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The Jackrabbit Dairy Review

Dairy Science

Winter 2013

The Jackrabbit Dairy Review

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The Jackrabbit Dairy Review

Winter 2012-2013

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

DAIRY SCIENCE DEPARTMENT

Faculty

Sanjeev Anand *Associate Professor*
Jill Anderson *Assistant Professor*
Howard Bonnemenn *Instructor*
David Casper *Assistant Professor*
Alvaro Garcia *Professor/Extension Dairy Specialist*
Ashraf Hassan *Associate Professor*
Kenneth Kalscheur *Professor*
Lloyd Metzger *Professor, Alfred Chair in Dairy Education*
Vikram Mistry *Professor and Head*
Hasmukh Patel *Assistant Professor*

Emeritus Faculty

Robert Baer *Currently in the Black Hills area*
David Henning *Currently in Wisconsin*
John Parsons *Currently in Arkansas*
David Schingoethe *Currently in Brookings*

Staff

Jacob Anderson *Dairy Plant Manager*
Melinda Bennett *Secretary*
Ananya Biswas *Research Associate*
Stephen Crego *Manager, Dairy Research and Training Facility*
Akimoto Ichinomiya *Assistant Dairy Plant Manager*
Anil Kommineni *Assistant Manager, Institute for Dairy Ingredient Processing*
Pete Linke *Ag Foreman/Fresh and Sick Cows/Calf Care*
Chenchaiiah Marella *Manager, Institute of Dairy Ingredients Processing*
Jayne Raabe *Senior Secretary*
Tracey Renelt *Extension Field Specialist*
Melissa Schmitt *Assistant Manager, Dairy Research and Training Facility*
Thomas VanderWal *Agriculture Foreman*

GRADUATE STUDENTS

Dairy Production

Ishwary Acharya
Fernando Diaz-Royon
*Dana Gaden
*Nadeesha Jayasinghe
Angela Manthey
Sanjeeva Ranathunga
Ulises Salas-Vega
Adlai Schuler
Megan Smith
*Shruti Srivastava
*Brittney Strayer
**William Weich

*New students in 2012 **New students in 2013

Dairy Manufacturing

Khilendra Bhanduriya
*Kimberly Buehner
Nuria Garcia-Fernandez
Sowmya Marka
**Gopinathan Haridas
Meletharayil
Laura Mealy
Prafulla Salunke
**Suresh Sutariya

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MESSAGE FROM THE DEPARTMENT HEAD



I have been honored to serve as the head of the Dairy Science Department for 10 years, and as a faculty member for 26 years. With each passing year I have been fortunate to witness numerous changes within the department, the college and the university. Each of these changes has been strategically designed to address contemporary and future needs within current constraints. All through these changes, the mission of the department "to help create a prosperous future for the dairy industry of South Dakota, the region, nation, and world" has remained at the forefront. To help achieve this, in 2012 we welcomed two new faculty members, Dr. Hasmukh Patel in Dairy Manufacturing, and Dr. Jill Anderson in Dairy Production. We also welcomed two new staff members, twenty six new undergraduate students and eight new graduate students. To fully utilize our new teaching and dairy plant facilities, our goal is to recruit more students at both, undergraduate and graduate levels. Our faculty members have excelled in their areas; Dr. Kalscheur was recognized as a top researcher in the College of Agriculture and Biological Sciences and also received the Gamma Sigma Delta research award, Dr. Casper received a national research award for forage research, Dr. Jill Anderson received a national award for her graduate research, Dr. Metzger was recognized as coach of the year for dairy products judging. Faculty members were invited to assist in various projects, e.g., Dr. Garcia was invited to Saudi Arabia for expert advice, several faculty members served on boards of national and local organizations. Faculty members actively sought external funds for conducting research and supporting graduate students, they also not just taught scheduled classes, but sought ways to design and redesign classes to cover new, relevant topics, using updated teaching methods. Extension faculty integrated their programs into the newly organized SDSU Extension and assisted producers in the areas of nutrition, health, milk quality, labor management, etc. Thus, the diversity of activities of faculty and staff is truly impressive and humbling. While the new dairy plant has been operational for over a year we continue to welcome new supporting members; in 2012, Saputo Cheese and bel brands USA joined the Jackrabbit Dairy Council. We were pleased to welcome Francine Moudry, project manager of bel brands, to Brookings as she embarked on an exciting project of building a new \$100 million cheese plant. As we look at 2013 and beyond, we will shortly engage in the development of a new strategic plan once the university and college planning phases are completed in spring. Further, we are already engaged in developing plans for significantly upgrading our dairy research and training facility for our dairy production teaching and research programs. As we look forward to our new directions we thank you for your past support and invite your input for our future endeavours.

