

Kevin M. Keener, Ph.D., P.E.

WORK:

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 United States Citizen

INTERESTS:

Applying science and engineering principles to improve food safety, enhance quality, and reduce waste in an overall effort to promote economically sustainable practices in the production and processing of food, pharmaceutical, and biological products. Educating students, industry personnel and government inspectors in applying science and engineering principles to solve problems in food, pharmaceutical, and biological systems and provide fact-based reports for policymakers on controversial topics.

A. GENERAL INFORMATION

Degrees & Licenses	Institution/State	Date
B.S.& M.S. Agricultural Engineering	The Ohio State University	1990 & 1993
Ph.D. Food Process Engineering	Purdue University	August 1996
Professional Engineer - PE#24584	North Carolina	1999-current

Professional Experience	Department	Institution	Date
Distinguished Fulbright Research Fellow	Ag. Eng. and Tech.	Moscow State Agr.. U.	Jan 14-June 14
Professor/Assoc. Professor	F.S. and Env. Health	Dublin Inst. Tech.	Jan 12-Oct 12
Faculty Courtesy Appointment	Food Science	Purdue University	Aug 05-present
Associate Faculty Member	Ag. & Bio. Eng.	Purdue University	Jan 06 – present
Associate Faculty Member	Food Science	Clemson University	May 09 - present
Associate Faculty Member	Poultry Sci. & BAE	NCSU	Mar 98 - present
Assoc. Professor/Asst. Professor	Food Science	NCSU	May 97 - July 05
Visiting Assistant Professor	ABE	Purdue University	Aug 96 - May 97

Awards and Honors (<i>National awards in bold</i>)	Organization	Year
Dean's Team Award, "Zip Trips" Team	College of Ag., Purdue University	2012
Finalist (1 of 5) - "Distinguished Agriscience Scientist Award" [More than 200 nominees]	Christopher Columbus Foundation	2010, 2011
Macy Food Science and Technology Award	Minnesota IFT Section	2010
Sharvelle Award	Purdue University Cooperative Extension	2009
Mitchell Young Extension Worker Award	ASABE: American Society of Agriculture and Biological Engineers	2007
Dean's Team Award, New Ventures Team	College of Ag., Purdue University	2007
New Ventures Team Award	Purdue University Coop. Ext. Service Assoc.	2006
IAFIS-FPEI "Emerging" Food Eng. Award	International Assoc. of Food Industry Suppliers & Food and Process Eng. Inst.	2004
American Egg Board Research Award	Poultry Science Association	2001, 2003, 2004

Current Memberships in Academic, Professional and Scholarly Societies

Institute of Food Technologists	Professional Engineers of North Carolina
American Society of Agricultural and Biological Engineers	Phi Tau Sigma - Food Science Honor Society
Poultry Science Association	Gamma Sigma Delta - Agriculture Honor Society
World Poultry Science Association	Alpha Epsilon Agricultural Engineering Honor Society

GENERAL PROGRAM HIGHLIGHTS:

Dr. Keener is a recognized expert in food safety, food processing and food technology. The goal of his Purdue program is to promote economically sustainable practices in the food industry through engagement with entrepreneurs, companies, researchers, students, and government. He currently serves as the Center Director for the newly created [EPA] Food Processing Environmental Assistance Center. His program efforts accomplish three main objectives: 1) the food entrepreneur program supports Indiana Economic Development; 2) his technical assistance to small, medium, and large food processors in food safety, food technology, and food processing saves jobs and money; 3) his applied research program enhances food quality and food safety, improves processing efficiencies, and reduces waste in food manufacturing. Dr. Keener's support of the food industry and food entrepreneurs has been recognized with the Macy Food Science and Technology Award, Purdue University Sharvelle Award, Nolan Mitchell Young Extension Award, American Egg Board Research Award and the International Association of Food Industry Suppliers-Food Process Engineering Institute (IAFIS-FPEI) Emerging Food Engineer Award. The IAFIS-FPEI Award specifically recognizes "advancement of knowledge and practice in the food industry."

Dr. Keener excels in his unique efforts to use his food engineering and extension expertise along with his leadership skills to achieve close collaboration between academia, industry, and government. Dr. Keener collaborates with academic colleagues within the State (Indiana State Department of Health, Indiana State Department of Agriculture, Purdue Cooperative Extension Service), nationwide (University of Arkansas, North Carolina State University, Clemson University, Auburn University, Southern Illinois University, USDA-ARS), and internationally (Asian Productivity Organization, Dublin Institute of Technology (Ireland), Codex Alimentarius Commission (CODEX)). He also works with USDA-FSIS, FDA, IFT and state trade associations such as the Indiana State Poultry Association.

B. EXCELLENCE IN ENGAGEMENT:

Dr. Keener is best known for his food process engineering experience and has developed and delivered educational training programs for food entrepreneurs, established food companies, and regulatory agencies in Indiana, United States and international audiences. One of the greatest impacts of Dr. Keener's program has been in the State of Indiana. Since his arrival to Purdue in 2005, over 250 food entrepreneurs have been trained in food processing and food preservations methods for starting a food business. He organizes and co-organizes 5 to 7 industry workshops per year in HACCP, food preservation, food processing, food plant sanitation, energy reduction, egg processing, food equipment design, wastewater and water conservation, and fat, oil, and grease management. In the past 15 years Dr. Keener has delivered over 100 workshops and 100 invited

presentations to over 2,500 persons from 16 countries. In 2010 (last data compiled), Dr. Keener's Purdue Extension factsheets received over 108,000 visitors online, and 10,000 downloads. He has helped more than 50 large and small food processors in rural communities in Indiana, Illinois, Kentucky, North Carolina, and South Carolina facing closure due to violations of food safety regulations. His assistance has saved hundreds of jobs, millions of dollars and kept several plants from closing.

Upon his arrival at Purdue in 2005, Dr. Keener worked collaboratively with Dr. Maria Marshall (Agricultural Economics) to upgrade the food entrepreneur workshop. He revised and updated materials with presentation responsibility for three of the eight presentations (food safety, food processing, and food preservation). In addition, he added a demonstration to the workshop which highlights critical food safety principles of pH, temperature measurement and water activity. He also developed the Food Entrepreneur Assistance Response (FEAR) Program in collaboration with the Department of Agricultural Economics. The program encompasses the food entrepreneur workshop along with a food entrepreneurs technical assistance team that provides direct technical assistance with food regulations and food processing requirements to entrepreneurs and food manufacturers. This team annually interacts with over 150 food entrepreneurs of which approximately 80% are Indiana based. Dr. Keener co-leads this effort with responsibility for food regulations, food processing, food packaging, and food safety questions. These efforts have supported the success of Indiana food entrepreneurs in salsa, baked goods, meat, poultry, dairy, and cheese products. Dr. Keener also has worked with numerous Indiana state agencies to compile a master list of 1,200 Indiana food manufacturers now used for marketing educational programs. Dr. Keener has also developed workshops to aid local communities in supporting food entrepreneurs in establishing community kitchens and exporting Indiana food products. These programs have aided development of five community kitchens around the state and eight Indiana processors in exporting food products.

Dr. Keener also developed an on-line food plant sanitation course for college credit (3-credit graduate and undergraduate credit). This course, offered since 2004, has provided training to over 80 industry persons from many food companies located in four countries (China, Mexico, Canada, United States), and university students. More recently, he developed a 12-module, on-line course for USDA-FSIS on Ready-to-Eat, Not Shelf-Stable Meat and Poultry Products. This course is a prerequisite for newly hired USDA-FSIS Meat and Poultry Inspectors prior to starting. In the past two years he has developed an on-line course for Food Plant Sanitation Inspection for FDA inspectors.

As another example of impact, in October 2009, Dr. Keener provided three two-hour webinars for USDA-FSIS on "Selecting Scientific Documentation in HACCP Decision making for Small and Very Small Meat and Poultry Plants." Of the 379 participants, 95% strongly agreed or agreed that the webinar was useful. Seventy eight percent plan to make at least one change in their day-to-day operations.

The creation of the (U.S.) Food Processing Environmental Assistance Center, with a five-year \$520,000 funding support from the U.S. Environmental Protection Agency, speaks to Dr. Keener's recognized expertise and knowledge of food manufacturing. This Purdue Center provides

educational programs such as workshops, instruction, one-on-one assistance, and technical programs to small-and medium-sized food manufacturers on environmental topics such as greenhouse gas emissions, odor control, waste and water management, and energy reduction strategies. In addition, the center will compile and provide access to an electronic library of relevant research and extension publications in food processing in topic areas of water, waste, air, and energy in different commodity sectors (e.g. pork, beef, poultry, eggs, seafood, fruit and vegetables, and dairy).

Government Interaction

Dr. Keener works closely with state regulatory agencies (i.e., Indiana State Department of Health, Indiana Animal Board of Health) and trade organizations (e.g., Indiana State Poultry Association) by responding to technical questions on food processing, food technology, and food safety, as well as federal agencies and international organizations. He was one of three non-government scientific advisors selected for the USDA-FSIS Delegation for the CODEX International Standards Meetings on Meat and Poultry Hygiene Requirements. He was also an invited lecturer and trainer at the Asian Productivity Organization (APO) conference in Bangkok, Thailand which included government officials and food manufacturers from 13 Asian countries.

In addition to the previously mentioned USDA and FDA inspector training courses and HACCP webinars, Dr. Keener has assisted USDA-FSIS in compiling cost analyses and process modifications required for very small, small, and large meat and poultry plants to meet proposed food safety regulations. He has participated in a number of expert opinion reports on proposed rules and manufacturing processes for federal agencies and non-profits such as the following: United States Department of Agriculture, Food Safety Inspection Service (USDA-FSIS) study impact of *Clostridium perfringens* Performance Standard on meat and poultry processing plants; USDA-FSIS study on impact of *Salmonella* Performance Standard on meat and poultry processing plants; FDA Food Biotechnology; American Academy of Pediatrics study on food irradiation; United States Humane Society evaluation of poultry slaughter processing, IFT Expert Panel (Economic Sub-panel) on Food Traceability. Dr. Keener is developing economic costs data for varying sizes of food companies implementing new food defense practices as part of upcoming regulations, such as increased security, restricted access, improved equipment design, and others. These costs data will be used to determine new FDA regulations.

Industry Support

Dr. Keener actively supports the international food processing industry. Previously, he has held leadership positions in national organizations such as associate director for the Education and Outreach Center of the National Alliance for Food Safety and Security, chair of the Food and Process Engineering Institute (FPEI) of the ASABE Society, and several national and international committees. He was a founding member, organizer and presenter for the National Egg Products School, and organizer and presenter for the National Poultry Waste Management Symposium; both programs serve international food processors. He is also an International Hazard Analysis Critical Control Points (HAACP) Alliance approved instructor and has organized and presented HACCP trainings and HACCP Roundtables. He is currently a member of the National Egg Products and

Processing Committee, the USDA Meat and Poultry Small Plant [Indiana] State Coordinator, past program chair of the American Society of Agricultural and Biological Engineers' Food and Process Engineering Institute and founding member of the Virtual Food Safety Training Center at Auburn University.

A number of large food processors consult with Dr. Keener in development of new food processes, facility design, waste management, and regulatory compliance. His processing plant audits and technical assistance have highlighted opportunities for the food industry to save over \$50 million in energy and water costs to international food companies. He has worked closely with many food companies over the past fifteen years developing technologies and improving food processes. Examples include Michael Foods (in-shell egg pasteurization), Unilever (processing dry soup bases), Tropicana (juice processing), FMC (orange juice processing), Perdue Farms (Poultry processing), Tyson Foods (poultry processing), Maple Leaf Farms (duck processing), Rose Acre Farms (egg processing safety), Proctor and Gamble (food drying), and Maola Milk Company (dairy processing). He has also worked with major food companies outside the United States, such as Produkty Pitania (Russia's largest poultry processor), which imports more than 200 million pounds of frozen U.S. poultry per year.

An example of Dr. Keener's close collaboration between academia, industry, and government is his involvement with the development of the radionuclide testing requirements for poultry meat exports to Russia. In the 2002 export quota negotiations between the U.S. and Russia, a requirement for radioactivity testing was inserted into the agreement. This new requirement created a significant challenge to the poultry industry, since there were no developed protocols for radioactivity testing of meat products. The USA Poultry and Egg Export Council (USAPEEC) contacted Dr. Keener for his assistance and he worked with the USAPEEC, USDA, poultry industry representatives and faculty from three other universities developing radionuclide testing protocol for meat products. Once the protocol was established, it became apparent that satisfactory private laboratory testing for this analysis was unlikely because of the sophisticated equipment and laboratory safety standards required to conduct these test. Consequently, he went a step further and worked with the Nuclear Engineering Department at North Carolina State University to set up a radionuclide testing service for the poultry industry. This service analyzes radioactivity of poultry meat exports from 25 U.S. poultry processors to Russia, representing 200 million pounds annually (20% of Russian poultry meat exports valued at \$200 million dollars in 2010).

