

*Whose research
has a fingerprint
in every cup
of yogurt?*

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food microbiology pioneer*
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EVENTS

2017

Novemberfest	Nov 21
Holiday Lunch/Open House	Dec 14
FBNS Fall Graduation	Dec 15

2018

Wine and Cheese	Mar 24
Awards Banquet	April 19
End-of-Year Cookout	April 24
FBNS Spring Graduation	May 12
Faculty Retreat	May 17
IFT 2018	July 15-18

Learn more at go.ncsu.edu/fbns

A HOME LIKE NO OTHER

The Department of Food, Bioprocessing and Nutrition Sciences (FBNS) at NC State University is home to people and programs at Schaub Hall, as well as the Dairy Farm on Lake Wheeler Road in Raleigh, the Plants for Human Health Institute in Kannapolis and the Center for Marine Sciences and Technology in Morehead City.

For more than 25 years, the department has served as home to two national centers – the Southeast Dairy Foods Research Center and the Center for Advanced Processing and Packaging Studies. FBNS also houses two USDA-ARS units – the Food Science Research Unit that works on sweet potatoes and cucumbers and the Market Quality and Handling Research Unit that works on peanuts.

Most importantly, FBNS is home to more than 500 extraordinary students and nearly 100 exceptional faculty and staff who provide outstanding service to our stakeholders through research, teaching and extension.

As you'll read in this issue, the department has a once-in-a-lifetime opportunity to revolutionize the food industry in North Carolina by leading a new food manufacturing and processing initiative.

None of this would be possible without the continued support of our alumni and industry partners.

I am excited to work with such an amazing group, and I look forward to all that the future has in store for FBNS.



K.P. Sandeep
Interim Department Head

Juggling More Responsibilities

K.P. accepted the position of Interim Head of FBNS in June, following Chris Daubert's move to the University of Missouri. In addition to his new administrative responsibilities, K.P. will continue to conduct thermal processing research and teach an undergrad class.





NC
STATE

A LASTING LEGACY

If you've ever enjoyed a cup of yogurt, you've consumed millions of bacteria that are good for you. And Dr. Todd Klaenhammer's fingerprint is all over them.

One in particular, *Lactobacillus acidophilus*, is added to most yogurts produced worldwide as a probiotic supplement to augment the traditional cultures used in fermentation. Since its debut in sweet acidophilus milk in the '70s, this bacterium has exploded in the markets for yogurt and probiotic dietary supplements.

Klaenhammer's research group sequenced the complete genome of *Lactobacillus acidophilus* NCFM (North Carolina Food Microbiology) in 2005. Today, most of the *L. acidophilus* strains used worldwide share the same genetic fingerprint as NCFM.

The genetic information and technologies developed by Klaenhammer's team led to the creation of oral probiotics that could deliver vaccines and potentially abate colon cancer. They also laid the foundation for the CRISPR movement that has the potential to improve human health in unprecedented ways.

Klaenhammer is a pioneer, an innovator, a champion of basic research and core-concept teaching. His awards and honors speak for themselves: NAS, AAAS, Holladay Medal, O. Max Gardner Award ... and the list goes on.

But he's quick to praise his team, his former students, his colleagues. Without them, he says, none of this would have been possible.

"Dr. Klaenhammer is a leading innovator of dairy microbiology research, and he has inspired a strong cohort of graduate students who are now strong leaders in academia and the food industry," says CALS Dean Richard Linton. "He remains the only food microbiologist to be a member of the prestigious National Academy of Sciences – the highest research honor there is."

On the heels of his July 2017 retirement, Klaenhammer says he's looking forward to spending more time with wife, Amy; daughter, Ellen (a physician's assistant in Wilmington); and their golden retrievers. If only separation from NC State wasn't so difficult.

Read on to learn more about Klaenhammer and his incredible career.

Legacy in Action

The Todd R. Klaenhammer Distinguished Professorship in Probiotics Research – created with a \$1 million endowment in 2015 – supports the activities of a full professor in FBNS.



A Pioneer with a Passion

Thanks to Dr. Todd Klaenhammer and his research team, new genetic information and technologies are revolutionizing food microbiology – and human health.