Vikram Mistry



2012 Dairy Club students reminiscing the past.

NEW FACULTY AND STAFF



Anderson Kominenni Patel Vander Wal

Jill Anderson joined the Department as Assistant Professor in Dairy Production. Dr. Anderson brings valuable experience and interest in dairy heifer nutrition and teaching. She received her B.S. in Animal Science from the University of Delaware and M.S. in Animal Science in dairy cattle nutrition at SDSU under the supervision of Dr. David Schingoethe. In 2005, she was appointed as a Research Assistant to manage the dairy cattle nutrition laboratory in the Department. In search of greater challenges, she began her Ph.D. program in 2008 in dairy cattle nutrition under the supervision of Dr. Kenneth Kalscheur, completing it in August 2012. Her Ph.D. research was titled "Growth, nutrient utilization, metabolic profile, and long term performance of dairy heifers fed distillers grains." Her studies demonstrated that feeding distillers grains maintained the average daily gain, skeletal growth and energy status of prepubertal dairy heifers similar to feeding corn and soybean meal. She showed that heifers fed the distillers diets had similar or improved reproductive and lactation performance compared to those fed the corn and soybean meal diet. Her study demonstrated that producers can feed high amounts of distillers grains in place of corn and soybean meal in growing heifer rations without compromising growth, development, or future performance. She has authored or co-authored five refereed journal articles and 11 abstracts. As a faculty member, Dr. Anderson will conduct research in the area of dairy heifer nutrition and teach undergraduate and graduate courses.

Anil Kominenni joined the Department as Assistant Manager of the Institute of Dairy Ingredient Processing. He received his M.S. in Dairy Manufacturing from SDSU in 2011. He then worked for Schwan's Enterprise in Marshall, MN, as Food Scientist. In his current role at SDSU Anil is responsible for assisting with ingredient development research.

Hasmukh Patel has joined the Department as Assistant Professor of Dairy Manufacturing. Dr. Patel brings with him more than 15 years of highly valuable and international experience in the area of research, new product development and processing and quality assurance of dairy and food products. Dr. Patel received his B.Sc. in Dairy Technology from Gujarat Agricultural University (GAU) in India and M.Sc., in Dairy Technology and Dairy Chemistry from GAU. He received his Ph.D. in Food Technology from Massey University in New Zealand under the direction of Drs. Harjinder Singh and Lawrie Creamer, leading figures in the field of dairy protein structure and functions in the food systems.

During his 15 years in industry, Dr. Patel worked for multi-national dairy companies in New Zealand and India and made significant contributions to the dairy and food industry. He has an outstanding track record of scientific and commercial successes throughout his career. He is a co-inventor of three process patents and has written nearly 50 peer-reviewed publications including invited book chapters, original scholarly research papers in international journals and many invited presentations and keynote addresses at international conferences and meetings. Dr. Patel spent 10 years as a Research Scientist at the Fonterra Research Centre in New Zealand involved in ground breaking research in new technologies and development of value added dairy ingredients with novel functional properties and nutritional benefits. At SDSU, Dr. Patel will teach undergraduate and graduate classes in Dairy Manufacturing and initiate a research program in applied dairy processing. The main focus of his research is to help understand the basic mechanisms that can be applied to provide new insights and new knowledge which enables design of new ingredients, new products and processes.

Thomas Vander Wal joined the Department as Agricultural Foreman and is responsible for feeding cows and replacement heifers and overall maintenance at the Dairy Research and Training Facility. Tom holds an Associate's Degree in Farm Operation and Management/Dairy Farming from Ridgewater College in Willmar, MN. Prior to SDSU, Tom was employed at Farmer's Implement in Brookings.

VISITORS

Randy Gross, former President of Holstein Association, USA and retired Assistant Branch Manager of Northwest Farm Credit Services of Washington State, served as co-instructor in the Dairy Breeds and Breeding, Dairy Farm Management, and Cattle Judging classes. Randy's wealth of experience was most valuable to our students.

Walt Wosje, alumnus and retired CEO of Michigan Milk Producers served as guest lecturer in several of our classes. Walt was also the recipient of a distinguished alumnus award of the SDSU Alumni Association in 2011.

Xuiniang Wang, an entrepreneur from China spent two weeks in the Dairy Science Department learning how to make ice cream. Howard Bonnemann, instructor, provided one-on-one instruction to Mr. Wang through a translator. The specialized workshop included dairy lectures and hands-on activities in the Davis Dairy Plant and lab. Mr. Wang plans on establishing an ice cream manufacturing facility in China.

Other visitors included numerous alumni and industry guest speakers in classes and for special seminars and to discuss research opportunities. In addition, Elie Saade and Kurban Yasar spent the summer with us as visiting students from ENSAT, France, and Mart University, Turkey, respectively.



Xuiniang Wang (left) observing ice cream production.

2012 GRADUATES

Ph.D.
Jill Anderson, Production
Kevin Herrick, Production

M.S.
Jacob Albrecht, Production
Ishwary Acharya, Production
Gagan Deep, Manufacturing
Som Khanal, Manufacturing
Kartik Shah, Manufacturing
Diwakar Singh, Manufact.