1. Grants and Awards (\$1,105,737 Total: PI/co-PI)

Agency:	United States Food and Drug Administration
Title of grant:	<i>Virtual Foods System Training Center for FDA inspectors</i>
Duration of Funding:	10/11-9/16
Total Amount of award:	\$6,500,000
Role:	Co-PI (Lead - Auburn University)
Amount responsible:	\$325,000 (5%)

Agency:	NOAA Sea Grant Aquaculture Extension and Technology Transfer
Title of grant:	<i>Outreach and Education Programming for Aquaculture and Seafood Products</i>
Duration of Funding:	11/10-10/13

Total Amount of award: \$319,000 (\$109,746 Purdue matching funds)
Role: Co-PI
Amount responsible: \$47,850 (15%)

Agency: United States Environmental Protection Agency
Title of grant: *Environmental Compliance and Assistance Center for Food Processors*
Duration of Funding: 4/08-3/13
Total Amount of award: \$533,238
Role: PI, Collaborators: Mark Morgan (FS) and Martin Okos (ABE)
Amount responsible: \$533,238 (100%)

Agency: Purdue University: New Manufacturing Economy Booster Grant
Title of grant: *Development of an Indiana Food Export Training Program*
Duration of Funding: 9/07-11/08
Total Amount of award: \$75,000
Role: PI
Amount responsible: 100%

Agency: Griffith Laboratories, Inc.
Title of grant: *Reducing Bacteria in Spices Using Novel Technologies*
Duration of Funding: 8/06-3/07
Total Amount of award: \$3,000
Role: PI
Amount responsible: 100%

Agency: State of Indiana Office of Lieutenant Governor
Title of grant: *Indiana Technical Assistance Program – Food Processing Plants*
Duration of Funding: 1/06-12/07
Total Amount of award: \$2,500 (subcontract)
Role: PI, Collaboration with Center for Clean Manufacturing Technology
Amount responsible: 100%

Agency: NCSU Animal and Poultry Waste Management Center
Title of grant: *Characterization of Poultry Manure for use in Co-Generation of Electricity*
Duration of Funding: 6/01-5/02
Total Amount of award: \$18,500
Role: PI with Co-PI K.E. Anderson
Amount responsible: \$12,300 (66%)

Agency: North Carolina Poultry Waste Management Center
Title of grant: *Characterization of Poultry Manure for use in Co-Generation of Electricity*
Duration of Funding: 4/01-5/02
Total Amount of award: \$3,600
Role: PI with Co- PI K.E. Anderson
Amount responsible: \$1,800 (50%)

Agency: Fishery Grant Resource Program
Title of grant: *Development of a Process Control Strategy for Blue Crab Quality*
Duration of Funding: 4/01-3/02
Total Amount of award: \$38,900
Role: PI with Co-PI's D. R. Green and R.W. Barcliffe

Amount responsible: \$31,200 (80%)

Agency: Praxair, Inc.
Title of grant: *Testing of Shell Egg Quality and Safety from CO2 Cooling – Phase II*
Duration of Funding: 4/01-5/02
Total Amount of award: \$3,600
Role: Co-PI with PI- K.E. Anderson and P.A. Curtis
Amount responsible: \$10,500 (33%)

Agency: North Carolina Agricultural Research Service
Title of grant: *Bioremediation of Swine Waste Using a Greenhouse Tomato Crop: A Systems Approach - Air Quality Assessment.*
Duration of Funding: 6/31/00-7/1/01
Total Amount of award: \$6,500
Role: Co-PI with R.W. Bottcher
Amount responsible: \$3,250 (50%)

Agency: Praxair, Inc.
Title of grant: *Testing of Shell Egg Quality and Safety from CO2 Cooling – Phase I*
Duration of Funding: 3/00-7/00
Total Amount of award: \$20,149
Role: Co-PI with PI- K.E. Anderson and P.A. Curtis
Amount responsible: \$6,716 (33%)

Agency: North Carolina Pollution Prevention Program
Title of grant: *Food Processing Waste Processing in a Thermophilic Digester. Rhodelia-Smith Farm, Carolina Pollution Prevention Grant.*
Duration of Funding: 1/00-6/00
Total Amount of award: \$21,000
Role: PI: K. M. Keener. Co-PI: R. Vetter
Amount responsible: \$10,500 (50%)

Agency: NCSU Animal and Poultry Waste Management Center
Title of grant: *Effect of Carcass Washers and Washing Systems on Campylobacter Contamination in Large Broiler Processing Plants*
Duration of Funding: 1/00-12/01
Total Amount of award: \$78,074
Role: co-PI with P.A. Curtis and B.W. Sheldon
Amount responsible: \$26,025 (33%)

Agency: Dairy Marketing Institute, Inc
Title of grant: *Rheology, NMR, and Microscopy: Linking Processed Cheese Microstructure With Functionality*
Duration of Funding: 1/00-12/02
Total Amount of award: \$154,803
Role: co-PI with C.R. Daubert and B.E. Amutis (Land O'Lakes)
Amount responsible: \$51,601 (33%)

Agency: U.S. Poultry and Egg Association

Title of grant: *Quantification of shell egg quality, shelf-life, and safety from rapid cooling with Carbon Dioxide Gas*
Duration of Funding: 9/99-11/00
Total Amount of award: \$30,000
Role: co-PI with P.A. Curtis and D.E. Conner
Amount responsible: \$10,000 (33%)

Agency: USDA Food and Agricultural Sciences Fellowship Grants Program
Title of grant: *National Needs Fellowship Grants Program*
Duration of Funding: 1/00-12/03
Total Amount of award: \$138,000
Role: co-PI with S.A. Hale and K.P. Sandeep
Amount responsible: \$46,000 (33%)

Agency: Michael Foods
Title of grant: *Microbiological Profile of Table Eggs Based on a Shell Staining Classification System*
Duration of Funding: 9/99-6/00
Total Amount of award: \$20,380
Role: co-PI with P.A. Curtis, B.W. Sheldon, K.E. Anderson, and D. Carver, S.A. Hale and K.P. Sandeep
Amount responsible: \$2,912 (14%)

Agency: USDA Food and Agricultural Sciences Fellowship Grants Program
Title of grant: *National Needs Fellowship Grants Program*
Duration of Funding: 1/00-12/03
Total Amount of award: \$138,000
Role: co-PI with S.A. Hale and K.P. Sandeep
Amount responsible: \$46,000 (33%)

Agency: NCSU Six-State Consortium on Animal Waste Management
Title of grant: *Evaluation of Commercial Systems for Controlling Dust-Borne Odorants Emitted from Swine Buildings*
Duration of Funding: 6/99-7/01
Total Amount of award: \$193,800
Role: co-PI with S.H. Davies (Michigan State) and R.W. Bottcher
Amount responsible: \$64,600 (33%)

Agency: North Carolina Cooperative Extension Service
Title of grant: *Reduce Water Use: Forming and Implementing an Effective Water Conservation Team in Your Plant*
Duration of Funding: 1/98-12/99
Total Amount of award: \$2,000
Role: co-PI with M.C. Taylor and P.A. Curtis
Amount responsible: \$1,000 (50%)

Agency: NCSU Agriculture Research Service
Title of grant: *Field Evaluation of Dust and Odor Control Systems in Swine Facilities.*
Duration of Funding: 6/98-12/98
Total Amount of award: \$169,000
Role: co-PI with R.W. Bottcher and T. Kempen

Amount responsible: \$56,333 (33%)

Agency: USDA Food Characterization/Products/Process Research
Title of grant: *Noninvasive Mapping of Heat and Mass Transfer During Immersion Frying*
Duration of Funding: 9/98-8/01
Total Amount of award: \$175,000
Role: co-PI with B.E. Farkas
Amount responsible: \$87,500 (50%)

Agency: NCSU Faculty Research and Professional Development Fund
Title of grant: *Analysis of Gas Exchange Within Shell Eggs During Rapid Cooling with CO₂ Gas*
Duration of Funding: 7/98-8/99
Total Amount of award: \$5,000
Role: PI
Amount responsible: \$5,000(100%)

Agency: Multi-State Animal and Waste Consortium (NCSU, MSU, ISU, Purdue)
Title of grant: *Measurement, Control, and Analysis of Odor and Gas Emission Rates from Large Swine Finishing Houses*
Duration of Funding: 7/97-6/98
Total Amount of award: \$95,200
Role: co-PI with A. Heber (Purdue), D. Bundy and S. Hoff (Iowa State), and R.W. Bottcher
Amount responsible: \$15,000 (16%)

2. Extension Conferences, Schools, Workshops, Webinars, and Short Courses

a) INDUSTRY SERVICES:

- i) WEBINARS
 - i) Food Processing Environmental Assistance Center (Director)
 - (1) Emergency Planning and Community Right to Know Act (EPCRA)and Risk Management Plans, Tuesday, January 22, 2012, 1-3 p.m. – 20 persons attending
 - (2) Clean Water Act (CWA): Stormwater Management and National Pollutant Discharge Elimination System (NPDES) Permitting, Tuesday, January 31, 2012 1-3 p.m., 15 persons attending
 - (3) Clean Air Act (CAA): Section 608—Stratospheric Ozone and the Energy Star Program for Industry, Tuesday, February 14, 2012 1-3 p.m. 15 persons attending.
 - ii) USDA-FSIS Outreach Seminar: Selecting Scientific Documentation to Support and Establishments HACCP Program. 3-two hour webinars (2009). 379 participants. Total responsibility for development and delivery. Course rating: 9.0 out of 10.0
- ii) HACCP ROUNDTABLE – Discussion for meat and poultry processors with USDA and NCDA/ISDA regulators.
 - West Lafayette, IN – October 25, 2006 – Approximately 15 industry persons in attendance
 - Indianapolis, IN – March 15, 2006 – Approximately 10 industry persons in attendance

Raleigh, NC – February 17, 2005 – Approximately 25 industry persons in attendance
 Raleigh, NC – Aug, 25, 2004 – Approximately 20 industry persons in attendance
 Raleigh, NC – March 10, 2004 – Approximately 20 industry persons in attendance
 Raleigh, NC – Aug 20, 2003 – Approximately 20 industry persons in attendance
 Raleigh, NC – April 7, 2003 – Approximately 25 industry persons in attendance
 Raleigh, NC – Sept 25, 2002 – Approximately 30 industry persons in attendance
 Raleigh, NC – June 12, 2002 – Approximately 33 industry persons in attendance
 Raleigh, NC – February 27, 2002 – Approximately 40 industry persons in attendance

- iii) USDA-FSIS ON-LINE INTRODUCTORY COURSE – READY-TO-EAT, NOT SHELF-STABLE MEAT AND POULTRY PRODUCTS (2008) - a 12-module, on-line course for USDA-FSIS Meat and Poultry Inspectors.
- iv) FOOD ENTREPRENEUR ASSISTANCE RESPONSE (FEAR) Program (2006-present) Director of the FEAR Program which is part of the Purdue College of Agriculture's New Venture Team. This program provides technical assistance, product testing, and regulatory compliance assistance to over 150 food entrepreneurs annually.
- v) RADIONUCLIDE TESTING (2003-06)
 Between 2003 and 2006 developed and operated radionuclide testing service along with three other universities and the United States of America Poultry and Egg Export Council (USAPEEC) for meat exports (2003). Certain countries require radioactivity measurement of exported meats. Our laboratory in cooperation with Nuclear Services in the Department of Nuclear Engineering provides testing for 25 large poultry plants exporting an estimated 200 million tons of meat products annually.

b) TRAINING PROGRAMS:

ENERGY REDUCTION IN FOOD PROCESSING PLANTS – Organizer and Instructor
 Industry Efficiency Initiative - National Video Conference – Northwest Food Processors Association – Purdue University – March 9, 2006. Approximately 15 persons attending

NATIONAL EGG QUALITY SCHOOL – Instructor
 Workshop for egg producers on food safety, egg production, egg processing, sanitation, and regulations.
 University Park, PA – Sept 25-26, 2012 – 80 persons attending
 Indianapolis, IN – May 21-24, 2012 – 60 persons attending

NATIONAL EGG PRODUCTS SCHOOL – Co-Organizer and Instructor
 Workshop for egg processors on food safety, egg product applications, egg product manufacturing, sanitation, and regulations.

Auburn, AL – Oct 15-17, 2012 – 30 persons attending
 Lake Okoboji, IA – Dec 6-8, 2010 – 80 persons attending
 Auburn, AL – Oct 10-14, 2010 – 30 persons attending
 Auburn, AL – Sept 29-Oct 1, 2008 – 30 persons attending
 Auburn, AL – Sept 10-13, 2007 – 30 persons attending
 Fayetteville, AR – July 30-Aug 3, 2006 – 20 persons attending
 Auburn, AL – November 6-10, 2005 – 40 persons attending
 Columbus, OH – October 10-14, 2004 – 45 persons attending

NATIONAL AGRICULTURAL ENGINEERING EXAM WRITING WORKSHOP- Co-Organizer

Agricultural Engineering Exam writing program. Member of organizing committee of 10 and led writing and review of food engineering exam questions.

July 30, 2012, Dallas, TX- 15 participants

February 2-3, 2011 Clemson, SC – 15 participants

February 3-4, 2010 Clemson, SC – 18 participants

February 4-5, 2009 Clemson, SC – 14 participants

February 5-6, 2008 Clemson, SC – 17 participants

February 6-7, 2007 Clemson, SC – 15 participants

February 7-8, 2006 Clemson, SC – 15 participants

FOOD PROCESSING SANITATION WORKSHOP – Organizer and Instructor

Workshop for meat and poultry processors on processing plant sanitation.