1978

Joined NC State as assistant professor

1992

Named William Neal Reynolds Distinguished Professor

1993-2014

Director of the Southeast Dairy Foods Research Center



“The reason I came here was because NC State has the best food microbiology program in the country.”

Where did you get your start?

I worked with Professor Larry McKay at the University of Minnesota. He was the first person to start bringing genetic viewpoints to food microbiology. You're dealing with beneficial bacteria that you can eat, and it's the positive side of microbiology. I just loved it.

What made you decide to come to NC State?

The reason I came here was because NC State has the best food microbiology program in the country. WNR Professor Marvin Speck was one of the most renowned food microbiologists in the U.S., and he realized that a genetic perspective was what NC State needed to have.

What was your first title?

I started here as an assistant professor. My primary appointment was in research, with 20 percent teaching. When you walk into the door, you know the technical side. You know what you want to do in research. But to learn how to manage people, students and programs, it's overwhelming. Maybe a lot of people come into a job like this being confident. I wasn't, but I hoped that I could do a good job.

Was it difficult to convince others, not just your students, but your peers, about this new genetic focus?

No. They welcomed the approach. At that moment in time, having a genetic perspective on beneficial microbes was exciting. My students realized that to learn the science and skills in genomics and biotechnology was going to get them to where they wanted to be.

What would you consider to be your first major research milestone?

We were the first group to find that the cheese starter culture *Lactococcus lactis* harbored a DNA-based suicide system that was activated during a phage infection. We also showed that natural genetic techniques could be used to move the plasmid into industrial starter cultures and make them resistant to the bacteriophages that can devastate dairy fermentations.

About 80 percent of the cheese cultures used in North America and Europe at the time were using our approach to protect their strains. In these huge fermentation volumes of one million liters per day, there are 100 million bacteria per milliliter. If you multiply that, you can come up with 10,000,000,000,000,000 bacteria in the factories' cheese vats, per day! Just think about the opportunity for a virus infection in a scenario like this.

But if one bacterium gets a phage infection, it kills itself, stops proliferation of the virus and saves all the other microbes in the vat. It's an altruistic strategy, if you will.

The technology has shifted in big ways. What has that been like, especially in the last decade?

It keeps it interesting because it changes all the time. I always tried to build a platform for my students to learn both traditional methods in microbiology and cutting-edge technologies in genetics and genomics. That opens up new avenues for research. Then, in the course of a student's education, that dynamic changes, and they're now thinking about how they can use those new technologies to solve big problems. Then they start teaching you.

Over my career I've had fantastic senior people working in the research lab who taught and managed the students and incoming post-doctoral scientists; most notable among these were Rosemary Sanosky Dawes and Evelyn Dumaz, who were the best microbiologists one could possibly hope to work with.

2000

Named Fellow of Institute of Food Technologists

2001

Named Fellow of American Academy of Microbiology

2001

Elected to National Academy of Sciences



In the research effort to discover and explain CRISPR, by the Danisco/Dupont Nutrition and Health group, there were four NC State alumni working on that project, who had studied in my research group: Sylvain Moineau, Dennis Romero, Christophe Fremaux and Rodolphe Barrangou. Dr. Barrangou, who led the effort, is now an FBNS faculty member and distinguished scholar at NC State.

Given the seminal explosion of the CRISPR discovery and its expansion into all areas of biology, medicine and agriculture, I am very proud of the fact that four of the core group of people working to find and understand CRISPR were Klaenhammer Lab alumni and that Rodolphe found his way back to NC State.

Why is it so important to you not just to teach your students, but also to mentor them, to really see them through?

Working in this job, you never have to think about trying to motivate somebody. These people are motivated, and they're smart. I tried to put them on the edge of the science and technology. Then when they finish here, they're going to get hired. If you look at what has happened between genetics and genomics and human sequencing, the stuff they're doing really is cutting-edge. Over my career, I am very proud that six of my Ph.D. students were awarded the Kenneth Keller Award for the outstanding Ph.D. thesis in CALS.