B.S. Manufacturing
Nathan Gollnick
Angela Klaers
Taylor Lais
Eric McNeel
Luke Rensink

B.S. Production
Emily Jungemann
Mitchell Maher
Valerie Mohr
Brittany Moore

Katie Nelson
Cody Schlecht
Ana Schweer
Renae Hinkeldey

B.S. Manufacturing and Production
Jessica Becker
Megan Forst
Megan Rice
Johnna Schuur

JUDGING ACTIVITIES

DAIRY CATTLE EVALUATION & DAIRY CHALLENGE

Our Dairy Cattle Judging team consisting of Alisha Vander Wal, Chelsey Johnson and Christopher Schulze participated in the North American International Livestock Dairy Judging contest in Louisville, Kentucky. Stephen Crego was the coach. There were twenty teams in the collegiate division with SDSU placing 15th. Chelsey Johnson placed third in Holsteins and Chris Schulze placed 25th overall. Earlier in the year, our teams participated in the Nineteenth annual Accelerated Genetics Intercollegiate Dairy Cattle Judging Contest in Viroqua, Wisconsin. The senior team consisted of Chelsey Johnson, Alisha Vander Wal and Chris Schulze. The junior team included Ben Choudek, Matthew Holdvogt, and Rachel Achen. Eighteen teams were present representing 10 universities. The contest consisted of ten Classes and Reasons for five classes. The Junior Team placed fourth in Guernsey and the Senior Team placed first in Holstein. Chelsey Johnson placed fifth individual overall and seventh in Reasons. The team placed fifth in Jersey, fourth in Milking Shorthorn. Overall, Alisha Vander Wal placed seventh and Chris Schulze was ninth. Overall, the SDSU team placed third in the contest. The team also attended the Southwestern Exposition and Livestock Show in Fort Worth, Texas. The team consisted of Chelsey Johnson, Chris Schulze, Sara Sontag, and Alisha Vander Wal and was coached by Steve Crego and Megan Smith. The team placed seventh overall among 14 teams and sixth in reasons. They placed fifth in Brown Swiss and Jersey classes. Chris Schulze and Alisha Vander Wal placed fifth and 10th, respectively in Jerseys. Alisha placed second in Brown Swiss. In overall individual placing, Alisha and Chris were 22nd and 24th respectively. Alisha placed 15th and Chelsey 18th in overall individual reasons. Oklahoma State University hosted judging practice prior to the contest in Fort Worth. At this practice teams from Kansas State University and North Dakota State University also participated.

Four Dairy Science students traveled to Roanoke, Virginia, to participate in the Eleventh Annual North American Intercollegiate Dairy Challenge (NAIDC). The SDSU Dairy Challenge Team consisted of Megan Forst, Kaitlin Hartkopf, Mitch Maher, and Megan Rice. The contest included 128 students from 32 universities and colleges across the United States and Canada. Associate Professor Kenneth Kalscheur, Assistant Professor David Casper, Assistant Farm Manager Melissa Schmitt, and Farm Manager Steve Crego helped coach the team. The two-day competition began with a walk-through of an operating dairy, analysis of farm data, and question and answer session with farm owners. Then each team developed recommendations for nutrition, reproduction, milking procedures, animal health, housing, and financial management. The teams presented their recommendations to owners, while being evaluated by a panel of five judges — dairy producers, veterinarians, farm finance specialists, and industry personnel. Team members commented that the contest is incomparable to other collegiate dairy experiences. The knowledge and hands-on experience gained through Dairy Challenge will be used by many participants for years to come. Earlier in the year, five SDSU students traveled to St. Joseph, Missouri, to participate in the 10th annual Midwest Regional Dairy Challenge. SDSU students were mixed with students from 19 other Midwest universities and colleges to work in teams of four or fifth to assess all aspects of a working dairy farm and present recommendations to a panel of judges and the dairy farm owners. Representing SDSU were Megan Forst, Mitch Maher, Valerie Mohr, Megan Rice, and Ana Schweer.

DAIRY PRODUCTS

Our Dairy Products Judging Team placed first in All Products at the Collegiate Dairy Products Evaluation Contest for the fifth consecutive year. SDSU teams have won the national championship 20 times in the 91 year history of the contest. The 2012 team placed first in milk and Cheddar cheese, second in ice cream, third in cottage cheese, fourth in butter, and fifth in yogurt. A total of 53 contestants from 17 universities in the U.S. and Canada participated in the contest. Team members were Austin Asche, Cassandra Hulstein, Lee Alexander, and Laura Mealy.



Dairy Cattle Judging Team



Dairy Products Judging Team

The team is coached by Lloyd Metzger, Professor of Dairy Science and Alfred Chair in Dairy Education, and Justin Ochsner, student. Hulstein placed first overall and fourth in ice cream and Cheddar cheese. As top judge in the nation, Hulstein received the Robert Rosenbaum Award. Asche placed third overall, and first in Cheddar cheese and milk and third in cottage cheese. As the third place judge in the nation Asche received the Harold Roberts Award. Alexander was fourth overall and placed fifth in Cheddar cheese and seventh in butter. In the graduate student contest, Mealy placed first overall and was first in butter, ice cream, and cottage cheese. As top judge in the graduate contest, Mealy received the Genevieve Christen Award. For placing first overall, the SDSU team won the Shirley Seas Memorial Scholarship given in memory of Shirley Seas, who coached SDSU's team for 21 years. Metzger also received the Aurelia and George Weigold Coach of the Year Award. The contest was hosted by Dairiconcepts and was sponsored by the U.S. Department of Agriculture, Food Processing Suppliers Association, Arthur W. Nesbitt, Chr. Hansen Inc., Hilmar Cheese Co., Dairy Concepts, Dupont Danisco, YoCrunch, Nasco, Nelson Jameson, Schreiber Foods, Saputo, Dairy Chem, IDFA, and Griton Manufacturing Co.

