

MIDWEST DAIRY FOODS RESEARCH CENTER



University of Minnesota (St. Paul)

http://fscn.che.umn.edu/research_discovery/centers/mndak.html

South Dakota State University (Brookings)

Iowa State University (Ames)

OVERVIEW

The Midwest Dairy Foods Research Center has resources within the University of Minnesota (St. Paul), South Dakota State University (Brookings) and Iowa State University (Ames). The dairy center was formed to conduct research and provide support needed to increase the viability of the U.S. dairy industry and ensure its future competitiveness. The center offers expertise in dairy foods research for both traditional dairy products and dairy products used as an ingredient.

RESEARCH FOCUS

- Improving and controlling flavor development and functionality in cheese
- Improving the performance of cheese starter cultures through genetics
- Adding value to milk-based products with probiotics and nutraceuticals
- Improving shelf life of flavored milks
- Reducing undesirable taste attributes of milk
- Improving functionality and controlling flavor attributes of milk fractionation components
- Developing methods for effective and profitable uses of whey

FACILITIES AND EQUIPMENT

The center includes a number of specialists in dairy/cheese processing, twin-screw extrusion, aseptic processing, spray and fluidized-bed drying, milling, baking, micromalting, and a wide range of extraction, sterilization and ancillary separation systems.

UNIVERSITY OF MINNESOTA

CONTACT: RAY MILLER
Plant Manager
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FACILITIES

- Sensory Center
- Joseph J. Warthesen Food Processing Center

EQUIPMENT:	– Agglomerator: Glatt 3-lb. cap.	– Homogenizer: Gaulin 30 and 125 gal./hr.
	– Buhler extruder	– HPLC
	– Butter churn: Vane, 300 lbs.	– HTST and homogenizer: APV 35 gal./hr.
	– CEM microwave (rapid moisture oven)	– Mass spectrometer (MS)
	– Cheese vat: Kusel 2,000 lbs.	– Microthermics: 1-3 l./min.
	– Cheese vat: Nu-Vat, 800 lbs.	– Mix process unit: 50-100 gal.
	– Continuous ice cream freezer: 60 gal./hr.	– Pasteurizer: Cherry-Burrell 4,000 lbs./hr.
	– Decanter: Sharples 1 gal./min.	– Process cheese cooker: Blantech 10 lbs.
	– Desludging centrifuge: Westfalia, 5,000 lbs./hr.	– Process cheese cooker: Damrow 40 lbs.
	– Drum dryer: Buffalovac 6-in.	– PTI RO/UF system multitube
	– Dryer: Courter, 90 lbs./hr.	– Refrigerated tank: Cherry-Burrell 200 gal.
	– Dryer: Niro, 20 lbs./hr.	– Ribbon blender
	– Evaporator: CE Rogers, 200 lbs./min.	– Scherping Cheddaring belt: 200-300 lbs./hr.
	– Food chopper and cutter: Hobart 10 lbs.	– Scherping cheese system: 2,500-lb. cap
	– Fruit/nut feeder	
	– Gas chromatography (GC)	
	– Hammermill: Fitzpatrick, 5-lb. hopper	

- EQUIPMENT:**
- Separator: Westfalia 2,000 lbs./hr.
 - Shelf-life testing
 - UF system: DDS-20, Plate and Frame, 10-l.
 - UF system: Osmonics 5m², spiral-wound
 - Univats: Cherry-Burrell, 50 gal.
 - Water activity testing

FACILITIES AND EQUIPMENT

SOUTH DAKOTA STATE UNIVERSITY

CONTACT: HOWARD BONNEMANN
 Dairy Plant Manager
 612-688-5480
howard.bonnemann@sdsu.edu

FACILITIES

- Dairy Research and Training Facility
- Dairy Pilot Plant

- EQUIPMENT:**
- Batch freezer: 40-qt. Emery Thompson
 - Butter churns: 15 to 450 lbs.
 - Centrifugal pumps
 - Cheddar mill
 - Cheese block cutter (pneumatic)
 - Cheese press (pneumatic)
 - Cheese sealer: Sipromac
 - Cheese shredder: Hobart
 - Cheese vat: Damrow 3,000 lbs.
 - Cheese vat: Kusel Double-O, 500 lbs.
 - Cold bowl cream separator: DeLaval 5,000 lbs./hr.
 - Evaporator: vacuum-thermal, Blaw-Knox
 - Filler: Bag-n-Box, Scholle
 - Fruit feeder
 - Homogenizer: Gaulin 5,000 lbs./hr., 4,000 PSI
 - HTST system: 5,000 lbs./hr.
 - Ice cream freezer: APV Crepaco, 85-gph air injection
 - Likwifier: 100 gal.
 - Microfiltration system: 1.7m², ceramic membranes
 - Niro spray dryer: rotary atomizer
 - Platform scales: 75 lbs. and 400 lbs.
 - Positive pump for revel in ice cream
 - Process cheese cooker: single-screw, 30-lb. culinary steam generator
 - Process vats: 20, 50, 200 and 300 gal.; steam and cool
 - Raw milk storage: 1,500-gal. horizontal, 13,000 lbs.
 - Refrigerated and frozen storage facilities
 - Steam culture chest
 - Ultrafiltration pilot lab, spiral-wound