West Lafayette, IN – Oct 16, 2008 – 20 persons

West Lafayette, IN- April 5, 2006 – 14 persons

Raleigh, NC - March 6, 2001 – 11 persons

NON-THERMAL PROCESSING WORKSHOP – Co-Organizer

ASAE International Meeting in Milwaukee, WI - July 7, 2000 - 15 persons

FOOD PRODUCTS EXPORT WORKSHOP – Organizer and Presenter

ISDA-Midwest Food Export Association (Indianapolis, IN) – October 6, 2008. Exporting Value-Added Food Products from Indiana.. 15 participants

BETTER PROCESS CONTROL SCHOOLS/ACIDIFIED FOODS SCHOOLS - (FDA Certification Program) – Co-Organizer and Instructor

Purdue University (Indianapolis, IN) – May 10-13, 2010 – 60 persons certified

Missouri Department of Agriculture – (Jefferson City, MO) – Jan 20-21, 2010 – 80 persons certified

Purdue University (Indianapolis, IN) – April 26-27, 2006 – 25 persons certified

Purdue University (West Lafayette, IN) – April 17-20, 2006 – 80 - persons certified

North Carolina State University (Raleigh, NC) – Nov 2-4, 1998 - 20 persons certified

Kraft General Foods (Mason City, IA) – August 15, 1998 - 40 persons certified

ENTREPRENEUR WORKSHOP – Introduction to Starting a Specialty Food Business (in Indiana) -

Co-Organizer and Instructor

Indianapolis, Indiana, April 21, 2011 – 24 persons

Indianapolis, Indiana April 15, 2010 – 25 persons

Indianapolis, Indiana, April 23, 2009 – 30 persons

Indianapolis, Indiana April 24, 2008 – 30 persons

Crown Point, Indiana October 4, 2007 – 45 persons

Indianapolis, Indiana April 25, 2007 – 30 persons

Fort Wayne, Indiana October 24, 2006 18 persons

Indianapolis, Indiana April 25, 2006 25 persons

Madison, Indiana November 11, 2005 16 persons

North Carolina State University (Raleigh, NC) April 13-14, 1999 – 40 persons

STARTING A COMMERCIAL KITCHEN: Supporting Food Entrepreneurship – Co-Organizer and Instructor

Indianapolis, Indiana April 2, 2008 – 15 persons

Fort Wayne, Indiana April 30, 2008 18 persons

EUROPEAN HYGIENIC ENGINEERING DESIGN GROUP WORKSHOP - Co-Organizer and Instructor

Dallas, TX November 16, 2010 – 10 persons

West Lafayette, IN November 1-2, 2007 – 25 persons

ADVANCED HACCP TRAINING – Co-Organizer and Instructor - International HACCP Alliance Approved Instructor

Raleigh, NC - October 7-8, 2003 – Approximately 20 persons

Raleigh, NC – March 12-13, 2003 – Approximately 20 persons

Raleigh, NC – June 4-5, 2002 – Approximately 25 persons

Raleigh, NC – December 12-13, 2001 – Approximately 35 persons

ON-FARM HACCP TRAININGS – Poultry Production and Processing personnel: Co-Organizer and Instructor - Taught with NCSU-CALS Poultry Coordinating Committee

Pittsboro, NC – August, 2, 2000 - Approximately 40 persons

Goldboro, NC - June 7, 2000 - Approximately 32 persons

INTERNATIONAL HACCP ALLIANCE – INTRODUCTORY HACCP TRAININGS - Very Small Meat Processors: Co-organizer and Instructor - International HACCP Alliance approved instructor - Taught w/Food Science Extension Faculty and North Carolina Department of Agriculture/ Indiana Department of Agriculture

West Lafayette, IN – October 13-15, 2008 – Approximately 25 persons

Indianapolis, IN – May 5-6, 2008 – Approximately 20 persons – Butterfield Foods

West Lafayette, IN – October 23-25, 2006 – Approximately 25 persons

Raleigh, NC – March 23-25, 2004 – Approximately 35 person

Lumberton, NC – November 11-12, 2003 – Approximately 60 persons

Raleigh, NC – Oct 14-16, 2003 – Approximately 20 persons

Raleigh, NC – March 24-26, 2003 – Approximately 30 persons

Raleigh, NC – October 14-16, 2002 – Approximately 17 persons

Raleigh, NC – May 13-15, 2002 – Approximately 35 persons

Raleigh, NC – July 17-19, 2001 – Approximately 20 persons

Raleigh, NC – January 25-27, 2001 – Approximately 35 persons

Charlotte, NC - June 10, 17, and 24, 1999 - Approximately 30 persons

N. Wilkesboro, NC - June 9, 16, and 23, 1999 - Approximately 20 persons

Asheville, NC - June 8,15, and 22, 1999 - Approximately 22 persons

FOOD SAFETY TRAINING - Instructor

County Extension Agent Food Safety Training - Aug 2-5, 1999 - Approximately 12 agents

County Extension Agent Food Safety Training - June 15-19, 1997 - Approximately 16 agents

NORTH CAROLINA DEPARTMENT OF ENVIRONMENT, HEALTH, AND NATURAL RESOURCES – ENVIRONMENTAL HEALTH SPECIALIST TRAINING ON FOOD SAFETY DELIVERED BY THE DEPARTMENT OF FOOD SCIENCE AT NORTH CAROLINA STATE UNIVERSITY :

Food Safety Laboratory – February 11, 2005 – 40 persons

Food Safety Laboratory – February 13, 2004 – 40 persons
 Food Safety Laboratory – August 22, 2003 – 16 persons
 Food Safety Laboratory – February 21, 2003 – 15 persons
 Food Safety Laboratory – October 18, 2002 - 14 persons
 Food Safety Laboratory – May 17, 2002 - 8 persons
 Food Service Equipment Laboratory – May 13, 2002 – 8 persons
 Food Safety Laboratory – February 8, 2002 - Approximately 20 persons
 Food Service Equipment Laboratory – February 4, 2002 – Approximately 20 persons
 Food Safety Laboratory – September 20, 2001 - Approximately 15 persons
 Food Service Equipment Laboratory – September 17, 2001 – Approximately 15 persons
 Food Service Equipment Laboratory – May 14, 2001 - Approximately 16 persons
 Food Safety Laboratory – May 11, 2001 - Approximately 16 persons
 Food Service Equipment Laboratory – February 12, 2001 - Approximately 20 persons
 Food Safety Laboratory – February 9, 2001 - Approximately 20 persons
 Food Service Equipment Laboratory – September 11, 2000 - Approximately 30 persons
 Food Safety Laboratory – September 8, 2000 - Approximately 30 persons
 Food Safety Laboratory - April, 14, 2000 - Approximately 35 persons
 Food Service Equipment Laboratory – April 11, 2000 - Approximately 35 persons
 Food Safety Laboratory - October 11, 1999 - Approximately 30 persons
 Food Safety Laboratory - March 5, 1999 - Approximately 40 persons

3. Extension Invited Presentations and Invited Publications (International audiences highlighted in bold)

1. Atmospheric Cold Plasma Technology and Potential Applications in Poultry Processing. October 8, 2013. National Meeting on Poultry Health, Processing, and Live Production. Ocean City, Md. 100 persons attending.
2. Unit Operations in Egg Product Manufacturing. National Egg Products School. Oct 15, 2012. Auburn University, Auburn, AL. 30 persons attending.
3. Equipment and Facility Design Considerations in Egg Product Manufacturing. National Egg Products School. Oct 15, 2012. Auburn University, Auburn, AL. 30 persons attending.
4. Going from Grandma's Kitchen to the Market. October 3, 2012. Missouri Environmental Health Association Meeting. Lake of the Ozarks, MO. 80 persons attending.
5. 21st Century Egg Processing Technology. September 25, 2012. Poultry Sales and Services Conference. Pennsylvania State University. University Park, PA. 100 persons attending.
6. **Generating Atmospheric Cold Plasma Inside a Sealed Container. August 29, 2012. Dublin City University. Hosted by the National Center for Plasma Science and Technology. Dublin, Ireland. 80 persons attending.**
7. Canning Foods: Going from Grandma's Kitchen to the Marketplace. September 21, 2011. Indiana Environmental Health Association Meeting. Pokagon State Park, Angola, IN. 75 persons attending.
8. Opportunities and Challenges for Local and Regional Processing Plants. January 11, 2012.

- IL Specialty Crops, Agritourism, and Organics Conference. Urbana-Champaign, IL. 50 persons attending.
9. Improving Shell Egg Safety Using Rapid Cooling With Liquid Carbon Dioxide. North Central Avian Disease Conference. March 14-15, 2011. St. Paul, MN. 100 persons attending.
 10. 21st Century Egg Processing Technologies. Pennsylvania Poultry Sales and Service Conference and Northeastern Conference on Avian Diseases. September 27, 2012. Pennsylvania State University. State College, PA. 50 persons attending.
 11. The Effect of Rapid Cooling Shell Eggs from a Quality and Safety Perspective. Intervention technologies for the mitigation of *Salmonella enteritidis* infections in shell eggs. Institute of Food Technologists Annual Meeting. June 14, 2011. New Orleans, LA. 35 persons attending.
 12. Preventing Salmonellosis from Shell Eggs Using Rapid Cooling with Carbon Dioxide Gas. S37 - Salmonella in Shell Eggs - Post-harvest Intervention Technologies . International Association for Food Protection Conference (IAFP). July 25, 2012. Providence, RI. 50 persons attending.
 - 13. Development of a Novel In-Package Gas Treatment. DIT SAFE-BAG Meeting. Dublin, Ireland. November 21, 2011. 15 persons attending.**
 - 14. Application of Sealed Package Gas Treatment for Fruits and Vegetables. SAFE-BAG Meeting. Ljubljana, Slovenia. February 28, 2012. 25 persons attending.**
 - 15. Fat's Roots, Oil and Grease in U.S. Sewers. FOG's Build-up and Removal: Solutions and Problems Workshop (2010). 1-day workshop, Cranfield, England. 30 participants.**
 - 16. Fat, Roots, Oil, and Grease Workshop (2008), 100 participants from U.S. 1-day workshop, Chicago, IL. Invited program as part of Water Environment Federation Technical Conference (WEFTEC 2008).**
 17. Food Processing and Preservation Technologies for Developing Countries. Agricultural Programs in Afghanistan - National Guard Training (2008, 2009). 5-day workshop, Purdue University, West Lafayette, IN. Three programs, 57 participants.
 18. Sanitation at What Price? Innovative approaches to plant sanitation pays off for processors. Meat and Poultry Magazine. Pg 73-77. July 2009. www.MeatPoultry.com
 - 19. Good Hygiene Practices for Small-Scale Food Processing with Emphasis on Meat Processing. Asian Productivity Organization. September 8, 2008. Bangkok, Thailand. 100 persons (by invitation only) from 13 countries.**
 20. Converting Idle Kitchens. 2008. Starting a Community Kitchen Workshop. 27 participants, 1-day workshop, Indianapolis, IN and Fort Wayne, IN.

21. Food Safety Programs in Greenhouse Production. February 25, 2008. Greenhouse Production Workshop. Wooster, OH. 30 persons.
22. Meat and Poultry Magazine. Sosland Publishing. December 2007. Sanitation Tips. 1 pg. Readership 22,211.
23. HACCP and Sanitation Programs. November 1, 2007. European Hygienic Engineering Design Group, 20 participants, 1 workshop, 2-day program, Purdue University, West Lafayette, IN.
24. Emerging Food Trends. November 11, 2007. Farm Sustainability Tour. Purdue University, West Lafayette, IN. 30 persons.
25. Poultry USA. Watt Publishing Company. May 2007. "Chlorine-The Misunderstood Pathogen Reduction Tool. 6 pg. S. Russell and K.M. Keener. Readership 12,000.
26. Food Safety and Farmer's Markets. 2007 Indiana Horticultural Congress, Indianapolis, IN and Trade Show and Farmer's Market Workshop, Fort Wayne, IN. 70 persons.
27. Process Room Instrumentation Equipment and Operation. Better Process Control Schools (2006, 2007, 2008, 2010), 235 participants, 4-day program, Purdue University, West Lafayette, IN and Indianapolis, IN.
28. Food Processing in Indiana. Presented to Purdue Council for Agricultural Research, Extension and Teaching (PCARET). October 31, 2006. 50 persons.
29. Thermal Processing Requirements in Aseptic Processing. Presented at Coca-Cola Workshop. October 24, 2006. West Lafayette, IN. 40 persons.
30. Adding Value to Indiana. August 30, 2006 Presented to Purdue New Ventures Team. Turkey Run State Park, Marshall, IN. 25 persons.
31. Developing a Sanitation Program. June 19, 2006. Harlan Bakeries, Avon, IN. 15 persons.
32. Purdue University: Department of Food Science Engagement Program. Southeastern Indiana Extension Educators. May 19, 2006. Purdue University. 30 persons.
33. Engaging the Indiana Food Industry – Purdue Food Science. Visiting Delegation of Taiwan Food Buyers. May 6, 2006. Purdue University, West Lafayette, IN. 40 persons.
- 34. Cleaning and Sanitizing Operations in the Food Industry. International Conference on Food Safety. October 12-14, 2005. Monterrey, Mexico. 600 persons.**
35. Food Safety in a Global Marketplace: Where Does My Company Fit In? September 18, 2005. Food Industry Supplier Association's Annual Conference. Coeur d'Alene, Idaho. 105 CEO's, presidents, and vice-presidents of North American food equipment manufacturing and supply companies.
36. Food Irradiation in the United States. Current Status and Future Trends. June 22, 2003. Midwesterner's Meeting. Durham, NC. 25 persons.

37. Maximizing On-Farm Refrigeration for Fruits and Vegetables. February 17, 2003. Sponsored by North Carolina Cooperative Extension Service, Pasquotank County. Elizabeth City, NC. 25 persons.
38. Odor Characterization and Measurement. Presented at Professional Development Course for Wastewater Treatment Operators. Sponsored by North Carolina Section of American Water Works Association (NCAWWA). July 18, 2002. Durham, NC. 40 persons.

4. Interdisciplinary Activities in Extension

Dr. Keener has been instrumental in a number of national extension programs and committees such as National Alliance Food Safety and Security (NAFFS), National Egg Products School, CODEX Committee on Meat and Poultry Hygiene, Agricultural Engineering Professional Engineering Exam Writing Committee. These collaborations include persons from Purdue University Departments of Animal Sciences, Agricultural and Biological Engineering, Center for Clean Manufacturing Technology, and Agricultural Economics; North Carolina State University Departments of Food Science, Poultry Science, Biological and Agricultural Engineering, and Civil Engineering; University of Arkansas Department of Poultry Science, University of Georgia Department of Poultry Science, The Ohio State University Department of Food, Agricultural, and Biological Engineering, and Auburn University Department of Poultry Science. He also supports many state and federal regulatory agencies (FDA, USDA-FSIS, EPA, Indiana State Department of Health, Indiana Animal Board of Health) and trade organizations (Indiana State Poultry Association, American Egg Board, United States of America Poultry and Egg Export Council).