HEIFERS FOR STATE

The 2012 Heifers for State was held in conjunction with the annual South Dakota Central Plains Fall Sale on October 29, 2012, at the Swiftel Center in Brookings. Dairy Club members worked all week to set up the arena, receive cattle, prepare, feed and milk them. On the day of the sale they showed the cattle to buyers. Approximately 140 animals were sold at the sale. Three generous producers also donated animals for the Heifers for State program. Donors included K.C. Dairy – Edward Kavanagh, Elkton, SD; and Marv and Joy Post, Volga, SD. \$2,350 were raised from the donated animals. This contribution will be used for supporting dairy education, research programs and providing scholarships to Dairy Science students at SDSU. The Heifers for State program started in 2006.

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 <http://www.sdstate.edu/ds>.

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

Jacob Anderson served as the manager of the Davis Dairy Plant and as a Dairy Club advisor. In addition to managing the plant he also visited with students and their families during prospective student college visits.

Dr. Jill Anderson joined the Dairy Science Department as Assistant Professor in September 2012 and immediately began her teaching activities and developing her research program in heifer nutrition.

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

Dr. David Casper served in various capacities on boards of the American Dairy Science Association and the American Society of Animal Science. He was awarded the Pioneer Hi-Bred Forage Research award at the annual meeting of the American Dairy Science Association. He served as co-coach of the Intercollegiate Dairy Challenge team.

Dr. Alvaro Garcia has been a faculty member in Dairy Science since 2001 and has developed a strong highly recognized dairy Extension program. Dr. Garcia was invited to speak in Uruguay. He was also appointed by the U.S. Secretary of Agriculture to the Agricultural Advisory Committee (ATAC) for international Trade in Animals and Animal Products. During summer 2012 Dr. Garcia was invited to travel to Saudi Arabia to discuss distillers grains applications and other dairy cattle nutrition matters at Almari and other dairies.

Dr. Ashraf Hassan was a member of the International Animal Agriculture Committee of the American Dairy Science Association and of the expert panel on low fat cheese research of the Dairy Management, Inc., and now a member of the editorial board of the *Journal of Dairy Science*.

Dr. Kenneth Kalscheur was promoted to Professor in 2012. He was recognized as College of Agriculture and Biological Sciences Distinguished Researcher of the year and also received the SDSU Gamma Sigma Delta Outstanding Researcher Award. He served as the President of the Midwest ADSA/ASAS Board of Directors, and as member of the editorial board of the journal *Animal Feed Science and Technology*. He was an active participant on a NC multi-state research project; NC 1042, Management Systems to Improve the Economic and Environmental Substantiality of Dairy Enterprises. Dr. Kalscheur also served as co-coach of the Intercollegiate Dairy Challenge team.

Stephen Crego served as Manager of the Dairy Research and Training Facility. He also coached the dairy cattle judging team.

Dr. Lloyd Metzger was granted tenure and was promoted to Professor in 2012. He serves as the Director of the Midwest Dairy Foods Research Center and the Executive Secretary of the North Central Cheese Industries Association. Member – ADSA Dairy Foods Milk Protein and Enzyme Committee, President of the ADSA Dairy Foods division and member of the editorial board of the *Journal of Dairy Science*. Dr. Metzger has served as coach of the dairy products judging team and continues the legacy of Shirley Seas and Bob Baer.

Dr. 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 also served on the boards of the American Dairy Association of South Dakota, South Dakota Dairy



Garcia

Kalscheur

Metzger

Producers, American Dairy Science Association Foundation, and advisor to the North Central Cheese Association and the South Dakota Dairy Producers.

Dr. Hasmukh Patel joined the Dairy Science Department as Assistant Professor in June 2012 after 15 years in New Zealand as a researcher and is initiating a research program in dairy processing.

Tracey Renelt completed her first full year as Extension Field Specialist. She co-developed a Feedstuff Calculator app that is now available through iGrow. In addition to her Extension work, she also served as the secretary of the South Dakota Dairy Fieldmen's Association.

YEARS OF SERVICE



Howard Bonnemann was recognized for 15 years of service to SDSU. He joined the Dairy Science Department as Instructor and Dairy Plant Manager in 1997. Prior to this he graduated from Dairy Science with B.S., and M.S. degrees and was employed in the dairy industry.

Jayne Raabe was recognized for 25 years of service to SDSU. Jayne is currently Senior Secretary in the Dairy Science Department. She joined the department as Staff Assistant in 1987 and became Senior Secretary in 1991. In this position she has been overseeing department accounting, purchasing, scholarships, and many other operations.

DAIRY FACILITIES RENOVATION

We have completed two years in the newly renovated Alfred Dairy Science Hall and just over a year in the Davis Dairy Plant. In 2012 we extended invitations to all our Jackrabbit Dairy Council members and donors for the dairy plant project to campus for conducting interviews for summer internships and permanent positions. Nine donor companies visited the department and conducted 100 interviews. Job offers are being finalized.



NEW AND ONGOING FUNDS FOR SUPPORTING RESEARCH

Anand, S. K. To improve the microbial quality of milk powders by controlling thermally resistant spore forming and spores. 08/01/2012 to 07/01/2015. Dairy Research Institute. \$300,720.

Anand, S. K., Metzger, L. E. Thermophilic and thermophilic sporeforming bacteria in whey and whey ingredients. 08/01/2012 to 12/31/2013. Midwest Dairy Foods Research Center. \$32,204.