FACILITIES AND EQUIPMENT

IOWA STATE UNIVERSITY

CONTACT: MARK REUBER
 Pilot Plant Manager
 515-294-3572
 mar@iastate.edu

FACILITIES

- Dry processing pilot plant
- Fermentation facility
- Process development lab
- Technology transfer pilot plant and theater
- Test kitchen and sensory lab
- Wet processing pilot plant

- EQUIPMENT:**
- Acid digester: Labconco
 - Aroma scan
 - Autoclave
 - Brookfields HBYR1
 - CEM Microwave Ashing System 300
 - Centrifuge: Autocrit Ultra 3
 - Centrifuge: Beckman J2-21
 - Centrifuge: Beckman J2-2M/E, refrigerated
 - Centrifuge: Beckman J2-HC, high-speed
 - Centrifuge: Cepa Z41, continuous
 - Centrifuge: Clinical
 - Centrifuge: Damon/IEC, tabletop
 - Centrifuge: IEC, expl-proof, low-speed
 - Centrifuge: International Model HN
 - Centrifuge: Sorvall RC3B Plus
 - Centrifuge: Swing Bucket, 4-L
 - Centrivap concentrator: Labconco
 - Cheese press
 - Cheese vats: jacketed stainless steel w/agitation
 - Cold and dry storage lockers
 - Compression and injection molding machines
 - Consistometer: Adams
 - Consistometer: Bostwick
 - Extrusion systems for grain processing
 - Fermentors: Benchtop, 1-, 2-, 5-, 10-L
 - Fermentors: sterilizable-in-place, 15-, 50-, 100-L
 - Filters
 - Filtration unit: Amicaon hollow-fiber
 - Food extrusion
 - Freeze drying
 - Freezer: Ultralow (-70°C)
 - Frigerator/Freezer: explosion-proof, isotemp
 - Gamma counter
 - Gas chromatography: Varian

- EQUIPMENT:**
- Glue depositing
 - Homogenizer: Brinkman
 - Hunter Labscan XE
 - Incubator shaker: New Brunswick Sci
 - Instron 1122
 - Kettle: electric-heated with agitation, 10 gal.
 - Kjeldahl: Labconco
 - Membrane filter system
 - Microplate reader
 - Microscopes
 - Milestone M/S Meba Micro Digest Units
 - Oven: Fisher Isotemp
 - Oven: Lindberg Blue M
 - PCR Cycler: Biorad
 - Penetrometers
 - Plastic film and sheet extruder
 - Rapid Visco Analyzer
 - Refractometer
 - Retorts
 - Rotary evaporator and vacuum pump
 - Screens and mixing tanks
 - SLM French Pressure Cell Press
 - Spectronics XL-1500 UV Crosslinker
 - Spectrophotometer: Beckman DU 640
 - Spectrophotometer: Genesys 20
 - Spectrophotometer: HP PDA 8452
 - Spectrophotometer: Spectronic 21D
 - Spinning disc colorimeters
 - Spiral filter/pump
 - Stomachers
 - Texture analyzer
 - Toxic diet prep room and pelletor and mixer
 - Ultracentrifuge: Beckman L8M
 - UV illuminator: Fisher Biotech
 - Vacuum oven
 - Water activity meter: AquaLab
 - Wet grinders
 - Wire cheese block cutter

COURSES, SYMPOSIA AND EVENTS

University of Minnesota

- Food Entrepreneur Seminar
- Microbiology and Engineering of Sterilization Process
- Milk Pasteurization and Ultrafiltration Workshops

RESEARCHERS AND STAFF

Researchers and nutritionists work within the dairy research program and are closely aligned with the University of Minnesota Food Science Department, the South Dakota State University Dairy Science Department, and the Iowa State University Food Science and Human Nutrition Department, addressing new product development and processes for dairy products and ingredients.

RESEARCHERS AND STAFF

ROBERT BAER, PH.D.

Professor of Dairy Science
South Dakota State University

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Dairy products with beneficial fatty acids, emulsifiers in low-fat and nonfat ice cream, analysis of dairy products.