And you haven't only championed students. You've played a role in bringing some of the best scientists to FBNS, right?

I helped to recruit Peggy and Allen Foegeding, Lee-Ann Jaykus, Mary Anne Drake and Rodolphe Barrangou. These excellent teacher-scientists have been highly acclaimed – Foegeding, Jaykus, and Drake have all been named William Neal Reynolds Distinguished Professors; and Barrangou a Distinguished University Scholar.

2002
Named Distinguished
University Professor

2005
Klaenhammer lab sequences
Lactobacillus acidophilus genome



2007
Received NC State's
Alexander Quarles Holladay
Medal of Excellence

Has it been difficult to step away?

When you operate a program like this over so many years, you have many colleagues and overwhelming responsibilities. Also, you're a critical support pillar for young people who are trying to get involved and be recognized. I try to help people be successful and get connected, to promote their professional careers. I'm slowly finishing up. You can't just stop. You can't just walk away.

What do you see as the future of the field?

I believe the future is exciting for the use of beneficial bacteria that you can eat safely to promote health and deliver vaccines and biotherapeutics to save lives and cure diseases.

You've won a ton of awards.

Which is the most meaningful to you?

Being named to the National Academy of Sciences and receiving the O. Max Gardner Award, which is given by the UNC System Board of Governors for the top research program among the 16 institutions. On both occasions, NC State lit the belltower red!

But you are insistent that this has never been a solo venture.

Not even close. The reason this job is so great is because the people are brilliant and they are constantly changing as they arrive and graduate. They move the line forward. And it's not just research people. It's administrative assistants, postdocs, graduate students and international scholars. It's a collection of individuals who make a difference. It's never been just about me, at all.

And I'm very lucky. It's been an amazing and challenging journey.



Got Probiotics?

Klaenhammer's team's modifications to lactobacilli have been used to develop oral probiotics that could deliver vaccines and potentially abate colon cancer.

2009

Received the UNC System's O. Max Gardner Award



2009

Named AAAS Fellow

2015

The Todd R. Klaenhammer Distinguished Professorship in Probiotics Research is created





FROM SEED TO SUPERMARKET IN OUR OWN BACKYARD

A new food manufacturing initiative taking shape in Kannapolis could create jobs, revitalize rural communities and open new markets for entrepreneurs and farmers.

Years in the making, the North Carolina Food Processing Innovation Center (FPIC) leapt from dream to reality with the recent passage of the North Carolina state budget, which included \$4.4 million in funding. The new center, set to open in 2018, will also receive \$700,000 in recurring funds for operational support.

An initiative of North Carolina State University, the North Carolina Department of Agriculture and Consumer Services, and the North Carolina Research Campus (NCRC), the FPIC is poised to revolutionize food processing and manufacturing in North Carolina.

"This is the culmination of a process that NC State and the department and a lot of partners have gone through to do what we think can transform North Carolina's economy into a food manufacturing economy," said North Carolina Agriculture Commissioner Steve Troxler. "It's a perfect fit. We've got an \$84 billion industry in agriculture and agribusiness, so we think this is the defining moment for the future of North Carolina."

The 10,000-square-foot facility – to be housed in the NCRC Core Laboratory Building – will be the only one of its kind in the country. While there are other university-based food innovation centers nationwide, the FPIC will be the only one that is cGMP certified, which means that an FDA-regulated system of controls will ensure a high level of safety and quality at every step.

Processing profits

How does FPIC work? As an example, an entrepreneur could take advantage of one of our state's top commodities, local foods sentiments and growing international markets to manufacture tasty treats.



Mario Ferruzzi, a professor in the NC State Plants for Human Health Institute and FPIC subcommittee chair, says the center is designed to engage entrepreneurs, researchers and industry giants alike.

“A pilot plant facility such as the one we’re envisioning would provide flexibility to actually scale up and commercialize ideas, for small entrepreneurs who are looking for facilities that are able to bring them market-ready products. The research and development piece engages university researchers and allows us to think about how we can translate our technology into something that is commercializable.”

The FPIC also will enable national and international companies – from equipment to ingredient manufacturers – to collaborate with faculty and entrepreneurs.

