSION

Dairy Extension activities led by Dr. Maristela Rovai, Assistant Professor and Extension Specialist, and Tracey Erickson, Extension Field Specialist III had a productive year.

Over 16 years, **I-29 Moo University** has established a widespread learning community through the 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, podcasts, a dairy beef short course, a winter workshop series and a monthly e-newsletter. The Dairy Beef Short Course Committee, chaired by Tracey Erickson, needed to do a quick pivot to offer the program virtually instead of face to face due to the cancellation of the Central Plains Dairy Expo and the Covid-19 pandemic. Participation in the webinar was logged at 185 participants, with 137 being male and 48 being female. Participants were from Arizona, California, Colorado, Florida, Iowa, Indiana, Illinois, Minnesota, North Dakota, Nebraska, Ohio, Pennsylvania, South Dakota, Tennessee, Texas, Washington, and Wisconsin plus Canada and Australia. For I-29 Moo University information and program offerings go to extension.sdstate.edu/agriculture/livestock/dairy click on the "I-29 Moo University" heading.



The sixth annual **Dairy Fest** was held virtually throughout the summer of 2020. It included a Picasa of the Central Plains Art Contest, with 21 entries from third grade through college. Paintings were highlighted via the Dairy Fest Facebook page each week with artwork being

voted upon by viewers in each category. A virtual auction of artwork was conducted with proceeds going back to the dairy artists. The Fork 2 Farm youth educational event offered as a hybrid learning model to youth at the Boys & Girls Club in Brookings. Approximately 200 youth and 24 advisers participated in classroom activities and virtual interactions. A Virtual Dairy Fest was offered via Facebook utilizing interactive videos and posts created by the Dairy Fest social media committee throughout the summer. Thirty-six separate photo posts were created, 15 videos shared (8 originally created and 7 borrowed from Midwest Dairy), 4 links shared, and 2 status comments made. The average reach of each video post was 3,023 views and the photo average was 1,143 views. The Virtual Dairy Fest was spearheaded by the Virtual Social Media committee consisting of Darrel Rennich, Tracey Erickson, Cole Hoyer, Denver Stage and Johannah Nielsen.

Coronavirus Work with producers included resources being made available throughout the pandemic by Dr. Maristela Rovai and Tracey Erickson. Best management practice guidelines for COVID-19 for owners, herdsman and employees were developed and shared via email with dairy producers in South Dakota and the region. The resources included several articles and video resources being posted to the SDSU Extension COVID-19 Response webpage extension.sdstate.edu/covid-19-response.

Due to the pandemic the **S.D. FFA Contest for Dairy Cattle Evaluation** contests were moved online for 2020. Tracey Erickson coordinated the written evaluation, a list of check-type questions for two of the evaluation classes, a pedigree evaluation class and a sire selection class. There were 40 participants in the contest.

Tracey Erickson was a co-coordinator with Midwest Dairy for the **S.D. Dairy Ambassador Program** for SDSU students. The 2020 Ambassadors were Shelby Kuechle, Morgan Kohl, Calissa Lubben, Ethan Johnson and Kelsey Erf. They received consumer education and leadership training, networked with peers and industry experts and shared their dairy story with consumers throughout the year, primarily on a virtual basis due to the pandemic. They each received a \$1,000 award and per diem.

Tracey Erickson continues to represent SDSU Extension as part of the Dairy Learning Community of South Dakota serving on the Central Plains Dairy Foundation board, and the South Dakota Dairy Field Representative board. She also regularly attends the South Dakota Dairy Producers Association meetings and Midwest Dairy Association meetings. Erickson continues to work jointly with the S.D. Department of Agriculture–Dairy Regulatory Division, SDDP, Midwest Dairy, Ag United and the SDSU Dairy and Food Science Department focusing on sustainability and growth of the dairy industry in the I-29 Dairy Corridor and the upper Midwest.

RESEARCH HIGHLIGHTS

Carbohydrate-Based Carriers of Bioactive Compounds Dr. Srinivas Janaswamy. The goals of this project are 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 are carefully designed to provide a comprehensive evaluation of the proposed research strategy. *Objective 1:* Explore the effectiveness of various carbohydrate-based carriers in encapsulating BCs *Objective 2:* Assess the stability and bioavailability of encapsulated BCs.