Anand, S. K. Training modules for understanding the significance and control of thermophilic bacteria in dairy production and processing environments. 01/01/2012 to 01/01/2013. Midwest Dairy Foods Research Center. \$8,999.

Anand, S. K. Review article: Cleaning and sanitation challenges in dairy industry. 01/01/2012 to 01/01/2013. Midwest Dairy Foods Research Center. \$5,000.

Anand, S. K., Hegerfeld, J., Krishnan, P., Muthukumarappan, K., Wang, X. Recruitment and retention of a diverse population of food safety students using novel approaches to market enhanced programs. 09/01/2008 to 08/31/2012. USDA/CSREES FPT North Dakota State University. \$85,372.

Anand, S. K., Metzger, L. E. Determining the role of thermophilic and thermophilic sporeformers and their biofilms in cheese spoilage. 11/01/2011 to 12/31/2013. Dairy Research Institute. \$142,404.

Anand, S. K., Muthukumarappan, K. Modification of CIP protocol to prevent and control biofilms in dairy processing environments. 11/01/2011 to 12/31/2013. Dairy Research Institute. \$110,000.

Bonnamann, H., Anderson, J. K. Use of Dairy Plant Facilities for Testing Frozen Dessert Processing. 09/10/2012 to 10/31/2012. Praxair, Inc. \$6,827.

Casper, D. P. Investigation into bacteriological etiology of bovine digital dermatitis using serology, culture and genomic methodologies. 07/01/2012 to 12/31/2013. NADC-USDA-ARS. \$4,322.

Garcia, A. D. Producer surveys and outreach/extension programs for livestock producers. 05/01/2007 to 04/30/2012. USDA/Agricultural Research Service. \$65,160.

Hassan, A. Biofilm formation on dairy separation membranes as affected by substrate and cheese starter. 01/01/2011 to 12/31/2012. Midwest Dairy Foods Research Center. \$28,831.

Hegerfeld, J., Anand, S.K., Dalaly, B., Ruesch, L., Underwood, K. Innovative STEM instructional techniques to increase the number and diversity of students in food safety related majors. 09/01/2011 to 08/31/2014. USDA/NIFA-HEC grant. \$280,341.

Hippen, A. R., Hassan, A., Abd El-Salam, M. H. Production of novel probiotic dairy products rich in conjugated linoleic acid. 03/01/2006 to 11/30/2010. US-Egypt Joint Science and Technology Board through USDA/FAS. \$27,000.

Hippen, A. R., Kalscheur, K. F., Schingoethe, D. J. Protocol for steam-flaked soybeans in dairy cow diets. 12/17/2009 to 12/17/2011. Midwest EnRG Flakes, LLC. \$52,000.

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

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

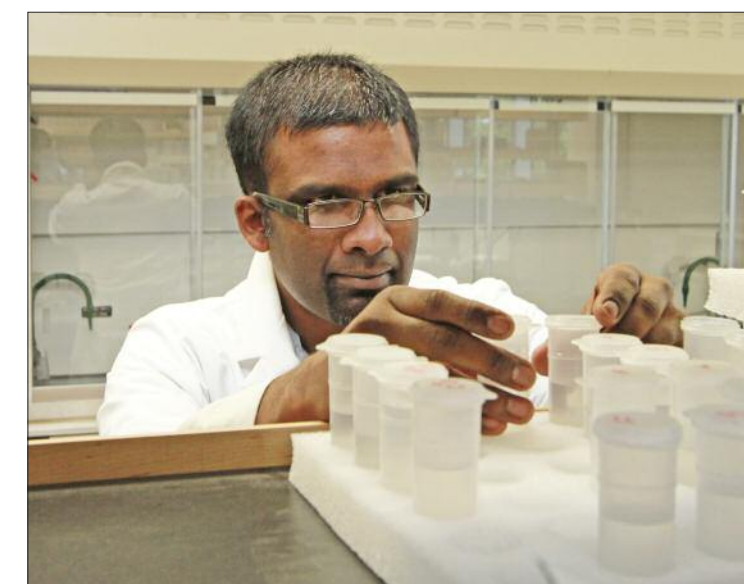
Kalscheur, K. F. Effect of DEMP in high and low forage diets on ruminal metabolism and lactation performance of high-producing dairy cows. 09/15/2012 to 06/15/2013. Alltech, Inc. \$45,600.

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

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

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

Kalscheur, K. F., Herrick, K. Abomasal infusion of butyrate in dairy cattle. 10/24/2011 to 08/31/2013. Nutriad Inc. \$35,856.



Kalscheur, K. F., Hippen, A. R., Schingoethe, D. J. Monensin in dairy cow diets containing high RUFAL from corn distillers grains and low fractions of physically effective fiber. 12/01/2010 to 07/31/2013. Elanco Animal Health. \$124,695.

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

Metzger, L. E. Development of modified milk protein concentrates and native casein concentrates that can be utilized as an alternative to rennet casein in process cheese product applications. 10/01/2010 to 12/31/2012. Dairy Management Inc. \$135,450.

Metzger, L. E. Institute for Dairy Ingredient Processing 2012. 01/01/2012 to 12/31/2012. Dairy Research Institute (DRI) thru University of Minnesota (UMN). \$166,950.