“Providing a space where ideas can actually come to fruition allows us to engage in really groundbreaking research,” Ferruzzi said.

“Providing a space where ideas can actually come to fruition allows us to engage in really groundbreaking research.”

The center’s location in an agriculturally diverse state also is a boon, he said.

“The raw materials that come from this state are second to none, so we have tremendous diversity and tremendous capacity from an agricultural perspective,” he said. “But to really grab value from that ... would be to transform those materials. So what we would be able to do is to facilitate growth of food manufacturing that would allow us to do more of that transformation here and not have our materials ship out of state.”

Richard Linton, dean of the NC State College of Agriculture and Life Sciences, describes the FPIC as a “base camp” for the creation of food processing and manufacturing facilities across the state, in the counties where agricultural products are raised and grown.

“Our hope is that this initiative will help build up the tax base and revive local economies in many of the counties that need it most,” he said.

Sen. Paul Newton echoes Linton's vision. "This project has the potential for a tremendous manufacturing breakthrough that could impact rural North Carolina," he said. "What we're doing here can absolutely take our largest industry in North Carolina to a whole new level, and that is going to directly help rural North Carolina because that's where we grow the food."

The wheels are in motion for a grand opening in 2018.

"We know we've got the business climate," Troxler said. "We're constantly rated the top state in the nation as far as the place to do business. We've got the ag industry. Now, putting this in place so you combine all of this together, this is wonderful."

Check out our video online: go.ncsu.edu/FPICstory



The North Carolina Food Processing and Manufacturing Initiative in a nutshell:

Bringing manufacturing back to N.C.

In 2014, the North Carolina General Assembly funded this initiative to diversify and add value to agricultural-based businesses through food processing. The goal is to expand the economic impact of agriculture and agribusiness in our state by 22 percent – to \$100 billion – by 2025.

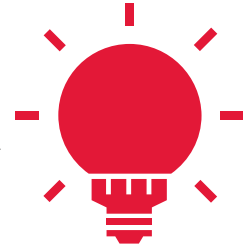
+22%

A greater bread basket

Increases in food and beverage manufacturing – entirely possible given North Carolina's highly diverse variety of crops, livestock, soils and climate – will be the cornerstone of this initiative.

Collaborative partners

We will focus the strengths of our university, government and industry entities toward a common goal – an enhanced food entrepreneur assistance program centered on job growth.



Innovation and entrepreneurship

Our university develops and transfers new technologies and research to startup and commercial enterprises. These new technologies drive innovation and efficiencies that will result in entrepreneurial development in communities across North Carolina.

We will grow jobs

From innovations that can transfer commercially to increased payrolls at new manufacturing sites, our goal is clear: Grow jobs.



The Food Processing Initiative is a partnership among NC State University, the North Carolina Department of Agriculture and Consumer Services, the Economic Development Partnership of North Carolina, and the North Carolina Research Campus.



LEE-ANN JAYKUS WINS UNIVERSITY'S TOP HONOR

The William Neal Reynolds Distinguished Professor is awarded the Alexander Quarles Holladay Medal for Excellence – NC State's highest faculty award.

Jaykus was one of three NC State faculty members to receive the award from Chancellor Randy Woodson during a ceremony in May.

An internationally recognized expert in food microbiology, Jaykus is best known for her work in food virology. She secured a \$24.8 million award from the United States Department of Agriculture National Institute of Food and Agriculture – one of the two largest grants ever issued by USDA-NIFA in support of food safety work – to establish the NoroCORE project.

As NoroCORE scientific director, Jaykus leads a collaborative of scientists from over 15 other institutions and more than 100 stakeholders representing more than 50 public and private entities. The collaborators work together to translate research findings into practical applications that improve the quality of life of citizens worldwide.

The Trailblazer

An internationally-known expert in food microbiology, Jaykus secured a \$24.8 million award from USDA-NIFA – one of the largest grants it's ever issued in support of food safety work – to establish the NoroCORE project.

