

SOUTHEAST DAIRY FOODS RESEARCH CENTER



North Carolina State University (Raleigh)

http://www.cals.ncsu.edu/food_science/sdfrc/sdfrc.html

Mississippi State University (Starkville)

Sensory Applications Laboratory (North Carolina State University)

<http://www.ncsu.edu/sensory/>

OVERVIEW

The Southeast Dairy Foods Research Center, with facilities and support at North Carolina State University (Raleigh) and Mississippi State University (Starkville), has been operating since 1988 and actively participates in national research planning and execution on behalf of the dairy industry and other entities. The center's research scientists help food processors address applications challenges and develop new products and processes using dairy products and ingredients. The center also hosts the Sensory Applications Laboratory, conducting analytical, qualitative and affective sensory tests and flavor chemistry analyses tailored to meet specific needs of the food industry.

RESEARCH FOCUS

- Milk and whey ingredient functionality
- Thermal and biological processing
- Extended shelf-life processing
- Sensory properties of cheese and dairy ingredients
- Dairy food safety
- Dairy starter cultures and probiotics

SENSORY APPLICATIONS LABORATORY

The Sensory Applications Laboratory at North Carolina State University specializes in dairy sensory and flavor chemistry analysis, including consumer testing (qualitative and quantitative), preference mapping, instrument flavor analysis techniques and descriptive analysis. (The center maintains three trained panels.) Ongoing flavor research is primarily focused on dairy products (including milk, cheese, milk powders, whey proteins and butter), dairy ingredients applications, and how flavor varies with processing and storage. A specific focus is development of defined sensory languages and the application of these languages to enhanced product understanding, links to volatile compounds (flavor chemistry) and enhanced consumer understanding.

FACILITIES AND EQUIPMENT

NORTH CAROLINA STATE UNIVERSITY

CONTACT: TODD KLAENHAMMER, PH.D.
 Director, Southeast Dairy Foods Research Center
 919-515-4197
sdfrc@ncsu.edu

- EQUIPMENT:**
- Cherry-Burrell EQ-3 ESL half-pint filler
 - HTST system (700/350 gal./hr.)
 - Feldmeier tubular ultrapasteurization booster
 - DeLaval 590 cold milk separator
 - Multiple batch tanks
 - Admix Rotosolver submersible mixer
 - Tri-clover blender
 - CEM SMART Trac fat/solids analysis system
 - APV Gaulin 2-stage homogenizer
 - Ice cream processing
 - Tetra Hoyer Frigus 600 freezer
 - Tetra Hoyer FF 2000 ingredient feeder
 - Tetra Hoyer variegation system
 - Sweetheart cup filler
 - Shrink-wrap oven
 - Cheese vat—300 gal. (automatic stir, jacketed)
 - Kusel 4MX cheese vat—65 gal.
 - Manual cheese vat—50 gal. (jacketed)
 - Cheddar mill
 - Cheese hoops and presses
 - VRC multicoil processor XXI
 - Feldmeier tubular heat exchanger
 - 60-kw continuous microwave processor
 - Cherry-Burrell unitherm (indirect)—150-300 gph
 - Cherry-Burrell unitherm Model XV—50-100 gph
 - Marlen piston pump Model 629
 - Contherm scraped surface heat exchangers (4)
 - ASTEPO low-acid aseptic Bag-n-Box filler
 - Radio Frequency Co. Macrowave processor
 - Pilot-scale aseptic surge tanks

- EQUIPMENT:**
- Superspeed and ultracentrifuges
 - Gas chromatography/mass spectrometry (GC/MS)
 - Gas chromatography olfactometry (GCO)
 - Benchtop micro- and ultrafiltration
 - High-pressure liquid chromatography (HPLC)
 - Microscopy: light, phase and fluorescent
 - Microbiological support laboratory
 - Autoclaves
 - Rheometers
 - Electrophoretic analyses: DNA and protein
 - DNA fingerprinting
 - Kitchen preparation room
 - Consumer testing booths with Compusense™
 - Descriptive panel room
 - Sensory panel room
 - Atomic absorption spectrophotometry
 - Visible, UV and fluorescent plate readers
 - Mammalian cell culture
 - Stock retort and can sealer
 - Anhydro spray dryer

FACILITIES AND EQUIPMENT

MISSISSIPPI STATE UNIVERSITY

CONTACT: WILLIAM BENJY MIKEL, PH.D.