SAARI CSALLANY, PH.D.

Professor of Food Science
University of Minnesota

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Lipids, vitamin E, oxidative enzyme systems, edible fats and oil nutritional biochemistry, free radicals.

SAM BEATTIE, PH.D.

Assistant Professor of Food Science and Human Nutrition
Iowa State University

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Food and agricultural mycology, food safety and security issues with food.

FRANCISCO DIEZ-GONZALEZ, PH.D.

Associate Professor of Food Science
University of Minnesota

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Food safety microbiology, food-borne pathogens, pre-harvest control of pathogenic E. coli, bioterrorism.

DONALD BEITZ, PH.D.

Distinguished Professor in Agriculture and Professor of Animal Science and Biochemistry
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Lipid metabolism; cholesterol; nutritional and genetic control of animal food.

CARRIE EARTHMAN, PH.D.

Assistant Professor of Nutrition
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Clinical nutrition, medical nutrition therapy, body cell mass, nutrition support and assessment for patients at risk for wasting and gastric bypass surgery.

TERRY BOYLSTON, PH.D.

Associate Professor of Food Science and Human Nutrition
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Lipid and flavor composition of foods; conjugated linoleic acid formation in dairy products.

ASHRAF HASSAN, PH.D.

Assistant Professor of Dairy Science
South Dakota State University

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Lactic acid bacteria, fermented milks, low-fat cheeses and exopolysaccharides.

BYRON BREHM-STECHER, PH.D.

Assistant Professor of Food Science and Human Nutrition
Iowa State University

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Food safety and biosecurity; rapid molecular detection of food-borne pathogens and spoilage organisms; flow cytometry; biomimetics; multicomponent antimicrobial systems.

THEODORE LABUZA, PH.D.

Morse Alumni Distinguished Teaching Professor of Food Science
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Water activity, food stability and safety, food law, shelf-life testing, glass transition phenomena, bioterrorism, contaminants in food, time-temperature integrator tags.

RESEARCHERS AND STAFF

PEGGY LEHTOLA

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Assistant to the director.

RUTH MACDONALD, PH.D.

Professor and Food Science and
Human Nutrition Department Head
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Identifying factors in foods that reduce the incidence
of progression of cancer.

LARRY MCKAY, PH.D.

Professor Emeritus of Food Science
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Microbiology, gene transfer systems, plasmids,
bacteriophages of cheese starter cultures, microbiology
of food fermentations.

LLOYD METZGER, PH.D.

Associate Professor and Alfred Chair in Dairy Education,
Director of Dairy Center
South Dakota State University

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Structure and functional roles of cheese components
and modification of manufacturing parameters; cheese
technology; dairy products processing.

VIKRAM MISTRY, PH.D.

Professor and Department Head of Dairy Science
South Dakota State University

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Reduced-fat dairy products; membrane processing;
process cheese manufacture; salt whey in cheesemaking;
cheesemaking characteristics of milks from Holstein and
Brown Swiss cows.

**KASIVISWANATH MUTHUKUMARAPPAN,
PH.D.**

Associate Professor of Agricultural
and Biosystems Engineering
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Dairy rheology and microstructure; physical and functional
properties of dairy products.

DANIEL O'SULLIVAN, PH.D.

Associate Professor of Food Science
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Bacteriophage resistance and bacteriocin production
in lactococci, genetic regulatory circuits, genetic
fingerprinting, probiotic cultures.

ANTHONY POMETTO III, PH.D.

Professor and Director of NASA FTCSC,
Professor-in-Charge of ISU Fermentation Facility
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Bioconversion of agricultural commodities;
strain development of microorganisms; production
of enzymes; bioremediation of food industrial wastes,
soil and water systems.

GARY REINECCIUS, PH.D.

Professor of Food Science
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Flavor chemistry, off-flavors and flavor processing.

R. ROGER RUAN, PH.D.

Professor of Biosystems and Agricultural Engineering
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Imaging and spectroscopy technology; shelf-life testing;
structure-function relationships of biological materials.

RESEARCHERS AND STAFF

DAVID SCHINGOETHE, PH.D.

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Distillers grains, fiber-digesting enzymes in dairy rations, bovine somatotropin (bST), rumen bypass proteins and dietary fat in lactating cows.

ZATA VICKERS, PH.D.

Professor of Food Science
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Food aromas and acceptability; sensory evaluation of food; improved sensory and flavor techniques for fermented dairy products.

PAMELA WHITE, PH.D.

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Edible oils, oxidation, sensory and chemical changes, antioxidants; β -glucans; lipid-carbohydrate interactions.