“Our food microbiology programs are widely regarded among the finest in the world, and Lee-Ann is one of the elite scientists within that global community,” said Chris Daubert, former head of the Department of Food, Bioprocessing and Nutrition Sciences. “The sustained success and excellence of her 22-year career at NC State speaks for itself. Lee-Ann is a trailblazing scientist, a beloved teacher and mentor, and a consummate professional who is well-deserving of this award recognizing her exceptional contributions.”

The research produced by Dr. Jaykus’ food virology program has led to increased public health awareness of how easily norovirus is transmitted and how difficult it is to halt that transmission. These findings have led to the development of better ways to control norovirus.

“When I became an assistant professor at NC State, I could never have dreamed I would one day be in this position,” Jaykus said. “While being named a Holladay Medal winner is a

peak experience for me, I am humbled by just how many people have had a role in my success. The Holladay Medal is really an award for our work together. I can’t imagine a life without such wonderful students, colleagues and collaborators.”

Jaykus received a bachelor’s degree in food science and a master’s degree in food microbiology from Purdue University in 1979 and 1982, respectively. She joined industry for seven years, then returned to school to earn a Ph.D. in environmental sciences and engineering from the University of North Carolina at Chapel Hill in 1994. Jaykus joined NC State in 1994 and became a William Neal Reynolds Distinguished Professor in 2012.

She also has served as a faculty member of the Department of Microbiology, the Population Medicine Program (College of Veterinary Medicine), and the Genomics and Biotechnology Program.

“When I became an assistant professor at NC State, I could never have dreamed I would one day be in this position,”





“While being named a Holladay Medal winner is a peak experience for me, I am humbled by just how many people have had a role in my success.”

Jaykus’ numerous awards and honors include the International Association for Food Protection Maurice Weber Laboratorian Award and the NC State Alumni Association Outstanding Research Award. Her NoroCORE team won the USDA NIFA partnership award for their work on norovirus. She also was featured in 2011 as “Tar Heel of the Week” in the *Raleigh News & Observer*.



A Dash of Salt

(and a lot of time)

“The most important idea to take out of these classes is the Hanson equation, Salt + Time = Love.”

In the basement of Schaub Hall, Dana Hanson, associate professor of food science and Extension meat specialist, leads an unconventional group of students. Local restaurateurs, butchers and foodies convene once a week for four weeks at Hanson’s Charcuterie School to pick the brain of NC State’s guru on meat preservation.

With generous supplies of salt, sugar and other necessary ingredients, Hanson instructs the curious on how to make their own bacon, salami, sausage and other processed meats.

Hanson aims to educate his students not only on how to create the products, but also how to navigate the administrative aspects of meat processing.

Check out our video for a peek behind the scenes of NC State’s Charcuterie School: go.ncsu.edu/charcuterie



AGPACK STRONG: CAITLIN BOON SPEAKS UP FOR FOOD SAFETY

From learning to speak up in front of authority figures to meeting her husband in Genetics 311, Caitlin Boon has fond memories of her time in the College of Agriculture and Life Sciences.

Now, Boon serves as senior advisor to the director of the U.S. Food and Drug Administration's Center for Food Safety and Applied Nutrition, a role she has filled since 2015. She provides advice to senior management on scientific, policy and operational issues that are priorities for the FDA Foods and Veterinary Medicine Program.

While at CALS, Boon discovered a passion for food policy and regulation during internships at Kraft and General Mills. She volunteered in Cuba with Presbyterian Campus Ministry and in Peru with the International Potato Center, learning how United States food policies compare to and affect other parts of the world. She graduated with degrees in food science and poultry science.

"When it came time for college, NC State was the only place I wanted to go," Caitlin says. "I still believe that is one of the best decisions I ever made."