Metzger, L. E. Manufacture of modified MPC utilizing injection of carbon dioxide. 01/01/2011 to 12/31/2012. Dairy Management Inc. \$63,000.

Metzger, L. E., Mistry, V. V. Institute for Dairy Ingredient Processing (IDIP Application Lab). 01/01/2011 to 12/31/2012. Dairy Management, Inc. \$166,950.

Mistry, V. V. Dairy Science Industry. 07/01/1988 to 12/31/2012. Dairy Science Industry. \$37,656.

Patel, H. A. The stability and functionality of Liquid dairy ingredients: Role of protein interactions in their heat stability. 08/16/2012 to 12/31/2013. \$27,796

Renelt, T. Agricultural human resource management. 01/01/2012 to 01/01/2013. North Central Risk Management Education Center. \$37,559.

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

MARK YOUR CALENDAR

I-29 Dairy Conference

February 27-28, Best Western Ramkota Inn, Sioux Falls

Central Plains Dairy Expo

March 27-28, Convention Center, Sioux Falls

2013 Dairy Science Scholarship Banquet

Monday, April 1, at 6:00 p.m., SDSU Student Union.

SCHOLARSHIPS

Our students were again the beneficiaries of the generosity of many alumni, friends and industry. At the spring 2012 banquet, 220 attendees witnessed the awarding of 95 scholarships and awards valued at \$91,714.

Agropur, Inc. Dairy Production, \$500
 Alfred Hermann Rishoi (2 @ \$550 each), \$1,100
 Associated Milk Producers, Inc., \$1,000
 bel brands USA, \$3,000
 Clyde Helsper Memorial, \$1,000
 Dairy Club (2 @ \$500 each), \$1,000
 Dairy Connections, \$1,000
 Dairy Farmers of America, \$400
 David H. Henry Memorial \$200
 David J. Schingoethe, \$1,000
 Davisco Foods Int'l,
 and Jay Headly Memorial, \$1,500
 Dean Foods – Land O'Lakes, \$1,250
 Derald, \$500
 DuPont (2 @ \$1,000 each), \$2,000
 Emery Bartle Memorial, \$5,000
 Gilbert T. and Olga Gilbertson Memorial, \$350
 H. C. Olson, \$450
 Heifers for State (2 @ \$500 each), \$1,000
 I-29 Dairy Extension, \$500
 J. J. Yee, \$500
 James Marvel Memorial, \$350
 John Anderson Memorial
 (2 @ \$2,000 each), \$4,000
 John C. Gross, \$1,000
 Joseph Van Treeck, \$1,300
 Kemps LLC, \$1,500
 Kirk Mears Memorial, \$900
 Land O'Lakes – Region 65, \$250
 Leprino Foods, \$4,000



2012 Dairy Science Banquet

Midwest Dairy Association
 (2 @ \$1,500 each), \$3,000
 North Central Cheese Industries Association,
 (2 @ \$1,800, 2 @ \$700), \$5,000
 Ode Family, \$500
 Ralph Rogers Memorial, \$400
 Ross Baker Memorial, \$400
 Ryan Graber Memorial, \$1,000
 Saputo Cheese, \$1,000
 Schreiber Foods, \$1,500
 Schuch Family, \$600
 Shirley Seas Memorial, \$400
 South Dakota State Dairy Association
 (4 @ \$1,000 each), \$4,000
 Susan Hawkins, \$1,000
 T. M. Olson, \$600
 Todd and Erica Stahl, \$1,000
 Valley Queen Cheese Factory, \$4,000
 Walt and Yvonne Wosje, \$1,000
 WOW Logistics' Donald E. Utschig, \$1,000

Awards

Dairy Challenge (4 @ \$200), \$800
 Dairy Judging Manufacturing, \$150
 Dairy Judging Production, \$150

Forbes Leadership, \$300
 Graber-Ford, \$90
 Students Employee Excellence (2 @ \$250), \$500
 Alfred Tobkin Memorial (4 @ \$163 each), \$652
 Howard Voelker Memorial (4 @ \$200 each), \$800

Incoming Students Scholarships

Agropur, Inc. Dairy Manufacturing, \$500
 Clyde G. Helsper Dairy Fieldmen's, \$1,000
 Dr. S. K. Dash, \$1,000
 Howard Voelker Freshman Dairy Prod., \$1,000
 Royal and Helen Doner in Dairy Prod., \$300
 South Dakota Dairy Fieldmen's Association
 (5 @ \$1,000), \$5,000
 South Dakota State Dairy Association
 (4 @ \$500), \$2,000
 William and Marge Kallemeyn & Sons, \$1,300
 Valley Queen Cheese Factory, \$1,000

Graduate Student Scholarships

Dairy Recog. and Education Foundation
 (2 @ \$5,937), \$11,874
 Delbert and Robert Breazeale Memorial, \$750

OUTREACH

Area Dairy Expos

Alumni, students, staff, and faculty of the Dairy Science Department participated in Central Plains Dairy Expo in Sioux Falls and the World Dairy Expo in Madison, WI. 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 Advisor to the NCCIA. The annual meeting was held in Sioux Falls in October and attracted over 130 cheese makers and suppliers from the upper Midwest.