5. Extension Publications

1. Clayton, K., Bush, D., and **Keener, K. M.** 2012. Serie emprendimientos alimenticios: Productos orgánicos (Food Entrepreneurship: Organic Products) FS-14-W-S (Spanish).
2. Clayton, K., Bush, D., and **Keener, K. M.** 2012. Serie emprendimientos alimenticios: Tecnologías de la conservación y el procesamiento de los alimentos (Food Entrepreneurship: Food Preservation and Processing Techniques) FS-15-W-S (Spanish).
3. Clayton, K., Bush, D., and **Keener, K. M.** 2012. Serie emprendimientos alimenticios: Reglamentación para el procesamiento de los alimentos en Indiana (Food Entrepreneurship: Regulations for Indiana Food Processing) FS-16-W-S (Spanish).
4. Clayton, K., Bush, D., and **Keener, K. M.** 2012. Serie emprendimientos alimenticios: Uso de cocinas aprobadas (Food Entrepreneurship: Using Approved Kitchens) FS-17-W-S (Spanish).
5. Clayton, K., Bush, D., and **Keener, K. M.** 2012. Emprendimientos alimentarios: Uso de la cocina del hogar para preparar alimentos para vender. FS-18-W-S (Spanish).
6. Clayton, K., Bush, D., and **Keener, K. M.** 2012. Organic Foods. Department of Food Science, Purdue University. Food Entrepreneurship FS-14-W.
7. Clayton, K., Bush, D., and Keener, K. M. 2012. Food Preservation Methods. Department of Food Science, Purdue University. Food Entrepreneurship FS-15-W.

8. Clayton, K., Bush, D., and Keener, K. M. 2012. Regulations for Indiana Food Processing. Department of Food Science, Purdue University. Food Entrepreneurship FS-16-W.
9. Clayton, K., Morgan, M., and Keener, K. M. 2012. Using An Approved Kitchen to Prepare Food for Sale. Department of Food Science, Purdue University. Food Entrepreneurship FS-17-W.
10. Clayton, K., Bush, D., and Keener, K. M. 2012. Using A Home Kitchen to Prepare Food for Sale. Department of Food Science, Purdue University. Food Entrepreneurship FS-18-W.
11. Bush, D., and **Keener, K. M.** 2009. Serie emprendimientos alimenticios: Productos orgánicos (Food Entrepreneurship: Organic Products) FS-14-W-S (Spanish).
12. Bush, D., and **Keener, K. M.** 2009. Serie emprendimientos alimenticios: Tecnologías de la conservación y el procesamiento de los alimentos (Food Entrepreneurship: Food Preservation and Processing Techniques) FS-15-W-S (Spanish).
13. Bush, D., and **Keener, K. M.** 2009. Serie emprendimientos alimenticios: Reglamentación para el procesamiento de los alimentos en Indiana (Food Entrepreneurship: Regulations for Indiana Food Processing) FS-16-W-S (Spanish).
14. Bush, D., and **Keener, K. M.** 2009. Serie emprendimientos alimenticios: Uso de cocinas aprobadas (Food Entrepreneurship: Using Approved Kitchens) FS-17-W-S (Spanish).
15. **Keener, K.M.** 2007. Overview of HACCP: Hazard Analysis and Critical Control Point Program. Department of Food Science, Purdue University. No. FS-20-W. 2009 Data: 12,200 hits; 2,000 downloads.
16. **Keener, K.M.** 2007. SSOP and GMP Practices and Programs for Small Processors. Department of Food Science, Purdue University. No. FS-21-W. 2009 Data: 47,500 hits; 7,300 downloads.
17. **K.M. Keener.** 2007. Pest Control Program for Small Processors. Department of Food Science, Purdue University. No. FS-22-W. 2009 Data: 12,100 hits; 2,200 downloads.
18. **K.M. Keener.** 2007. A Recall and Traceability Program for Small Processors. Department of Food Science, Purdue University. No. FS-23-W. 2009 Data: 6,100 hits; 1,500 downloads.
19. **K.M. Keener.** 2007. Verification Programs for Small Processors. Department of Food Science, Purdue University. No. FS-24-W. 2009 Data: 4,000 hits; 700 downloads.
20. **Keener, K.M.** 2007. Selection and Maintenance of Temperature Measurement Devices. Department of Food Science, Purdue University. No. FS-25-W. 2009 Data: 6,300 hits; 1,200 downloads.
21. Bush, D., and **Keener, K. M.** 2007. Food Preservation and Processing Technologies. Department of Food Science, Purdue University. Food Entrepreneurship FS-15-W. 2009 Data: 9,000 hits; 2,100 downloads.

22. Bush, D., and **Keener, K. M.** 2007. Regulations for Indiana Food Processing. Department of Food Science, Purdue University. Food Entrepreneurship FS-16-W. 2009 Data: 6,300 hits; 1,200 downloads.
23. Bush, D., and **Keener, K. M.** 2007. Using Approved Kitchens. Department of Food Science, Purdue University. Food Entrepreneurship FS-17-W. 2009 Data: 2,600 hits; 600 downloads.
24. Bush, D., and **Keener, K. M.** 2006. Organic Products. Department of Food Science, Purdue University. Food Entrepreneurship FS-14-W. 2009 Data: 2,300 hits; 600 downloads.
25. **Keener, K.M.**, B.J. Lloyd, M. C. Scherpereel, and S. A. Barnes. 2004. Overview of HACCP: Hazard Analysis and Critical Control Point Program. North Carolina Cooperative Extension Service, Department of Food Science, North Carolina State University. No. 04-27.
26. **Keener, K.M.**, B.J. Lloyd, M. C. Scherpereel, and S. A. Barnes. 2004. SSOP and GMP Practices and Programs for Small Processors. North Carolina Cooperative Extension Service, Department of Food Science, North Carolina State University. No. 04-28.
27. Lloyd, B.J., **K.M. Keener**, M. C. Scherpereel, and S. A. Barnes. 2004. Verification Programs for Small Processors. North Carolina Cooperative Extension Service, Department of Food Science, North Carolina State University. No. 04-29.
28. Lloyd, B.J., **K.M. Keener**, M. C. Scherpereel, and S. A. Barnes. 2004. Pest Control Program for Small Processors. North Carolina Cooperative Extension Service, Department of Food Science, North Carolina State University. No. 04-30.
29. **Keener, K.M.**, B.J. Lloyd, M. C. Scherpereel, and S. A. Barnes. 2004. Selection and Maintenance of Temperature Measurement Devices. North Carolina Cooperative Extension Service, Department of Food Science, North Carolina State University. No. 04-31.
30. Lloyd, B.J., **K.M. Keener**, M. C. Scherpereel, and S. A. Barnes. 2004. A Recall and Traceability Program for Small Processors. North Carolina Cooperative Extension Service, Department of Food Science, North Carolina State University. No. 04-32.
31. Keener, K. M. 2001. Air Quality Intervention Strategies in the Processing Plant – A Systems Approach. Extension Publication 01-15. 9 pp.
32. Keener, K. M.. 2001. Biotechnology facts without fiction: the truth is out there. The Forum for Family and Consumer Issues. No. 6(1). 2 pages.
<http://www.ces.ncsu.edu/depts/fcs/pub/2001w/keener.html>>.
33. Keener, K. M. and T. J. Hoban. 2000. Biotechnology: Answers to Common Questions. FSR 00-25. Distributed at Eloise S. Cofer Symposium on Biotechnology on October 27, 2000 in Research Triangle Park, NC.
34. Keener, K. M., T. J. Hoban, and R. K. Balasubramanian. 2000. Biotechnology and Its Applications. FSR 00-26. Distributed at Eloise S. Cofer Symposium on Biotechnology on October 27, 2000 in Research Triangle Park, NC.

35. Taylor, M. C., P. A. Curtis, R. E. Carawan and K. M. Keener. 1999. Liquid Assets for your poultry plant. North Carolina Cooperative Extension Service, NC State University. No.CD-20.
36. Ennis, A. E. and K. M. Keener. 1999. The safe use of plastics in the microwave. North Carolina Cooperative Extension Service, NC State University. No. CD-21.
37. Keener, K. M., M. C. Taylor, P. A. Curtis, and R. E. Carawan. 1999. Poultry Processors: You can reduce waste load and cut sewer charges. North Carolina Cooperative Extension Service, NC State University. No. CD-22.
38. Jackson, W. C. , P. A. Curtis, R. E. Carawan, K. M. Keener and M. C. Taylor. 1999. Survey shows that poultry processors can save money by conserving water. North Carolina Cooperative Extension Service, NC State University. No. CD-23.
39. Curtis, P. A., M. C. Taylor, R. E. Carawan and K. M. Keener. 1999. Poultry CEO's: You may have a \$162 million opportunity. North Carolina Cooperative Extension Service, NC State University. No. CD-24.
40. Keener, K. M. 1998. Food Irradiation: To Zap or Not to Zap? Department of Food Science. NCSU. FSR98-13
41. LaCrosse, J. D. and K. M. Keener. 1998. Oven Calibration Kit. North Carolina Cooperative Extension Service. North Carolina State University, Department of Food Science. Raleigh, NC 27695-7624.
42. Keener, K. M., and M. C. Taylor. 1997. Perfectly Cooked Poultry. Department of Food Science. NCSU. FSR97-46.

6. Selected Popular Press (>100 since 2003)

1. Keep It Clean. Oct-Nov 2013. Food Quality and Safety Magazine. http://www.foodquality.com/details/article/5314281/Keep_It_Clean.html?tzcheck=1&tzcheck=1.
2. In-package Cold Plasma Process Kills Bacteria. July-Aug 2013. ASABE Resource Magazine. <http://bt.e-ditionsbyfry.com/publication/?i=164821&p=26>
3. Radiant Fried Chicken Patties versus Traditional. July 31, 2013. Imperial Valley News. <http://www.imperialvalleynews.com/index.php/news/latest-news/5104-radiant-fried-chicken-patties-versus-traditional.html>
4. Purdue professor: quick-cooling eggs could boost exports. July 4, 2012. Journal and Courier Newspaper. <http://www.jconline.com/article/20120704/BUSINESS/307040016/Purdue-professor-quick-cooling-eggs-could-boost-exports>
5. 'Fried Chicken: Deep Fried Love in a Bucket'. CRAVE television show. Food Network. Season 1, Episode 2. Sept 5, 2011.
6. Controlling Pests. June 1, 2010. Meat and Poultry Magazine. Sanitation Tips. Pg 56-57. <http://am1.sosland.com/Olive/ODE/MeatPoultry/Default.aspx?href=MP%2F2010%2F06%2F01&pageno=56&view=document>
7. Coming Soon: A Radiant Cooker That Can Deep-Fry Foods Without Oil. February 16, 2010. Popular Science Magazine. <http://www.popsci.com/technology/article/2010-02/coming-soon-radiant-cooker-can-deep-fry-foods-without-oil>

8. Safety of Poultry Meat. Channel 6 News Indianapolis, IN. December 1, 2009.
www.theindychannel.com
9. Purdue Zip Trips: Disease Detectives. November 19, 2009. 130 schools with 9,000 students on all 8 PBS stations in the State of Indiana.[highlights in-package ozonation technology]
10. Fried Food Might Be Getting Healthier. WLFI TV 18. October 8, 2009.
http://www.wlfi.com/dpp/news/local/local_wlfi_westlafayette_fried_food_might_be_getting_healthier_20091008
11. Inventors create ‘radiant fryer’ oven; healthier fried foods without oil. Smart Planet. October 8, 2009. <http://www.smartplanet.com/business/blog/smart-takes/inventors-create-radiant-fryer-oven-produces-fried-chicken-without-oil/1492/>
12. Ozone Used to Improve Food Safety. Big Ten Network: Boiler Bytes. June 30, July 2 &3 2009.
www.boilerbytes.com
13. Simple Device can Ensure Your Food Gets to the Store Bacteria Free. Resource: Engineering and Technology For a Sustainable World. July/Aug 2009. Pg 27.
http://www.asabe.org/resource/09july_augcontents.pdf
14. A Breathe of Fresh Air. The Guardian Newspaper: Technology Section (United Kingdom) April 16, 2009. <http://www.guardian.co.uk/technology/2009/apr/16/ozone-food-technology>
15. Five Ways Science is Trying to Keep Your Food Safe. April 1, 2009. Scientific American – Health. <http://www.scientificamerican.com/slideshow.cfm?id=5-ways-to-keep-food-safe>
16. Ionization research shows promise for produce. The Packer Magazine. March 25, 2009.
<http://www.thepacker.com/Ionization-research-shows-promise-for-produce/Article.aspx?articleid=273879&authorid=108&feedid=218>
17. Device May Help Eliminate Bacteria in Food. The Weekly: Latest in Food Science and Technology News. March 11, 2009. Institute of Food Technologists. Chicago, IL 60607
http://members.ift.org/IFT/Pubs/Newsletters/weekly/nl_031109.htm
18. Researcher Uses Ozone to Kill Bacteria. Journal and Courier Newspaper. March 8, 2009.
<http://www.jconline.com/>
19. In-package Ozonation. Our-World: Voice of America Radio. March 7, 2009.
<http://www.listeningexpress.com/voa/ourworld/ourworld%202009-03-07.html> 134 million weekly viewers in 45 languages.
20. News and Observer, Raleigh, NC, April 9, 2008. “Ban on Garbage Disposals Fizzling”. 1 page. Readership 500,000. <http://www.newsobserver.com/front/story/1030373.html>
21. Disposals to grind on in Raleigh. WRAL Channel 5 News. Raleigh, NC. April 15, 2008. 1 page.
<http://wral.com/news/local/story/2734861/>
22. Rooting out SSO’s: Evaluating Popular Root-Control Methods in a Pilot-Scale Sanitary Sewer. Feature Article. Water Environment and Technology Magazine. August 2008. 5 pg. J. Ducoate, J. Wood, T. Aziz, J. Groninger, L. Holt, and and K.M. Keener. Readership 32,580.
23. It takes a Community to Build a Kitchen. April 2, 2008. Marisa Renwald, Gary Post-Tribune. Gary, IN. <http://www.post-trib.com/lifestyles/food/873192> Readership 73,795.
24. QSR’s Work to Overcome Oily Situations. April 15, 2008. Julie Sturgeon, Quick-Serve Restaurant Magazine. http://qsrweb.com/view_article.php?id=10396 Readership 78,520.
25. Seminar on Good Hygiene Practices for Small-Scale Food Processing with emphasis on Meat Processing. Food Focus Magazine. October 2008, pg 55.
26. University Profs Develop New IR Oven. Foodservice Equipment Reports. December 2008. 1 pg. Readership 41,000 worldwide.
27. I Can’t Believe it’s not fried: New Oven Fries Food Without Oil. PhysOrg.com. September 16, 2008. 1 pg. www.physorg.com/pdf140799665.pdf 1,500,000 unique visitors a month
28. “Radiant Oven” Could Make Fried Foods Healthier. Engineering News. October 12, 2008. 1 pg.
<http://www.engcom.net/engineering/view/3113/>
29. Oven Makes “Fried” Food Without Oil. Inventor’s Spot. September 16, 2008. 1 pg.
http://inventorspot.com/articles/oven_makes_fried_foods_without_oil_17830