Read Caitlin's full story online: go.ncsu.edu/CaitlinBoon

FBNS IN THE NEWS

FBNS online Master of Nutrition program nabs top national ranking: go.ncsu.edu/MSnutritionRanking

Dr. John Sheppard, our pilot plant and "Bumblebee" were featured on PBS Newshour: go.ncsu.edu/Bumblebee

The Plants for Human Health Institute was featured in PBS Natural Health Breakthroughs: go.ncsu.edu/PHHstory1 and Martha Stewart Magazine: go.ncsu.edu/PHHstory2

Dr. April Fogleman and an interdisciplinary team of NC State faculty were recently awarded a prestigious NSF S-STEM Grant: go.ncsu.edu/FoglemanStory

Dr. Rodolphe Barrangou was named "Tar Heel of the Week" by the News & Observer: go.ncsu.edu/BarrangouTarHeel

Dr. Ken Swartzel was featured in a story on Aseptics in Food Processing: go.ncsu.edu/SwartzelStory

Dr. Keith Harris was quoted in the Chronicle of Higher Education: go.ncsu.edu/HarrisStory

Dr. Lisa Dean's paper on chocolate milk was highlighted in the Sigma Xi Smart Brief: go.ncsu.edu/DeanStory



DEPARTMENT NOTES

Dr. Jessica White joined FBNS in August 2017 as an Instructional Designer. She will work with FBNS faculty on online course design. She received her master's degree from NC State and holds an Ed.S. in Instructional Design and Technology and a Ph.D. in Educational Leadership. She recently served as a contractor with the U.S. Department of the Interior in Washington, D.C., and was a faculty member at a private college for several years prior.

Ms. Courtney Hart, Administrative Support Associate for the Dairy Enterprise System and FBNS, joined the department as a full-time employee on Sept. 1. Courtney is no stranger to us. She has been a part of the FBNS family in many roles over the years.

Mr. Nick Fragedakis, Process Authority and Director of the ei4f Program, joined the department on Sept. 1. Nick received his bachelor's and master's degrees from FBNS and worked with the N.C. Department of Agriculture and Consumer Services as a compliance officer, then with the FDA in Arizona as an investigator, before coming back.

Retirement

Dr. David Green retired from FBNS and NC State following an outstanding 30-year career. His Extension program has had tremendous impact on the North Carolina seafood industry.



Departure

Dr. Chris Daubert, a rheologist by profession, had an outstanding 21-year stint at FBNS. For the past seven years he served as the Department Head, and his excellent leadership and contributions helped position the department in very good standing among our peer institutions. He recently joined the University of Missouri as Vice Chancellor and Dean of the College of Agriculture, Food and Natural Resources.



Dr. Rodolphe Barrangou (far left) and CALS Dean Richard Linton (far right) at the Canada Gairdner Award ceremony.

Faculty Awards and Honors

Dr. Rodolphe Barrangou received the National Academy of Sciences Award in Molecular Biology and the Canada Gairdner Award for pioneering the gene-editing system known as CRISPR.

Dr. Natalie Cooke won three awards for her outstanding advising: the National Academic Advising Association Outstanding New Faculty Advisor Award, the CALS Outstanding Faculty Advisor Award, and the New Faculty Advisor Award at NC State University.

Dr. Mary Anne Drake was inducted as an IFT Fellow for outstanding and extraordinary contributions in the field of food science and technology.



Dr. Suzie Goodell was a recipient of the 2017 USDA Excellence in College and University Teaching in the Food and Agricultural Sciences Program.

Dr. Dana Hanson's meat lab won the annual "Battle of the Brats" contest at the American Society of Animal Science Meeting in Baltimore, Maryland.

Dr. Lee-Ann Jaykus won the Alexander Quarles Holladay Medal for Excellence, the highest award bestowed by NC State University. Jaykus also was named by the National Academies of Sciences, Engineering, and Medicine to be on the executive committee of a new initiative called ScienceBreakthroughs 2030.

Dr. Sophia Kathariou was elected as a Fellow in the American Academy of Microbiology. The Academy recognizes excellence, originality, and leadership in Microbiological Sciences.

Dr. Clint Stevenson won the Innovative Teaching Award given by the Association of Public & Land Grant Universities and the Educator Award given by the North American Colleges and Teachers of Agriculture.

Student Awards and Honors

The NC State Food Science Club won the IFTSA award for Outstanding Chapter for National Engagement.

At the Society of Sensory Professionals annual meeting, **Will Harwood** received the Jean Caul award for best presentation on the use of scientific principle in sensory analysis, and **Megan Parker** received the Elaine Skinner award for best presentation on an applied topic.