K-12 STUDENTS

Dairy Camp

The Dairy Club hosted the 9th annual Dairy Camp in June 2012 for youth ages 8-18. Activities for the 37 participants included a visit to a local commercial dairy, training on care of heifers, judging, 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 and Randy Gross served as a judge for the show.

High School Visits

Recruiting students for our programs 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 also visited schools in these states.

EXTENSION

Seventh Annual I-29 Dairy Conference

More than 200 individuals in dairy farming improved their understanding of sustainability concepts at an I-29 Regional Dairy Conference held in Sioux Falls, SD. Speakers from the United Kingdom, SDSU, Minnesota, Illinois, and Texas spoke on the theme "Future Global Dairy Issues."

UPDATE: DAIRY RESEARCH & TRAINING FACILITY



Our dairy farm has approximately 150 certified and registered milking cows and a total of 300 animals. This includes about 50 Brown Swiss. The rolling herd average attained a record of just over 25,000 pounds per year. The herd is used for research projects primarily in the cattle nutrition area and also for teaching. In addition K-12 students also benefit from it through the Dairy Camp and cattle judging contests that are hosted at the farm. Matthew Holdvogt and Benjamin Choudek serve as student managers. Stephen Crego and Melissa Schmitt, manager and assistant manager, respectively managed the farm. Thomas Vander Wal joined the DRTF as Ag Foreman and took on the duties of feeding and maintenance. Farm research was enhanced recently with the purchase of a new Data Ranger.



Dairy Camp

Dairy Science at World Dairy Expo

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

Applied Food Safety Education Lab Workshop IV

Joan Hegerfeld-Baker from Nutrition and Health Sciences and Sanjeev Anand from Dairy Science jointly organized this USDA/HEC challenge grant workshop, for hands-on training in microbiological analytical procedures and virtual labs, at Riggs High School Science Lab, Pierre. Fifteen teachers participated in the workshop.

Food Safety Science Workshop

Joan Hegerfeld-Baker from Nutrition and Health Sciences and Sanjeev Anand from Dairy Science jointly organized this USDA/HEC challenge grant workshop, for hands-on training in microbiological analytical procedures and virtual labs at SDSU. Eighteen student-teachers attended this workshop.

DAIRY CLUB

2012 Officers: Grace Liebenstein, President; Chelsey Johnson, Vice President; Matt Holdvogt, Secretary; Alisha Vander Wal, Treasurer; Kayla Quincey and Lydia Olson, Historians; Sara Sontag and Christopher Schulze, Activities Coordinators; and Chelsey Johnson and Jennifer Vander Wal, Dairy Digest editors. Advisors: Jacob Anderson, Steve Crego, Drs. Alvaro Garcia, Kenneth Kalscheur, and Lloyd Metzger. Club members attended ADSA-SAD regional conference in Champaign, IL, in February. In June, Club members hosted youth at the ninth annual Jackrabbit Dairy Camp. Other club activities this past year included the Fall Central Plains Dairy Sale, Hobo Days festivities, World Dairy Expo in October and cheese boxes. The Dairy Club was selected as the Student Club of the Year for 2012.



UNDERGRADUATE STUDENTS

*Rachel Achen, Sauk Centre, MN, Manufacturing
 Lee Alexander, Twin Brooks, SD, Manufacturing
 Kyle Anderson, De Smet, SD, Manufacturing
 Austin Asche, Stewart, MN, Manufacturing
 Kevin Berg, Baltic, SD, Manufacturing, Production
 Samantha Berg, Pipestone, MN, Manufacturing
 Bethany Chapman, Winfred, SD, Production
 Roxane Chapman, Winfred, SD,
 Production, Manufacturing
 Benjamin Choudek, Owatonna, MN, Production
 Jordan Evans, Pipestone, MN, Production
 Kyle Fischer, New Ulm, MN, Production
 *Sam Fuchs, Eureka, SD,
 Production, Manufacturing
 *Daniel Gacke, Beresford, SD, Manufacturing
 Jennifer Gunnink, Lake Benton, MN, Production
 Tom Hammink, Bruce, SD, Production
 Nicole Hans, Wynot, NE, Production
 Kaitlin Hartkopf, Howard Lake, MN, Production
 Maxwell Henn, Norfolk, NE, Production
 *Joseph Hoffman, New Ulm, MN, Production
 Matthew Holdvogt, Eden Valley, MN, Production
 Megan Huegeli, Hartford, WI, Manufacturing
 Cassandra Hulstein, Edgerton, MN, Production
 *Nicole Jax, Waltham, MN, Manufacturing
 *Rachel Johnson, Russell, MN, Manufacturing
 *Chelsey Johnson, Heron Lake, MN, Production
 April Johnson, Heron Lake, MN, Production