30. Purdue Scientist Invents New Kind of Oven. Science News – United Press International. September 23, 2008. 1 pg. Readership 1.8M monthly.
http://www.upi.com/Science_News/2008/09/23/Purdue_scientist_invents_new_kind_of_oven/UPI-64191222190359/
31. Fried Foods Getting Healthier. CNN News – Health . September 18, 2008.
<http://www.cnn.com/video/#/video/health/2008/09/18/sotvo.no.oil.fried.food.wlfi?iref=videosearch> Readership 17.7 million unique users were registered on CNN.com's home page in a month. This is 68% more unique users to the home page than the nearest news competitor.
32. I can't believe it's not fried! New oven fries food without oil. September 24, 2008. Farmer's Advance Magazine.
<http://www.farmersadvance.com/apps/pbcs.dll/article?AID=/20080924/NEWS/809240309/1001>
33. WaterWorld Online (Magazine). March 2006. NC State Researchers Study FROG Problem in Sewer Systems. 1 pg. Readership 30,000.
34. Feedinfo News Service Scientific Reviews. February 2005. “Campylobacter in Poultry Processing - A Continuing Challenge”. 18 pg. Available from URL: <http://www.feedinfo.com>. Readership 15,000 companies and individuals in 60 countries.
35. PERSPECTIVES – The Magazine of the College of Agricultural and Life Sciences. Spring 2003. “Keener examines effectiveness of washers in poultry processing”. 2 pages. Readership 10,000. Kansas City Star, Kansas City, MO. March 14, 2004. “Grease is the Word of a New Industry”. 1 page. Readership 631,000.
36. MEATNEWS DAILY – WATT Publishing Company. April 26, 2004. “PATHOGEN STUDY RELEASED: University food scientists examines the effectiveness of methods U.S. poultry processors are using to control *Campylobacter* in their plants”. 1 page. Readership 12,000.
37. Innovations in Dairy – Dairy Industry Technology Review. Dairy Management Inc. May 2004. “New techniques for measuring textural and melt properties”. 1 page. Readership 10,000.
38. RESOURCE – ASAE Magazine for Engineering in Agriculture, Food, and Biological Systems. August 1, 2004. “Engineering and Technology for a Sustainable World”. Front Cover. 1 page Readership 8500 in 90 countries.
39. RESOURCE – ASAE Magazine for Engineering in Agriculture, Food, and Biological Systems. August 1, 2004. “For Undergrads: A Food and Bioprocess Engineering Vision”. Pg 5-8. Readership 8500 in 90 countries
40. MEATNEWS DAILY – WATT Publishing Company. August 16, 2004. “U.S. Poultry Researchers investigate the value of carcass washers on reducing bacterial contamination”. 1 page. Readership 12,000.
41. PERSPECTIVES – The Magazine of the College of Agricultural and Life Sciences. Spring 2003. “Keener examines effectiveness of washers in poultry processing”. 2 pages. Readership 10,000.

C. RESEARCH ACTIVITIES

Dr. Keener has a strong applied research program which has produced a number of promising food technology innovations over the past fifteen years. His research program parallels his extension efforts with egg processing, food safety, and environmental management. He has received several national awards for his research. He currently has several active projects working with companies to develop new food processes and technologies.

Dr. Keener's most significant contribution is in the development of a number of food technologies, including dynamic radiant frying, rapid cooling for shell eggs using cryogenic gases, in-package ozonation, and in-shell microwave pasteurization of eggs. Over 100 popular press articles on research and extension programming have featured these technologies, including Guardian

Newspaper (U.K.), Scientific American, Packer Magazine, Voice of America Radio, ASABE Resource Magazine, Institute of Food Technologists- Latest Food Science and Technology News, CNN News, Popular Science, and Science Magazine. Over the past fifteen years he has received over \$1 million dollars in research funding as PI or Co-PI. He has produced 30 refereed publications, six book chapters, one book, four patents, and six invention disclosures. He has advised or co-advised five PhD students, seven MS students, ten staff (research scientists and engineers) and over 60 undergraduate students in his laboratory.

1. Research Grants, Gifts, and Awards

	Total Funds	Share to Keener
Prior to 2002	\$986,703	\$430,193
Funds as Principal Investigator (since 2002)	\$587,346 \$387,543 at Purdue	\$502,469 \$385,078 at Purdue
Funds as co-Principal Investigator (since 2002)	\$560,000 \$360,000 at Purdue	\$129,600 \$29,600 at Purdue
Total	\$ 2,134,049 (\$747,543 at Purdue)	\$1,062,262 (\$414,678 at Purdue)

1.1 Current Research Grants

Agency: Emerson Appliances – InSinkerator Division, Racine, WI
Title of grant: Phase 2 - Examination of Mechanism of FOG Deposit Formation under Controlled Laboratory Conditions
Duration of Funding: 4/12-3/13
Total Amount of award: \$91,869
Role: PI
Amount responsible: \$91,869 (100%)

1.2 Gifts

Agency: Kraft Foods
Total Amount of Gift: \$5,000
Date: October 15, 2012

Agency: Keystone Foods
Total Amount of Gift: \$2,500
Date: September 22, 2010

Agency: Keystone Foods
Total Amount of Gift: \$3,000
Date: May 15, 2010

Agency: Emerson Appliances-InSinkerator Division
Total Amount of Gift: \$23,500
Date: May 15, 2010

Agency: Emerson Appliances-InSinkerator Division
Total Amount of Gift: \$5,000

Date: June 1, 2009
Agency: Emerson Appliances-InSinkerator Division
Total Amount of Gift: \$20,000
Date: September 1, 2008

Agency: Butterfield Foods, Inc.
Total Amount of Gift: \$2,500
Date: May 31, 2008

1.3 Past Grants

Agency: Clabber Girl
Title of grant: *Evaluation of InnovaFry in a Benchtop Oil Immersion Fryer*
Duration of Funding: 8/15/10-12/1/10
Total Amount of award: \$10,000
Role: PI

Agency: Purdue Trask Trust Fund
Title of grant: *In-package ozonation of Food and Pharmaceutical Products*
Duration of Funding: 6/1/09-5/31/10
Total Amount of award: \$55,031.24
Role: PI

Agency: Air Liquide
Title of grant: *In-Package Ozonation Technology Evaluation – Phase II*
Duration of Funding: 11/1/09-12/31/09
Total Amount of award: \$9,923
Role: PI

Agency: Air Liquide
Title of grant: *In-Package Ozonation Technology Evaluation – Phase I*
Duration of Funding: 7/13/09-9/7/09
Total Amount of award: \$16,500
Role: PI

Agency: Piazza Produce
Title of grant: *Characterization of Isothiocyanates in Horseradish Roots*
Duration of Funding: 1/15/09-3/15/09
Total Amount of award: \$2,500
Role: PI
Amount responsible as co-PI: \$2,500

Agency: USDA-SBIR
Title of grant: *Development of Controlled Dynamic Radiant Fryer for Food Manufacturers*
Duration of Funding: 9/08-3/09
Total Amount of award: \$160,000
Role: Co-PI with Anderson Tool and Engineering, Inc.
Amount responsible as co-PI: \$1,600 (1%)

Agency: Emerson Appliances – InSinkerator Division, Racine, WI

Title of grant: Phase 1 - Examination of Mechanism of FOG Deposit Formation in Simulated Sewer Wastewater
Duration of Funding: 8/08-12/08
Total Amount of award: \$30,268
Role: PI
Amount responsible: \$30,268 (100%)

Agency: HRR Enterprises, Inc. LaPorte Indiana Company
Title of grant: Phase II - Treatment of Beef Trimmings with Ammonia for Pathogen Reductions
Duration of Funding: 8/1/07-12/31/08
Total Amount of award: \$29,315
Role: PI with Co- PI D.E. Gerrard (Animal Sciences)
Amount responsible: \$ 27,850 (95%)

Agency: USDA-National Alliance For Food Safety and Security (NAFSS)
Title of grant: Inactivation of Pathogens in Protected Environments on Food and Food Contact-Surfaces Using Reactive Gases
Duration of Funding: 9/06-8/08
Total Amount of award: \$200,000
Role: Co-PI with D. Nivens, B.A. Annous, B.M. Applegate, C. Corvalan, S.E. Martin, M.T. Morgan
Amount responsible: \$28,000 (14%)

Agency: HRR Enterprises, Inc. LaPorte Indiana Company
Title of grant: Phase I - Treatment of Beef Trimmings with Ammonia for Pathogen Reductions
Duration of Funding: 8/1/06-3/31/07
Total Amount of award: \$22,560
Role: PI with Co- PI D.E. Gerrard (Animal Sciences)
Amount responsible: \$ 21,560 (95%)

Agency: Water Environment Research Foundation
Title of grant: Fats, Roots, Oils, and Grease (FROG) in Centralized and Decentralized Systems
Duration of Funding: 4/1/05-3/31/07
Total Amount of award: \$276,000
Role: PI with Co-PI J. J. DuCoste (Civil Engineering, NCSU)
Amount responsible: \$68,000 Purdue Subcontract – original amount (NCSU)-\$138,000

Agency: Altria Group, Inc.
Title of grant: Determination of Factors that Influence the Formation of Fat, Oil, and Grease Blockages in Sanitary Sewer Collection Systems
Duration of Funding: 01/05-1/06
Total Amount of award: \$20,000
Role: PI with Co-PI J. J. DuCoste (Civil Engineering, NCSU)
Amount responsible: \$ 20,000 (100%)

Agency: USDA Value-Added Products Research
Title of grant: Development of an Alternative Immersion Frying Process Using Spatially Directed Dynamic Radiant Heating

Duration of Funding: 9/1/03-8/31/06
Total Amount of award: \$200,000
Role: Co-PI with B. E. Farkas (Food Science, NCSU)
Amount responsible: \$ 100,000 (50%)

Agency: Faculty Research and Professional Development Fund
Title of grant: Characterization of Fat, Oil, and Grease Blockages in Sanitary Sewer Collection Systems

Duration of Funding: 6/16/03-12/31/04
Total Amount of award: \$25,000
Role: PI with Co-PI J. J. DuCoste (Civil Engineering, NCSU)
Amount responsible: \$ 25,000 (100%)

Agency: Dairy Marketing Institute, Inc.
Title of grant: Rheology, NMR, and Microscopy: Linking Processed Cheese Microstructure With Functionality

Duration of Funding: 1/1/00- 12/31/02
Total Amount of award: \$154,803
Role: PI with Co-PI's C.R. Daubert (Food Science, NCSU), B.E. Amutis (Land O'Lakes)
Amount responsible: \$ 72,401 (50%)

2. Research Publications

a. Refereed Journal Publications

1. Comparison of the FryLess 100 K Radiant Fryer to oil immersion frying. 2013. L.V. Nelson III, K.M. Keener, K.R. Kaczay, P. Banerjee, J.L. Jensen, and A. Liceaga. *Lebensmittel-Wissenschaft und Technologie*. 53(2): 473-479. IP=1.155, Tier 2.
2. Connolly, J., Valdramidis, V.P., Byrne, E., Karatzas, K.A., Cullen, P.J., Keener, K.M., and Mosnier, J.P. 2013. Characterization and antimicrobial efficacy against *E. coli* of a helium/air plasma at atmospheric pressure created in a plastic package. *J. Phys. D: Appl. Phys.* 46 (2013) 035401 (12pp). IP = 2.544, Tier 1
3. Dana, Z., Patil, S., Keener, K.M.; Cullen, P.J.; Bourke, P. 2013 (Accepted/in press). Atmospheric Cold Plasma Inactivation of *Escherichia coli* in Liquid Media inside a Sealed Package. *Journal of Applied Microbiology*. IP = 2.337, Tier 1
4. P. Banerjee and K.M. Keener. 2012. Maximizing carbon dioxide content of shell eggs by rapid cooling treatment and its effect on shell egg quality. *J. Poultry Science*. Jun;91(6):1444-53 IP = 1.747, Tier 1.
5. T. N. Aziz, L. M. Holt, K. M. Keener, J. W. Groninger, J. J. Ducoste. 2012. Field Characterization of External Grease Abatement Devices. *Water Environ. Res.*, 84:237-246. IP= 1.013, Tier 2
6. T. N. Aziz, L. M. Holt, K. M. Keener, J. W. Groninger, J. J. Ducoste. 2011. Performance of Grease Abatement Devices for Removal of Fat, Oil, and Grease. *J. Environ. Eng.* 137:84–92.
7. P. Banerjee, K.M. Keener, and V. D. Lukito. 2011. Influence of Carbon Dioxide on the Activity of Chicken Egg White Lysozyme. *J. Poultry Science*. Apr;90(4):889-95 IP = 1.747, Tier 1.
8. C. Mejia, J. McEntire, K.M. Keener, M. Muth, W. Nganje, T. Stinson, and H. Jensen. 2010. Traceability (Product Tracing) in Food Systems: An IFT Report Submitted to the FDA, Volume