Micaela Hayes, Leah Hamilton and **Lisa LaFountain** received the Southeastern Food Processors Association Scholarship.

Phi Tau Sigma & IFT Division Competition winners:

- > **Will Harwood**, first place, Sensory & Consumer Science Division oral competition
- > **Kelsey Kanyuck**, second place, Food Chemistry Division oral competition
- > **Angelina Schiano**, second place, Dairy Foods Division oral competition
- > **Mutian (Tristan) Zhang**, second place, Dairy Foods poster competition

Kati Scruggs, a junior majoring in Applied Nutrition Science and Women's and Gender Studies, won the NC State "Leader of the Pack" award.

FBNS students – both undergrad and grad – took home a number of prestigious awards in 2017.



PARTNERS AND DONORS

Endowments and Funds Supporting FBNS in 2016-17:

A. Tab Williams Jr. Endowed Scholarship
American Dairy Products Association Scholarship
Barbara and George Blum Scholarship
Burton M. Newell Food Science Library Endowment
College of Agriculture and Life Sciences
Agricultural Foundation Scholarship
Crawford Lentz Thomas Memorial Scholarship
Cristie Abigail 'Abbi' Fleming Dairy Science Scholarship Endowment
D. McKinley & Barbara Price Scholarship in Memory of
Durwood M. and Minnie Grady Price
Dairy Golf Tech Event Fund
Dixie Flyers Association Inc. Dairy Manufacturing Scholarship Fund
Don Hamann Memorial Lectureship Endowment
Dr. Frank and Rachel Kirby Thomas Food Science and
Family & Consumer Sciences Scholarship Endowment
Dr. Isadore and Cynthia Peppe Food, Bioprocessing and
Nutrition Sciences Scholarship Endowment
Dr. Peggy Foegeding Memorial Food Science Scholarship Endowment
Dr. Wanida E. Lewis Food Science Fellowship Award Endowment
Duong, Green & Gharst Food Science Leadership Award Endowment
Eakes Turner Food Science Scholarship
Evander Ayers Davis Memorial Scholarship
Extension Emergency Fund – Food Science
Food Science Fund
Food Science Club Endowment
Food, Bioprocessing and Nutrition Sciences Enrichment Fund
Fred R. Tarver Jr. Poultry Products Scholarship Endowment
Frito-Lay Product Development Graduate Fellowship
H. Hawkins Bradley Scholarship Endowment
Harvey L. & Kathleen R. Barnes Scholarship Endowment
Hase H & Lena Maie Smith Endowed Food Science Scholarship
J. Frank & Margaret B. Neely Scholarship Endowment
James L. and Diana G. Oblinger Scholarship Endowment
John and Kelli Rushing Food Science Freshman Scholarship
John L. Etchells Fund
John Rushing SE Food Processor's Association Endowed Scholarship
Leonard & Frances Crouch Achievement Award Endowment
Livio Ferruzzi Memorial Agricultural Scholarship Endowment
Mose & Helen Kiser Endowed Scholarship
Murphy-Brown Bacon and Pork Bellies Fund
Neil and Nancy Webb Memorial Scholarship Endowment
NC Dairy Campaign for Excellence
NC Dairy Technology Society Enhancement Fund
North Carolina Meat Processors Association Scholarship
in memory of John W. Long
North Carolina Soybean Producers Association Annual Scholarship
Phi Tau Sigma Food Science Technical Staff
Professional Development Endowment
Pilot Plant Enhancement Fund
Plants for Human Health Institute Enhancement Fund
Randleigh Farm Exhibition Building Fund
Randleigh Museum Fund
Raymond F. Shearin Scholarship
Robert Lee Lewis Agricultural Scholarship
Robert N. Wood Agricultural Scholarship
Robert N. Wood - NC Dairy Products Association Memorial Scholarship
Russell S. Flowers Teaching & Training Endowment for
Food Safety & Quality
Seafood Lab Enhancement Fund
Sweet Acidophilus Milk Program Fund
T.W. Garner Food Company (Texas Pete) Scholarship Endowment
Tarheel Suppliments Fund for Excellence Endowment
Thomas N. Blumer Endowment
Todd R. & Amy E. Klaenhammer FBNS Graduate Award Endowment
Todd R. Klaenhammer Distinguished Professorship
in Probiotics Research Endowment
Victor and Maryetta Jones Scholarship Endowment
W. L. Clevenger Department of Food Science Endowment for Excellence
Winslow Foundation Scholarship
Workshops for Farmstead Cheese