*Brandon Johnson, White, SD, Production
 Taylor Jones, Huron, SD, Manufacturing
 Kaleb Juntunen, Courtland, MN, Manufacturing
 Andrew Kaskie, Hudson, SD, Manufacturing
 *Molly Kennedy, Beresford, SD, Manufacturing
 Caleb Kottke, Owatonna, MN, Production
 Natasha Laska, Ponca, NE, Manufacturing
 Grace Liebenstein, Dundas, MN, Production
 Weina Liu, China, Manufacturing
 Bridgette Louwagie, Cottonwood, MN,
 Production, Manufacturing
 *Kimberly Maassen, Rock Valley, IA, Manufacturing
 *Emily Martin, Rochester, MN, Production
 Laura McMartin, Gerber, CA, Production
 *Geena Mott, Minneapolis, MN, Manufacturing
 *Seon Woo Nam, Republic of Korea, Production
 Larissa Neugebauer, Dimock, SD, Production
 Joshua Oakley, Dakota Dunes, SD, Manufacturing
 Justin Ochsner, New London, MN, Manufacturing
 *Zakhary Oelfke, Glencoe, MN, Manufacturing
 Lydia Olson, Owatonna, MN, Production
 *Timothy Pagel, Eyota, MN, Production
 Timothy Pennings, Saint Petersburg, FL,
 Manufacturing
 *Andrea Pfaffenbach, Roann, IN, Production
 Riley Pitman, Chatham, NH,
 Production, Manufacturing
 *Christopher Reiter, Medford, MN, Production
 Teresa Sandberg, Taylors Falls, MN, Production

Samantha Schaefer, Lake Benton, MN,
 Manufacturing, Production
 Holly Schmitt, Thorp, WI,
 Production, Manufacturing
 George Schoessler, Kimberly, ID, Production
 Angela Sellner, Sleepy Eye, MN, Production
 *Luke Serbus, Dassel, MN, Manufacturing
 *Chelsey Shumski, Fairmont, MN, Production
 *Jae Young Sim, Republic of Korea, Manufacturing
 Sara Sontag, Shafer, MN, Production
 Della Stage, Vesta, MN, Manufacturing
 *Margaret Stiles, Lakeville, MN, Production
 Danielle Tews, Hutchinson, MN, Production
 *Petrus van Bedaf, Carrington, ND, Production
 Cody Van Eck, Ruthon, MN, Production
 *Brent Van Middendorp, Sioux Center, IA,
 Manufacturing
 Alisha Vander Wal, Pipestone, MN, Production
 Megan Viland, Pipestone, MN, Production
 *Kaylee Wegner, Faribault, MN,
 Manufacturing, Production
 *Abigail Weyrens, Plano, TX,
 Production, Manufacturing
 *Austin Wyatt, St. James, MN, Manufacturing
 *Mitchell Youmie, Alpena, SD, Manufacturing

*New students in 2012-2013



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Dairy Science Department
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RESEARCH HIGHLIGHTS



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

Structure-function Relationship of Milk Proteins and Design of Dairy Ingredients with Tailored Functionality, Improved Nutrition and Health Benefits *Drs. Hasmukh Patel, Lloyd Metzger, and Bonny Specker.* 1) Improve our knowledge of structure-function relationship of milk proteins. 2) Provide link between food structure and bioavailability/nutrient delivery. 3) Improve understanding and provide insights for designing new dairy ingredients with improved nutrition and functionality.

Improving Feed Efficiency through High Forage Rations as a Feeding Strategy to Increase the Profitability & Sustainability of Dairy Production *Dr. David Casper* This research is intended to identify and evaluate methods to improve the feed efficiency of dairy cows through traditional forage quality and new forage hybrids that may come available for use in dairy cattle diets. Most evaluations will be as feeds for lactating cows, although some evaluations (e.g. specific nutrient profiles) may be with growing heifers or dry cows. Specific objectives for this project include: 1) Evaluate the nutritional composition and feeding value of highly digestible forages and new forage hybrids for maximum inclusion rate for feeding high forage diets to lactating dairy cows. Techniques will include ruminal fermentation with continuous culture fermenter system, measurement of gas production from ruminal fermentation and rational feeding methods of lactating dairy cows. 2) Evaluate the maximum forage inclusion rates for mid to late lactation dairy cows. Highly digestible forages could result in very high forage diets that will reduce the feed costs of these cows. 3) Evaluate the nutrient composition, dry matter digestibility, fiber digestibility, starch digestibility to accurately predict the feeding value of forages and new forage hybrids for dairy cattle.

Safety and Quality Improvement of Milk and Cheese *Dr. Sanjeev Anand.* 1) 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.

Role of Exopolysaccharides-Producing Cultures in Biofilms Formation and as a Texturizing Agent *Drs. Ashraf Hassan, Vikram Mistry, and Sanjeev Anand.* 1) Optimize manufacturing conditions for the production of 50% reduced fat and low fat Cheddar cheeses with characteristics similar to those in the full fat types using EPS-producing cultures. 2) Develop novel functional ingredients from whey containing exopolysaccharides. 3) Study the formation of biofilms on whey RO membranes as a cause of membrane fouling.

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

Management Systems to Improve the Economic and Environmental Sustainability of Dairy Enterprises *Dr. Kenneth Kalscheur* The purpose of this project is to develop decision support systems that address nutrition, management, environmental impacts, and economics of 1) calves and heifers and 2) lactating and dry cows.

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: 1) determine the impact of carbon dioxide injection on membrane performance, mineral content, and functionality of milk protein concentrate; and 2) to evaluate the effectiveness of transglutaminase 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.

Use of Biofuel Coproducts to Improve Nutrient Utilization in Dairy Cattle *Drs. Kenneth Kalscheur, David Schingoethe and Alvaro Garcia* This project examines nutrient utilization of dairy cattle fed diets using biofuel coproducts to reduce losses to the environment.