- 2: Cost Considerations and Implications. *Comprehensive Reviews in Food Science and Food Safety (CRFSFS)*. 9(1): 159-175. IP= 2.211, Tier 1
9. P. Klockow and K.M. Keener. 2009. Safety and Quality Assessment of Packaged Spinach Treated with a Novel Ozone Generation System. *Lebensmittel-Wissenschaft und Technologie*. 42(6): 1047-1053. IP=1.155, Tier 2.
 10. A. Biladeau and K.M. Keener. 2009. The Effect of Edible Coatings on Shell Egg Quality and Functionality Under Refrigerated Conditions. *J. Poultry Science*. 88(6):1266-1274. IP = 1.747, Tier 1.
 11. S. Ghosh, K.M. Keener, and Y. Pan. 2008. A simulation based method to assess inversion algorithms for transverse relaxation data. *Journal of Magnetic Resonance*. 191(2):226-230. IP=2.076, Tier 1.
 12. K.M. Keener, J. Ducoste, and L. Holt. 2008. Properties Influencing FOG Deposit Formation. *Water Environment Research*. 12:2241-2246. IP= 1.013, Tier 2.
 13. K.M. Keener, McEvoy, K.C., J.B. Tharrington, P.A. Curtis, and K.E. Anderson. 2006. Influence of Egg Testing Temperature on Internal Egg Quality Measurements. *J. Poultry Science* 85(3):550-555. IP=1.747, Tier 1.
 14. Keener, K.M., K.E. Anderson, P.A. Curtis, and J.E. Tharrington. 2004. Determination of Cooling Rates and Carbon Dioxide Uptake in Commercially Processed Shell Eggs Using Cryogenic Carbon Dioxide Gas. *J. Poultry Science*. 83:89-94. IP=1.747, Tier 1
 15. K. M. Keener, Bashor, M.P., P.A. Curtis, B.W. Sheldon, and S. Kathariou. 2004. *Campylobacter Contamination and Poultry Processing*. *Comprehensive Reviews in Food Science and Food Safety (CRFSFS)*. 3(2): 105-116. IP= 2.211, Tier 1.
 16. Bashor, M.P., P.A. Curtis, K.M. Keener, B.W. Sheldon, S. Kathariou, and J. A. Osborne. 2004. Effects of Carcass Washers on *Campylobacter* Contamination in Large Broiler Processing Plants. *J. Poultry Science*. 83(7):1232-1239. IP=1.747, Tier 1.
 17. Keener, K.M., R.W. Bottcher, and R.E. Munilla. 2004. Dust and Odor Emissions from Tunnel Ventilated Swine Buildings. *Applied Engineering in Agriculture*. 20(3): 343-347. IP=0.409, Tier 3
 18. Lloyd, B.J., B.E. Farkas, and K.M. Keener. 2004. Quality comparison of French fry style potatoes produced by oven heating, immersion frying, and controlled dynamic radiant (CDR) heating. *Journal of Food Processing and Preservation*. 28(12):460:472. IP=0.358, Tier 3.
 19. Lloyd, B.J. , B.E. Farkas, and K.M. Keener. 2003. Characterization of radiant emitters used in food processing. *Journal of Microwave Power and Electromagnetic Energy*. 38 (4): 213-224. IP=0.319, Tier 3.
 20. K.M. Keener, J. Zhang, R. W. Bottcher, and R. D. Munilla. 2002. Evaluation of Thermal Desorption for the Measurement of Artificial Swine Odorants in the Vapor Phase. *Trans. of the ASAE*. 45(5):1579-1584. IP=0.664, Tier 2.
 21. Sabliov, C.M., D. Boldor, B.E. Farkas, and K.M. Keener. 2002. Image processing method to determine surface area and volume of axi-symmetric agricultural products. *International Journal of Food Properties*. 5(3):641-653. IP=0.485, Tier 3.
 22. Jones, D.R., J.B. Tharrington, P.A. Curtis, K.E. Anderson, K.M. Keener, and F.T. Jones. 2002. Effects of cryogenic cooling on egg quality. *J. Poultry Sci*. 81:727-733. IP=1.747, Tier 1.
 23. Sabliov, C.M., B.E. Farkas, K.M. Keener, and P. A. Curtis. 2002. Cooling of Shell Eggs with Cryogenic Carbon Dioxide: A Finite Element Analysis of Heat Transfer. *Lebensmittel-Wissenschaft und Technologie*. 35: 568-574. IP=1.155, Tier 2.

24. Sabliov, C.M., B.E. Farkas, K.M. Keener. 2002. Parametric Analysis of Cryogenic Carbon Dioxide Cooling of Shell Eggs. *J. Poultry Science*. 81:1758-1765. IP=1.747, Tier 1.
25. Heber, A.J., J.Q. Ni, B.L. Haymore, R.K. Duggirala and K.M. Keener. 2001. Measurements of gas emissions from commercial swine buildings. *Trans. of the ASAE*. 44(6):1765-1778.
26. Keener, K. M., J. D. LaCrosse, and J. K. Babson. 2001. Chemical method for determination of carbon dioxide content in egg yolk and egg albumen. *J. Poult. Sci*. 83:983-987.
27. Oehrl, L. L., K. M. Keener, R. W. Bottcher, R. D. Munilla, and K. M. Connelly. 2001. Characterization of odor components from swine housing dust using gas chromatography. *Trans. of the ASAE*. 17(5) 669-671.
28. Parbst, K.E., K.M. Keener, and A.J. Heber, and J. Q. Ni. 2000. Comparison of a low cost and high cost odor monitoring equipment in a commercial swine finishing house. *Applied Engineering in Agriculture*. 16(6): 693-699.
29. Glenn, T.A., K. M. Keener, and C.R. Daubert. 2000. A mixer viscometry approach to use vane tools as steady shear rheological attachments. *J. of Appl. Rheol*. 10(2):80-89.
30. Keener, K.M., J.D. Lacrosse, P.A. Curtis, K.E. Anderson and B.E. Farkas. 2000. The influence of rapid air cooling and carbon dioxide cooling and subsequent storage in air and carbon dioxide on shell egg quality. *J. Poult. Sci*. 79:1067-1071.
31. Keener, K.M., J.D. Lacrosse, P.A. Curtis, B.E. Farkas. and K.E. Anderson. 2000. Gas exchange into shell eggs before and after cryogenic cooling. *J. Poult. Sci*. 79:275-280.
32. Keener, K.M., R.L. Stroshine, and J.A. Nyenhuis. 1999. Evaluation of low field (5.40 MHz) proton magnetic resonance measurements of Dw and T2 as methods of non-destructive quality evaluation of apples. *J. Am. Soc. Hort. Sci*. 124(3):289-295.
33. Keener, K.M., R.L. Stroshine, and J.A. Nyenhuis. 1997. Proton magnetic resonance measurement of self-diffusion coefficient of water in sucrose solutions, citric acid solutions, fruit juices, and apple tissue. 40(6):1633-1641. *Trans. of the ASAE*.

b. Published Research Abstracts

b1. International Written Paper Presentations with Abstracts

1. **Li, M. and K. M. Keener. 2002. NMR Diffusion Studies of the Effects of Emulsifying Salts and Cooling Schedule on the Microstructure of Processed Cheese. Presentation P-30. at the 6th International Conference on Applications of Magnetic Resonance in Food Science. September 4-6, 2002. Paris, France.**
2. **Conner, D.E., Curtis, P.A., Kuhlert, D.L., Anderson, K.E., Kerth, L.K., K.M. Keener. 2003. Potentiation of Salmonella enteritidis Growth in Shell Eggs. 10th European Symposium of the Quality of Eggs and Egg Products. Sept 23-26, 2003. Saint-Brieuc-Ploufragan, France.**
3. **B. E. Farkas, B. J. Lloyd, and K. M. Keener. 2004. Development of a radiant heating process to mimic immersion frying. 9th International Congress on Engineering and Food. Paper # 251. March 7-11, 2004. Montpellier, France.**
4. **J. Jensen, A. Donner, K.M. Keener. 2010. Use of a Novel In-Package Ozonation Process for Reducing Salmonella enteritidis on Chicken Meat. Paper 78-101209. Presented at the XVII World Congress of the International Commission of Agricultural and Biosystems Engineering. Quebec City, Canada June 13-17, 2010.**

5. **J. Connolly, J.P Mosnier, V. Valdramidis, E. Byrne, P.J. Cullen, K.M. Keener. 2010. Diagnostic of reactive species in a dielectric barrier discharge air/helium plasma for the treatment of a pre-packed food stimulant. Paper # P4.317. 37th European Physical Society Conference on Plasma Physics. June 21-25, 2010. Dublin, Ireland.**
6. **Keener, K. M., Jensen, J. L., Valdramidis, V. P., Byrne, E., Connelly, J. A., Mosnier, J. P., & Cullen, P. J. (2011). Decontamination of Bacillus subtilis spores in a sealed package using a non-thermal plasma system. NATO-Advanced Research Workshop: Plasma for Bio-Decontamination, Medicine and Food Security. Hotel Jasna Demanovska dolina, Slovakia. March 15-18, 2011.**

b2. National Written Paper Presentations with Abstracts

7. Stroshine, R. L., **K. M. Keener**, and L. Haney. 1994. Computer Aided Instruction on Topics for Courses in Physical Properties of Biomaterials. American Society of Agricultural Engineers Annual Meeting. Paper No. 94-3514. June 19-24, Charlotte, NC.
8. Stroshine, R. L., W. K. Wai, **K. M. Keener**, and G. W. Krutz. 1994. New Developments in Fruit Ripeness Sensing Using Magnetic Resonance. American Society of Agricultural Engineers Annual Meeting. Paper No. 94-6539. June 19-24, Charlotte, NC.
9. **Keener, K. M.**, R. L. Stroshine, J. A. Nyenhuis, and M. T. Morgan. 1996. Proton Magnetic Resonance Evaluation of Apple Quality using the Pulse Field Gradient Spin Echo (PFGSE) Technique. American Society of Agricultural Engineers Annual Meeting. Paper No. 96- 6063. July 14-18, Phoenix, AZ.
10. Heber, A. J., R. K. Duggirala, J. Ni, M. L. Spence, B. L. Haymore, V. I. Adamchuck, D. S. Bundy, A. L. Sutton, D. T. Kelly, and **K. M. Keener**. 1997. Measurement of Gas Emissions in Naturally Ventilated Swine Buildings. International Symposium on Ammonia and Odor Control from Animal Production Facilities. August 7-9, Vinkeloord, Netherlands.
11. **Keener, K. M.**, R. L. Stroshine, J. A. Nyenhuis, and B. L. Upchurch. 1997. Evaluation of PFGSE Measurements of D_w and CPMG Measurements of T_2 Taken with a 5.40 MHz, Low Resolution, NMR System for the Determination of Soluble Solids and Internal Defects in Granny Smith, Golden Delicious, and Red Delicious Apples. Nondestructive Techniques for Measuring the Quality of Fresh Fruits and Vegetables. Sponsored by USDA-CSREES and USDA-ARS. Proceedings pg. 183-197. February 18-21, Orlando, FL.
12. Bottcher, R. W., **K.M. Keener**, G. R. Baughman, R. D. Munilla, and K. E. Parbst. 1998. Windbreak Walls for Modifying Airflow and Emissions from Tunnel Ventilated Swine Buildings. Animal Production Systems and the Environment: An International Conference on Odor, Water Quality, Nutrient Management, and Socioeconomic Issues. Proceedings Volume 2 pg. 639-644. July 19-22, Des Moines, IA.
13. **Keener, K. M.**, J. D. Lacrosse, P. A. Curtis, and K. E. Anderson. 1998. Gas Exchange in Shell Eggs. American Society of Agricultural Engineers Annual Meeting. Paper No. 98-6094. July 11-16, Orlando, FL.
14. Parbst, K. E., **K. M. Keener**, A. J. Heber, and J. Ni. 1998. Comparison Between Low-End Discrete and High-End Continuous Measurements of Air Quality in Swine Buildings. American Society of Agricultural Engineers Annual Meeting. Paper No. 98-4060. July 11-16, Orlando, FL.

