

SOUTHEAST DAIRY FOODS RESEARCH CENTER



North Carolina State University (Raleigh)
www.cals.ncsu.edu/food_science/sdfrc/sdfrc.html

Mississippi State University (Starkville)

**Sensory Applications Laboratory
(North Carolina State University)**
www.ncsu.edu/sensory

CENTER DIRECTOR

Todd Klaenhammer, PH.D.
Center Director
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klaenhammer@ncsu.edu

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 researchers work nationally on cutting-edge information and technologies, educate future professionals for the dairy industries, and help food processors address applications challenges and develop new products and processes using dairy products and ingredients. The center also hosts a Food Rheology Laboratory and a 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 protein and whey ingredient functionality
- Thermal and biological processing
- Extended shelf-life processing
- Sensory properties and flavor chemistry 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 (gas chromatography mass spectrometry, gas chromatography olfactometry and HPLC) and descriptive analysis. The center maintains three trained descriptive 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

FACILITIES AND EQUIPMENT

- EQUIPMENT:**
- Cherry-Burrell EQ-3 ESL Gable-top filler
 - Shrink-wrap oven
 - LiquiBox Semi-automatic Bag-n-box filler
 - Cheese vat—300 gal. (automatic stir, jacketed)
 - HTST system (700/350 gal./hr.)
 - Kusel 4MX cheese vat—65 gal.
 - Feldmeier tubular ultrapasteurization booster
 - Manual cheese vat—50 gal. (jacketed)
 - DeLaval 590 cold milk separator
 - Cheddar mill
 - Multiple batch tanks
 - Cheese hoops and presses
 - Admix Rotosolver submersible mixer
 - Koch vacuum sealer
 - Tri-clover blender
 - VRC multicoil processor XXI
 - CEM SMART Trac fat/solids analysis system
 - Feldmeier tubular heat exchanger
 - APV Gaulin 2-stage homogenizer
 - 75-kw continuous microwave processor
 - Ice cream processing
 - Marlen piston pump Model 629
 - Tetra Hoyer Frigus 600 freezer
 - ASTEPO low-acid aseptic Bag-n-box filler
 - Tetra Hoyer FF 2000 ingredient feeder
 - Radio Frequency Co. Macrowave processor
 - Tetra Hoyer variegation system
 - Superspeed and ultracentrifuges
 - Sweetheart rotary 4-oz. cup filler
 - Gas chromatography/mass spectrometry (GC/MS)
 - Sawvel rotary pint cup filler

FACILITIES AND EQUIPMENT

- EQUIPMENT:**
- Gas chromatography olfactometry (GCO)
 - Benchtop micro- and ultrafiltration
 - Pilot scale 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 pilot scale spray dryer
 - Buchi benchtop spray drier

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
 662-325-5508, 662-325-8728
wmikel@fsnhp.msstate.edu

EQUIPMENT

- 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
 - Rooneys semiautomatic canning machine

FACILITIES AND EQUIPMENT

- EQUIPMENT:**
- 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
 - Oven
 - 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
- Annual Farmstead Cheese Manufacture Short Course

RESEARCHERS AND STAFF

JON ALLEN, PH.D.

Professor of Food, Bioprocessing and Nutrition Sciences

North Carolina State University

jon_allen@ncsu.edu

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.

CHRISTOPHER R. DAUBERT, PH.D.

Professor of Food, Bioprocessing and Nutrition Sciences

Director of Food Rheology Laboratory

North Carolina State University

chris_daubert@ncsu.edu

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

MARYANNE DRAKE, PH.D.

Professor, Food, Bioprocessing and Nutrition Sciences, and Director of DMI Sensory

Applications Laboratory and NCSU Sensory Services Center

North Carolina State University

mdrake@unity.ncsu.edu

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

E. ALLEN FOEGEDING, PH.D.

William Neal Reynolds Distinguished Professor

Department of Food, Bioprocessing and Nutrition Sciences

North Carolina State University

allen_foegeding@ncsu.edu

Controlling astringent flavor and stability in high-protein/high-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.

CAROL REILLY

Program Coordinator
Southeast Dairy Foods Research Center
Department of Food, Bioprocessing and
Nutrition Sciences

North Carolina State University

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JOSIP SIMUNOVIC, PH.D.

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

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Conventional and advanced aseptic processing, continuous-flow microwave thermal processing, monitoring and validation of thermal processes for high-acid and low-acid dairy, particulate/multiphase foods and biomaterials.

GARY CARTWRIGHT

Dairy Enterprise System Director
North Carolina State University

gary_cartwright@ncsu.edu

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

RAMA NANNAPANENI, PH.D.

Assistant Research Professor
Department of Food Science, Nutrition and Health
Promotion

Mississippi State University

nannapaneni@FSNHP.msstate.edu

Microbiological safety of soft processed cheeses.

WES SCHILLING, PH.D.

Associate Professor, Food Chemistry and Sensory
Analysis

Department of Food Science, Nutrition and
Health Promotion

Mississippi State University

schilling@foodscience.msstate.edu

Sensory and flavor analysis of foods; consumer testing, descriptive analysis, gas chromatography, flavor and preference mapping.