Donors to FBNS in Fiscal Year 2016-17:

A&B Process System	Harris Teeter LLC	Mr. Vishal Patil
American Meat Science Association	Dr. Linda J. Harris	Pepsi Co. Global Snacks R&D
Mr. Aaron R. Anders	Dr. Ronald A. Heddleson and Dr. Susan S. Heddleson	Mr. Marquis D. Pickett and Mrs. Virginia Webb Pickett
Dr. Jean E. Anderson	Mrs. Dorcas O. Hill and Mr. Paul E. Hill	Pickle Packers International Inc.
Mr. Dennis L. Ball	House of Raeford Farms Inc.	Piedmont Milk Sales Inc.
Dr. Lisa M. Barrangou and Dr. Rodolphe Barrangou	Mr. James H. Howie	The Randleigh Foundation Trust
Ms. Marie B. Beermann	International Paper	RDI Foods LLC
Mr. Albert P. Black and Mrs. Connie B. Black	Mrs. Maryetta Jones and Dr. Victor A. Jones	Dr. Dennis Angeles Romero
Bowen Sales LLC	JR Marketing Consulting Services	Mr. Ronnie Royal
Brigham Young University	Mr. Thomas S. Kenan III	Dr. John E. Rushing and Mrs. Kelli K. Rushing
Mrs. Anne L. Bromby and Mr. Craig A. Bromby	Mr. Charles D. King and Mrs. Rebecca M. King	Dr. Arnie I. Sair and Mrs. Kara L. Sair
Cargill Inc.	Mr. James A. King II and Mrs. Joy B. King	Mrs. Denise A. Saniga and Mr. John A. Saniga
Carolina Dairy LLC	Dr. Kai Koo	SEI Giving Fund
Catawba College	Mrs. Janet S. Lampe and Mr. John G. Lampe	Dr. Kurt M. Selle
Mrs. Nancy Chumney and Mr. Richard K. Chumney	Land O'Lakes Purina Feed LLC	Sensient Flavors
Dairy Farmers of America	Mr. Tony J. Lawrence	Dr. Mark X. Sliwkowski and Dr. Mary Burke Sliwkowski
Dairy Farmers of America Headquarters	Lenoir-Rhyne University	Dr. Stephen F. Sylvia
Darigold Inc.	Lindy's Homemade LLC	Mr. Darrell L. Taylor
Dr. Christopher R. Daubert	Mr. Wallace S. Mahanes	The NC Arboretum Society
Davisco Foods International Inc.	Mr. John J. McCarthy and Mrs. Loraine A. McCarthy	Mrs. Rachel K. Thomas
Dean Foods	Milkco Incorporated	Tobacco Rag Processors Inc.
Dean's Foods	National Peanut Board	Triangle Breastfeeding Alliance
Dole Food Company Inc.	NC Cattlemen's Association Inc.	Mr. Corey A. Troutman and Mrs. Katherine K. Troutman
Ecolab Inc.	NC Meat Processors Association Inc.	Mrs. Beth E. Turner and Dr. Lynn G. Turner
Mrs. Anne Emenhiser and Dr. Curtis W. Emenhiser	NC State Food Science Club	Villari Foods Group LLC
Mr. Jack M. Fleming Jr. and Mrs. Shirley O. Fleming	M.G. Newell Corporation	Dr. Natalie J. Webb
Mr. Charles L. Gaither Jr.	NC Museum of Art Foundation Inc.	Wenda America Inc.
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Glanbia Business Services Inc.	Novozymes North America Inc.	Wika Instruments
Goodnight Brothers	Novus International Inc.	
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