15. Bottcher, R.W., **K. M. Keener**, G. R. Baughman, R. D. Munilla, and K. E. Parbst. 1998. Windbreak Walls for Modifying Airflow and Emissions from Tunnel Ventilated Swine Buildings. American Society of Agricultural Engineers Annual Meeting. Paper No. 98-4071. July 11-16, Orlando, FL.
16. **Keener, K. M.**, R.W. Bottcher, R. D. Munilla, and G. L. Van Wicklen. 1999. Field Evaluation of an Indoor Ozonation System for Odor Control. Paper No. 99-4151 at the ASAE Annual International Meeting, July 18-21, 1999. Toronto, Ontario.
17. Bottcher, R. W., **K. M. Keener**, G. R. Baughman, R. D. Munilla, and K. E. Parbst. 1999. Field Evaluation of a Wet Pad Scrubber System for Controlling Odor and Dust Emissions. Paper No. 99-4152 at the ASAE Annual International Meeting, July 18-21, 1999. Toronto, Ontario.
18. **Keener, K. M.**, R.W. Bottcher, R. D. Munilla, and G. L. Van Wicklen. 1999. Odor Control Utilizing an Indoor Ozonation System for. North Carolina State University Animal Waste Management Symposium. January 27-28, 1999. Raleigh, NC
19. Bottcher, R. W., **K. M. Keener**, G. R. Baughman, R. D. Munilla, and K. E. Parbst. 1999. Field Evaluation of a Wet Pad Scrubber System for Odor and Dust Control. North Carolina State University Animal Waste Management Symposium. January 27-28, 1999. Raleigh, NC
20. Bottcher, R. W., **K. M. Keener**, G. R. Baughman, R. D. Munilla, and K. E. Parbst. 1999. Dust and Odor Control using Windbreak Walls. North Carolina State University Animal Waste Management Symposium. January 27-28, 1999. Raleigh, NC.
21. **Keener, K. M.**. 2000. Air Quality in Processing Plants – A Systems Approach. October 17, 2000 at the National Poultry Waste Management Symposium in Ocean City, MD.
22. Bottcher, R. W., **K. M. Keener**, R. W. Munilla, C. M. Williams, and S.S. Schiffman. 2000. Dust and Odor Emissions from Tunnel Ventilated Swine Buildings in North Carolina at the Second International Conference and Exhibition on Air Pollution from Agricultural Operations, October 9-11, 2000. Des Moines, IA.
23. Bottcher, R. W., R. W. Munilla, G. R. Baughman, and **K. M. Keener**. 2000. Design of Windbreak Walls for Mitigating Dust and Odor Emissions from Tunnel Ventilated Swine Buildings at the First International Swine Housing Conference and Exhibition, October 9-11, 2000. Des Moines, IA.
24. **Keener, K. M.**, H. M. Keener, R. W. Bottcher, R. D. Munilla, D. L. Elwell, and R. R. Stowell. 2000. Dust and Odor Emissions From a High-Rise Swine Finishing Facility. Paper No. 00-4028 at the ASAE Annual International Meeting, July 8-12, 2000. Milwaukee, WI.
25. Oehrl, L. L., **K. M. Keener**, R. W. Bottcher, R. D. Munilla, K. M. Connelly. 2000. Characterization of Odor Components From Swine Housing Dust Using Gas Chromatography. Paper No. 00-4020 at the ASAE Annual International Meeting, July 8-12, 2000. Milwaukee, WI.
26. Bottcher, R. W., **K. M. Keener**, R. W. Munilla. 2000. Comparison of Odor Control Mechanisms for Wet Pad Scrubbing, Indoor Ozonation, Windbreak Walls, and Biofilters. Paper No. 00-4091 at the ASAE Annual International Meeting, July 8-12, 2000. Milwaukee, WI.

27. B. E. Lloyd and **K. M. Keener**. 2001. Rapid Cooling of Orange Juice using Cryogenics for Quality Improvement. Paper No. 01-6073 at the ASAE Annual International Meeting, July 29-Aug 1, 2001. Sacramento, CA.
28. J. Zhang, **K. M. Keener**, R. W. Bottcher, and R. D. Munilla. 2001. Measurement of Artificial Swine Odorants in the Vapor Phase. Paper No. 01-4036 at the ASAE Annual International Meeting, July 29-Aug 1, 2001. Sacramento, CA.
29. R. W. Bottcher, R. D. Munilla, **K. M. Keener**, and R. S. Gates. 2001. Dispersion of Livestock Building Ventilation Using Windbreaks and Ducts. Paper No. 01-4073 at the ASAE Annual International Meeting, July 29-Aug 1, 2001. Sacramento, CA.
30. Bottcher, R.W., **K.M. Keener**, R.D. Munilla, and L.L. Oehrl-Dean. 2001. Measurement of odors and odorants in swine building airflow using aspirated fabric swatches and dust samples. pp. 513-518 in: Livestock Environment VI, Proceedings of the Sixth International Livestock Environment Symposium, R.R. Stowell, R. Bucklin, and R.W. Bottcher, eds. ASAE, St. Joseph, MI 49085-9659.
31. Dunlap, J. M., **K.M. Keener** and D. P. Green. 2002. Corrosion Control in Aluminum Blue Crab Containers. Presented at the Seafood Science and Technology Society of the Americas (SST) and the Atlantic Fisheries Technological Society (AFT), October 9-11, 2002. Orlando, FL.
32. **Keener, K. M.**, J. Zhang, R.W. Bottcher, and R. W. Munilla. 2002. Quantification of Odorants from Tedlar Bags. Paper No. 02-4165 at the ASAE Annual International Meeting, July 28-31, 2002. Chicago, IL.
33. Shook, R. W., **K. M. Keener**, and K. E. Anderson. 2002. Characterization of Poultry Manure for Potential Co-Combustion with Coal in an Electricity Generation Plant. Paper No. 02-6058 at the ASAE Annual International Meeting, July 28-31, 2002. Chicago, IL.
34. Dunlap, J. M., **K.M. Keener** and D. P. Green. 2003. Development of a Process Control Strategy to Prevent Corrosion in Aluminum Blue Crab Containers. Presented at the 23rd Annual North Carolina Commercial Fishing Show. February 22-23, 2003. New Bern, NC.
35. Li, M., **K. M. Keener**, B. E. Farkas. 2003. Frying Oil Degradation Studied by High Resolution NMR ¹H and ¹³C Spectra. Paper #036096 at the ASAE International Meeting. July 27-31. Las Vegas, NV.
36. Ghosh, S., **K. M. Keener**, and Y. Pan. 2006. 3d Simulation of Packed Particle Bed and Transport Properties Prediction for Product Optimization through Virtual Experiments. Paper # 440b. 2006 AIChE Annual Meeting. Nov 12-17, 2006. San Francisco, CA.
37. **K.M. Keener**, M. Chen. 2007. Dielectric properties of chicken eggs and their components. Paper # 076102. ASABE Annual International Meeting. June 17-20, 2007. Minneapolis, MN.
38. J. Wood, T. Aziz, L. Holt, **K.M. Keener**, J.D. Ducoste. 2007. Observation and analysis of popular root control methods in pilot scale sanitary sewer. Water Environment Federation Technical Exhibition and Conference. October 13-17, 2007. San Diego, CA.

39. P.A. Klockow and **K.M. Keener**. 2008. Inactivation of Escherichia Coli O157:H7 in Packaged Spinach Using Atmospheric Non-Equilibrium Plasma (ANEP). Paper # 241-5. Oral Presentation. ASABE Annual Meeting. June 29-July 2, 2008. Providence, RI.
40. **K.M. Keener**. 2008. Operational Practices in Food Processing Plants. Paper # 238-3. ASABE Annual Meeting. Oral Presentation. June 29-July 2, 2008. Providence, RI.
41. G.W. Williams and K.M. Keener. Design Considerations for the Construction and Operation of Meat and Poultry Processing Facilities. 2008. Paper # 238-2. ASABE Annual Meeting. June 29-July 2, 2008. Providence, RI.
42. J.L. Jensen, A. Saxena, and **K.M. Keener**. 2009. Evaluation of Treatment Methods for Reducing Bacteria in Textured Beef. Paper # 097375. ASABE Annual Meeting. June 21-24, 2009. Reno, NV.
43. L.V. Nelson, J.L. Jensen, **K.M. Keener**. 2010. Evaluation of Potato Cakes and Breaded Chicken Patties Fried using the FryLess 100K Radiant System Compared to Oil Immersion Frying. Paper # 1008894 ASABE Annual Meeting. June 20-23, 2010. Pittsburgh, PA.
44. N.N. Misra, D. Zuizana, P.J. Cullen, **K.M. Keener**. 2012. Characterization of a Novel Cold Atmospheric Air Plasma System for Treatment of Packaged Liquid Food Products. Paper # 12 ASABE Annual Meeting. July 30-Aug 2, 2012. Dallas, TX.

b3. International Abstracts

1. **S.E. Goldstein and K.M. Keener**. 2004. **A Multi-Variable Predictive Model of Egg White Lysozyme Activity**. 3rd International Symposium on Egg Nutrition for Health. April 18-21, 2004. Banff, Alberta, Canada.
2. **K.M. Keener and R. Rosaline**. 2006. **Egg white lysozyme activity in carbon dioxide solutions**. Abstract # 10790. Presented at the XII European Poultry Conference. Verona, Italy. Sept 10-14, 2006.
3. **A. Biladeau and K.M. Keener**. 2008. **The Effect of Edible Coatings on Shell Egg Functionality Under Refrigerated Conditions**. Abstract # 27845. Poster Presentation. Poultry Science Association Annual Meeting. July 20-23, 2008. Niagara Falls, Ontario, Canada
4. **A. Biladeau and K.M. Keener**. 2008. **The Effect of Edible Coatings on Shell Egg Quality Under Refrigerated Conditions**. Abstract # 27793. Poster Presentation. Poultry Science Association Annual Meeting. July 20-23, 2008. Niagara Falls, Ontario, Canada.
5. **E. Byrne, J. Connolly, V.P. Valdramids, K.M. Keener, J.P. Mosnier, P.J. Cullen**. 2010. **Assessing the antimicrobial efficacy of in-package cold plasma treatments; development of an experimental protocol**. International Conference on Antimicrobial Research. November 3-5, 2010. Vallodolid, Spain
6. **Non-thermal plasma inactivation of Listeria monocytogenes in liquid**. Safefood Knowledge Networks Conference. Lu H., Patil S., Keener, K.M., Cullen, P.J., and Bourke, P. May 1-2, 2012. Belfast, Ireland

7. **E. coli Reductions in Water Exposed to Atmospheric Plasma. Safefood Knowledge Networks Conference. Dana Zuizana., Patil S., Keener, K.M., Cullen, P.J., and Bourke, P. May 1-2, 2012. Belfast, Ireland**

b4. National Abstracts

8. N.N. Misra, D. Zuizana, P.J. Cullen, **K.M. Keener**. 2012. Characterization of a Novel Cold Atmospheric Air Plasma System for Treatment of Packaged Liquid Food Products.
9. V. Trinetta, R.H. Linton, B.M. Applegate, **K.M. Keener**, M.T. Morgan. 2010. Comparison between E-beam irradiation and Ozone treatment for pathogen inactivation on seeds. Abstract # 38-65 Institute of Food Technologists Meeting. July 17-20, 2010. Chicago, IL.
10. P. Banerjee, **K.M. Keener**, V. Lukito. 2010. Evaluation of Carbon Dioxide Treatment on Egg White Lysozyme. Abstract # 229-27 Institute of Food Technologists Meeting. July 17-20, 2010. Chicago, IL.
11. L.V. Nelson, J.L. Jensen, **K.M. Keener**. 2010. Evaluation of Potato Cakes Fried Without Oil in the FryLess 100K Radiant Fryer. Abstract # 152-23 Institute of Food Technologists Meeting. July 17-20, 2010. Chicago, IL.
12. P. Banerjee, **K.M. Keener**, V.D. Lukito, H. Fiock, and J.L. Jensen. 2009. Chicken egg white lysozyme activity in carbon dioxide solutions. Abstract #57-07 Institute of Food Technologists Meeting. June 6-10, 2009. Anaheim, CA.
13. Y. Yaniv, B.E. Farkas, and **K.M. Keener**. 2007. Mathematical modeling of infrared heating of a food matrix. Institute of Food Technologists Meeting. July 28-August 1, 2007. Chicago, IL.
14. **K.M. Keener** and K.D. Hayes. 2007. Developing problem solving skills through an industry supported case study course. Institute of Food Technologists Meeting. July 28-August 1, 2007. Chicago, IL.
15. S. Ghosh, **K.M. Keener**, and Y. Pan. 2005. Predictive Model for T₂ Data Precision and Accuracy using Standard Deconvolution Techniques. The 46th ENC Experimental Nuclear Magnetic Resonance Conference. Abstract #290. April 10 – 15, 2005, Rhode Island Convention Center, Providence, RI.
16. K.E. McCormick, K.S. Hauser, and **K.M. Keener**. 2005. Effects of Carbon dioxide and Carbonate on Lysozyme Activity in Chicken Eggs. Abstract T38. Poultry Science Association Annual Meeting. July 31-August 3, 2005. Auburn University. Auburn, AL
17. S. Ghosh and **K.M. Keener**. 2004. Quantitative, Non-invasive Characterization of Moisture Migration during Air-drying of Cheese Samples with Microstructural Variation. The 45th ENC Experimental Nuclear Magnetic Resonance Conference. Abstract #284. April 18–23, 2004, Pacific Grove, CA.
18. B. E. Farkas, B. J. Lloyd, and **K. M. Keener**. 2004. Numerical simulation of a radiant finish frying process. Institute of Food Technologists Annual Meeting. Abstract # 111-9. July 12-16, 2004. Las Vegas, NV.
19. Lloyd, B. J., B. E. Farkas, and **K. M. Keener**. 2003. Measurement of Spectral Emissivity from Infrared Sources. Institute of Food Technologists Annual Meeting. Abstract # 29D-5. July 12-16, 2003. Chicago, IL.