Process Interventions for Enhancing Microbial Quality, Safety, and Nutrition of Dairy Foods Dr. Sanjeev K. 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

Dr. Johan Osorio. *Overall goal:* 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 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 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-Monteagudo and Sanjeev Anand. The overall objective 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.

More Research Highlights continue on page 8.



SOUTH DAKOTA STATE UNIVERSITY

Dairy and Food Science Department

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RESEARCH HIGHLIGHTS

The 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.

Impacts of Stress Factors on Performance, Health, and Well-Being of Farm Animals Dr. Johan Osorio. Identify measures of animal stress and well-being, characterize factors affecting the biology of stress and immune responses. Identify and assess genetic components of animal stress and well-being. development of management strategies and/or tools to enhance farm animal well-being under conditions of climatic change or other stressful environments.

Metabolic Relationships in Supply on Nutrients for Lactating Cows Dr. Isaac J. Salfer. *Objective 1:* To quantify factors that impact supply and availability of nutrients utilized for efficient milk production while reducing environmental impact. *Objective 2:* To identify and quantify molecular, cellular, and organismal signals that regulate intake, partitioning and efficient utilization of nutrients. *Objective 3:* To use this knowledge of feed properties and metabolic and molecular quantitative relationships to challenge and refine nutrient requirement models leading to more accurate feeding systems for dairy cattle.

Quality and Compositional Evaluation of Pea, Lentil, and Chickpea and Ensuing Flours and Ingredients Drs. Clifford Hall, Padmanaban Krishnan, Srinivas Janaswamy, Brent Turnipseed, Douglas Raine. To address the utilization of dry pulses as an ingredient, the following objectives will be investigated: *Objective 1:* To assess effects of de-flavoring methods on pulse flour volatile composition, sensory attributes, nutrient composition, and functionality. *Objective 2:* To isolate and modify protein and starch fractions of pulses and assess the effects of modification on the chemical composition, physical properties, and functional attributes of pulse flours. *Objective 3:* To characterize the changes in volatile formation, functionality, and nutrient composition of pulses stored under diverse conditions experienced during storage.

Time-Based Feeding and Management Strategies to Improve the Health, Productivity, and Efficiency of Dairy Cattle Dr. Isaac J. Salfer. The overall objective of this project is to improve the health, productivity, and efficiency of dairy cattle through increased understanding of the biological rhythms of dairy cows that will lead to improved management practices. *Objective 1:* Determine the relationships between feeding time, daily rhythms of milk production, and the light/dark cycle in dairy cows. *Objective 2:* Determine

the impact of time-based feeding strategies on rumen health, function, and productivity. *Objective 3:* Evaluate the mechanisms governing circadian rhythms of nutrient metabolism and immune function.

Manufacture of Dairy-Based Ingredients Dr. Lloyd Metzger. Project goals and objectives: 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 can be utilized 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 will be utilized to evaluate modified manufacturing processes that improve the efficiency of lactose and permeate manufacture. *Objective 3:* Develop and evaluate membrane-based manufacturing processes that can be used to isolate or concentrate components in various dairy products including milk, whey, permeate and delactosed permeate.

Value Enhancement of Health, Nutrition and Economic Traits of Cereal Grains Drs. Padmanaban Krishnan, Karl Glover, Sunish Sehgal, Melanie Trembl, Sanjeev Anand, Sergio Martinez-Monteagudo. 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. To investigate the rheological traits and food functionality traits of South Dakota wheat varieties in new applications (Asian noodle, tortilla, pizza dough, flat breads) with a view to expanded food uses and determination of genetic and environmental causes of wheat constituent and functionality variability. To evaluate the nutritional and dietary fiber composition fiber of oat cultivars used in the U.S. food supply using rapid and non-destructive techniques such as near infrared analytical. To investigate the development of high-value wheat fractions (vital gluten, high-selenium bran, high selenium and whole white wheat) that increases the economic and health benefits of South Dakota grown wheat. To provide collaborative assistance in the discipline of cereal chemistry and wheat quality to the winter and spring wheat breeding programs as well as the oat breeding program at SDSU. To engage with food companies in the investigation of rapid food quality evaluation tools and instruments. To increase the value (wholesomeness, safety and efficacy) of corn and corn fractions through the development of new food ingredients, nutraceuticals, and bioactive food agents.