Professor and Head, Food Science,
Nutrition and Health Promotion
Director, Food Science Institute
Mississippi State University

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- EQUIPMENT:**
- Double-O cheese vat—65 gal. with stirrers
 - Square cheese vat—100 gal., hand-stirred
 - 2 cheese vats—750 gal. with stirrers
 - 4 vats—2- to 3-gal. capacity, hand-stirred
 - Cultured products vat—50 gal., heated and stirred
 - Continuous ice cream freezer—150 gal./hr.
 - Emery Thompson batch ice cream freezer—5 liters
 - Anderson HTST unit
 - Anderson, 2-stage homogenizer (30 gal./hr.)
 - Walts UHT unit-indirect steam-heated (40 gal./hr.)
 - Romicon ultrafiltration unit (1,700 lbs./hr.)
 - CO₂ freezing tunnel—24 ft. long
 - APV spray dryer—7 kg./hr., 1-meter diameter
 - Dayton Electric steam-closing canning machine

- EQUIPMENT:**
- Rooneys semiautomatic canning machine
 - Retort—approx. 120 1-lb. cans
 - Kemotech smoking room—4- by 5-ft. firebox
 - CEM microwave moisture analyzer
 - APV homogenizer—2 stages
 - Gas chromatographs (GC)
 - HPLC
 - Mass spectrometers (MS)
 - Spectrophotometers
 - Ultracentrifuge
 - Ovens
 - Walk-in freezer
 - Cooler
 - Grape crusher
 - Juice processing
 - Freeze dryers
 - Deep-fat fryers

COURSES, SYMPOSIA AND EVENTS

- Sensory and Instrumental Analysis of Dairy Flavors Short Course
- FS 324 Milk and Dairy Products (Internet-based distance education course)
- FS 554 Lactation, Milk and Nutrition

RESEARCHERS AND STAFF

JON ALLEN, PH.D.

Professor of Food, Bioprocessing and Nutrition Sciences
North Carolina State University

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Mammary gland biology and lactation; milk composition, chemistry and functional properties; mineral and vitamin nutrition and metabolism; food allergy; epithelial transport; regulatory biology; nutrition education; diabetes and obesity; glycemic index.

MARYANNE DRAKE, PH.D.

Professor of Microbiology and Sensory Analysis, Department of Food, Bioprocessing and Nutrition Sciences, and Director of Sensory Applications Laboratory and DMI Pilot Sensory Lab
North Carolina State University

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Sensory perception and chemistry of dairy flavors; understanding consumer needs, including market drivers and segmentation.

CHRISTOPHER R. DAUBERT, PH.D.

Professor of Food, Bioprocessing and Nutrition Sciences
Director of Food Rheology Laboratory
North Carolina State University

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Process cheese structure and texture; functionality of dairy ingredients; protein interactions in gel formation; fracture and texture design of dairy products.

E. ALLEN FOEGEDING, PH.D.

William Neal Reynolds Distinguished Professor
Department of Food, Bioprocessing and Nutrition Sciences
North Carolina State University

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Controlling astringent flavor and stability in high-protein/-acid drinks; determining molecular and microstructural origin of textural properties in protein gels.

RESEARCHERS AND STAFF

TODD KLAENHAMMER, PH.D.

Dairy Center Director, Distinguished University Professor and
William Neal Reynolds Distinguished Professor
Department of Food, Bioprocessing and Nutrition Sciences
North Carolina State University

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Microbiology of starter cultures and probiotics; controlling
fermentations and understanding probiotic bacteria
through genomics.

JOSIP SIMUNOVIC, PH.D.

Senior Researcher
North Carolina State University

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Continuous-flow microwave thermal processing;
conventional and advanced aseptic processing, monitoring
and validation of low-acid dairy, multiphase foods and
biomaterials.

GARY CARTWRIGHT

Pilot Plant Coordinator
North Carolina State University

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Dairy processing, aseptic processing and packaging,
continuous-flow microwave processing.