20. Conner, D.E., Kerth, L.K., Curtis, P.A., Kuhlert, D.L., Anderson, K.E., Foegeding, J.A., **K. M. Keener**. 2003. Growth of Salmonella Enteritidis in Shell Eggs as a Function of Vitelline Membrane Deterioration. Abstract # 224. Poultry Science Association Annual Meeting. Madison, WI. July 6-9.
21. McAvoy, K. C., J. B. Tharrington, **K. M. Keener**, P. A. Curtis, and K. E. Anderson. 2002. Comparison Methods and Testing Temperature for Internal Egg Quality Measurement. Session: Processing and Products – Poster. Abstract 357. Presented at the Poultry Science Association Meeting. August 11-14, 2002. Newark, DE.
22. Bashor, M. P., **K. M. Keener**, P. A. Curtis, and B. W. Sheldon. 2002. Effect of Carcass Washing Systems on Campylobacter Contamination in Large Broiler Processing Plants. Session: Processing and Products - Carcass Microbiology. Abstract 203. Presented at the Poultry Science Association Meeting. August 11-14, 2002. Newark, DE.
23. Li, M. and **K. M. Keener**. 2002. NMR Spectroscopy and Diffusion Studies on Processed Cheese. Session 15A-12. at the Institute of Food Technologists Annual Meeting. June 15-19, 2002. Anaheim, CA.
24. Li, M., **K. M. Keener**, and B. E. Farkas. 2001. Quality Assessment of Frying Oil by Quantitative Proton and Carbon-13 NMR Spectra. Session 14A-4 at the Institute of Food Technologists Annual Meeting. June 23-27, 2001. New Orleans, LA.
25. Li, M., **K. M. Keener**, and B. E. Farkas. 2001. Quality Assessment of Frying Oil by Quantitative Proton and Carbon-13 NMR Spectra. 115th North Carolina American Chemical Sectional Conference. April 21, 2001. North Carolina State University, Raleigh, NC.
26. Sabliov, C. M., B. E. Farkas, **K. M. Keener**, and P. A. Curtis. 2000. Cooling of Shell Eggs Cryogenic Carbon Dioxide: A Finite Element Analysis. 20th Annual Conference of the Institute of Thermal Processing Specialists, November 14-16, 2000. Arlington, VA.
27. Sabliov, C. M., B. E. Farkas, **K. M. Keener**, and P. A. Curtis. 2000. Heat Transfer Simulation of Cryogenic Carbon Dioxide Cooling of Shell Eggs. Fourth International Conference of Food Science & Technology, October 16-20, 2000. Wuxi, China.
28. Bottcher, R. W., **K. M. Keener**, R. W. Munilla, C. M. Williams, and S. S. Schiffman. 2000. Dust and Odor Emissions from Tunnel Ventilated Swine Buildings in North Carolina at the Second International Conference and Exhibition on Air Pollution from Agricultural Operations, October 9-11, 2000. Des Moines, IA.
29. Bottcher, R. W., R. W. Munilla, G. R. Baughman, and **K. M. Keener**. 2000. Design of Windbreak Walls for Mitigating Dust and Odor Emissions from Tunnel Ventilated Swine Buildings at the First International Swine Housing Conference and Exhibition, October 9-11, 2000. Des Moines, IA.
30. **Keener, K.M.**, J. D. LaCrosse, and J. K. Babson. 2000. Chemical Method for Determination of Carbon Dioxide Content in Egg yolk and Egg Albumen. Session 51G at the Institute of Food Technologists Annual Meeting. June 10-14, 2000. Dallas, TX. 38.
31. Sabliov, C.M., B. E. Farkas, **K. M. Keener**, and P. A. Curtis. 2000. Heat Transfer Simulation of Cryogenic Carbon Dioxide Cooling of Shell Eggs. Session 14A at the Institute of Food Technologists Annual Meeting. June 10-14, 2000. Dallas, TX.

32. Curtis, P., D. Larick, J. Rushing, **K. M. Keener**, L. Turner, D. Ward, D. Marshall, S. Wells, E. Moody, and R. Lambert. 2000. HACCP for Small Meat Processors. Session 73 at the Institute of Food Technologists Annual Meeting. June 10-14, 2000. Dallas, TX.
33. **Keener, K. M.**, R. W. Bottcher, R. D. Munilla, and G. L. Van Wicklen. 1999. Field Evaluation of an Indoor Ozonation System for Odor Control. North Carolina State University Animal Waste Management Symposium. January 27-28, 1999. Raleigh, NC
34. Bottcher, R. W., **K. M. Keener**, G. R. Baughman, R. D. Munilla, and K. E. Parbst. 1999. Field Evaluation of a Wet Pad Scrubber System for Odor and Dust Control. North Carolina State University Animal Waste Management Symposium. January 27-28, 1999. Raleigh, NC
35. Bottcher, R.W., **K.M. Keener**, G.R. Baughman, R.D. Munilla, and K. E. Parbst. 1999. Dust and Odor Control using Windbreak Walls. North Carolina State University Animal Waste Management Symposium. January 27-28, 1999. Raleigh, NC.
36. **Keener, K. M.**, L. Gwartney, A. Foegeding, and W. Kerr. 1998. The use of LR-NMR for the non-destructive characterization of whey protein isolate gels. International Conference on Applications of Magnetic Resonance to Food Science. September 7-9, Reading, England.
37. Bottcher, R. W., **K. M. Keener**, G. R. Baughman, R. D. Munilla, and K. E. Parbst. 1998. Windbreak Walls for Modifying Airflow and Emissions from Tunnel Ventilated Swine Buildings. Animal Production Systems and the Environment: An International Conference on Odor, Water Quality, Nutrient Management, and Socioeconomic Issues. Proceedings Volume 2 pg. 639-644. July 19-22, Des Moines, IA.
38. **Keener, K. M.**, T. A. Glenn, and C. R. Daubert. 1998. Vane Measurements in Food Products - Validity of Approach and Mixing Constants. Institute of Food Technologists Annual Meeting. June 20-24, Atlanta GA.
39. Heber, A. J., R. K. Duggirala, J. Ni, M. L. Spence, B. L. Haymore, V. I. Adamchuck, D. S. Bundy, A.L. Sutton, D.T. Kelly, and **K.M. Keener**. 1997. Measurement of Gas Emissions in Naturally Ventilated Swine Buildings. International Symposium on Ammonia and Odor Control from Animal Production Facilities. August 7-9, Vinkeloord, Netherlands.
40. **Keener, K. M.**, R. L. Stroshine, J. A. Nyenhuis, and B. L. Upchurch. 1997. Evaluation of PFGSE Measurements of D_w and CPMG Measurements of T_2 Taken with a 5.40 MHz, Low Resolution, NMR System for the Determination of Soluble Solids and Internal Defects in Granny Smith, Golden Delicious, and Red Delicious Apples. Nondestructive Techniques for Measuring the Quality of Fresh Fruits and Vegetables. Sponsored by USDA-CSREES and USDA-ARS. Proceedings pg. 183-197. February 18-21, Orlando, FL.
41. **Keener, K. M.**, R. L. Stroshine, and J. A. Nyenhuis. 1996. Proton Magnetic Resonance Measurement of Sugar Content in Aqueous Solutions and Soluble Solids Content in Fruit Juices. Frontiers in Carbohydrate Research - 5. Whistler Center for Carbohydrate Research. Poster Presentation. May 16-17, Purdue University, West Lafayette, IN.
42. **Keener, K. M.** and R. L. Stroshine. 1995. Teaching Module Developed on Thermal Properties of Agricultural Materials and Food Products. Oral Presentation. Physical Properties of

Agricultural and Biological Materials Workshop. July 18-22, North Carolina A& T, Greensboro, NC.

43. Stroshine, R. L., **K. M. Keener**, and L. Haney. 1994. Computer Aided Instruction on Topics for Courses in Physical Properties of Biomaterials. American Society of Agricultural Engineers Annual Meeting. Paper No. 94-3514. June 19-24, Charlotte, NC.
44. Stroshine, R. L., W. K. Wai, **K. M. Keener**, and G. W. Krutz. 1994. New Developments in Fruit Ripeness Sensing Using Magnetic Resonance. American Society of Agricultural Engineers Annual Meeting. Paper No. 94-6539. June 19-24, Charlotte, NC.
45. **Keener, K. M.** and R. L. Stroshine. 1994. Teaching Module Developed on Structure of Cells, Grains, Seeds, and Meat. Oral Presentation. Physical Properties of Agricultural and Biological Materials Workshop. July 26-30, Washington State University Pullman, WA.

c. Invited Research Presentations

1. Odor Characterization and Measurement. Presented at Professional Development Course for Wastewater Treatment Operators. Sponsored by North Carolina Section of American Water Works Association (NCAWWA). July 19, 2001. Durham, NC. Approximately 40 persons in attendance.
2. Cooperative Extension in North Carolina: Braswell Foods Example. Presented May 30, 2001 at the College of Agricultural and Life Sciences 2001 Administrative Retreat. Nashville, NC. Approximately 40 persons in attendance.
3. Processing of Shell Eggs and Their Safety. Presented May 9, 2001 at the Environmental Health Specialist Training Program. Raleigh, NC. 28 persons in attendance.
4. Food Irradiation- To Zap or Not To Zap. December 15, 2000. Presented to Liofol- a packaging adhesive company that manufactures food packaging adhesives. Cary, NC. Twelve persons in attendance.
5. Air Quality in Processing Plants – A Systems Approach. October 17, 2000 at the National Poultry Waste Management Symposium in Ocean City, MD. Approximately 80 persons attending.
6. Designing a Tubular Heat Exchanger for Rapid Product Cooling using Cryogenics. Presented September 19, 2000 at the Center for Advanced Processing and Packaging (CAPPS) Meeting in Sacramento CA. Approximately 40 persons attending.
7. Water Conservation. Presented June 13, 2000 in Jackson, MI at the Poultry Management School sponsored by the Mississippi Poultry Association. Twenty persons attended.
8. Temperature Measurement Devices and Their Calibration. Presented April 25, 2000 in Morehead City, NC to North Carolina Food Safety Extension Agents. Twelve agents attended.
9. Understanding the Principles of Temperature Measurement. Presented April 24, 2000 in Morehead City, NC to North Carolina Food Safety Extension Agents. Twelve agents attended.

10. Questions to consider when starting a Food Business. Presented February 28, 2000 at the Wake County Education Center, Raleigh, NC as part of the Entrepreneur Workshop. Approximately 30 persons attended.
11. Emerging Technologies – What consumers want to know. Presented February 10, 2000 at ServSafe Training Wake County Education Center, Raleigh, NC. Approximately 100 persons attending.
12. Food Irradiation: To Zap or Not To Zap? Presented March 10, 1998 in Aiken, SC to Citizens for Nuclear Technology Awareness (CNTA). It was attended by 165 people.
13. Food Irradiation: What does the consumer want to know? Presented September 21, 1998 in Raleigh, NC to North Carolina Food Safety Extension Agents. Seventeen agents attended the presentation.
14. Cryogenic Cooling of Shell Eggs. Presented March 13, 2002 to Triangle Chapter of American Society of Heating, Refrigeration, and Air Conditioning Engineers. North Carolina State University, Raleigh, NC. 10 persons.
15. The Emerging Science of Fat, Oil, & Grease (FOG) and its Impact on the Environment. September 1, 2004. United States Environmental Protection Agency. Washington, DC. 15 persons.
16. Presentation to Proctor and Gamble Company. Snack Food Division – Controlled Dynamic Radiant Frying. October 12, 2006. Cincinnati, OH. 8 persons.
17. Development of Technology for Improving Shell Egg Safety: Rapid Cooling, Hot Water Immersion, Humid Air Heating, Irradiation, and Microwave Heating. October 18, 2006. Indianapolis, IN. North Central Association of Food and Drug Officials Fall Conference. 75 Food and Drug Regulators from seven Midwestern states.
18. Dynamic Radiant Frying. Presented to Anderson Tool and Engineering. November 14, 2006. Anderson, IN. 5 persons.
19. Controlled Dynamic Radiant Frying for Breakfast Foods. Kellogg. March 22, 2007. Battle Creek, MI. 10 persons.
20. Fat, Oil and Grease (FOG) Blockages in Sanitary Sewer Systems. February 5, 2008. FOG Management Workshop. Raleigh, NC. 85 persons.
21. Composition of Fat, Oil, and Grease Blockages. April 8, 2008. Raleigh City Council Meeting (Raleigh, NC). FOG blockages and their suspected cause in sanitary sewers. 40 persons.
22. Characterization of Fat, Oil, and Grease Deposits. October 18, 2008. Water Environment Federation's Annual Technical Exhibition and Conference (WEFTEC) 2008: The Latest on Collection System Research. 60 persons. Chicago, IL.
23. Mechanisms Associated with FOG Accumulations in Simulated Sewer Lines. November 18, 2008. Indiana Water Environment Association Annual Meeting. 120 persons. Indianapolis, IN
24. Fat, Oil and Grease Deposit Formation. December 9, 2008. InSinkErator Company, Racine, Wisconsin. 8 persons.

25. Chemistry of Fat, Oil and Grease Deposits. April 2, 2009. InSinkErator Company, Racine, Wisconsin. 8 persons.
26. Application of In-Package Ozonation to Food and Pharmaceutical Products. May 5, 2009. Dublin Institute of Technology. Dublin, Ireland. 20 persons.
27. In-Package Ozonation of Food Products. May 28, 2009. Cryovac - Sealed Air Corporation. Duncan, SC. 15 persons.
28. Demonstration of In-Package Ozonation of Food. July 14, 2009. Research and Technology Development Center - Air Liquide Corporation. Newark, DE. 18 persons
29. In-Package Ionization of Food. February 1, 2010. FDA-Center for Food Safety and Applied Nutrition (CFSAN), College Park, MD. 15 persons
30. In-Package Ionization of Meat Products. February 9, 2010. Air Liquide North American Headquarters. Houston, TX. 12 persons
31. Demonstration of Sealed Package Atmospheric Cold Plasma for Meat Products. June 26, 2012. Kraft Foods. Purdue University, West Lafayette, IN. 8 persons.
32. Controlled Dynamic Radiant Frying of Fast Food. McDonalds Foods. December 16, 2010. Purdue University, West Lafayette, IN. 8 persons.
33. Controlled Dynamic Radiant Frying of Par-Fried Foods. Keystone Foods. February 5, 2010. Purdue University, West Lafayette, IN. 8 persons.
34. Food Finish Fryer for Convenience Foods. Henny Penny. June 18, 2012. Purdue University, West Lafayette, IN. 9 persons
35. Demonstration of Sealed Package Atmospheric Cold Plasma for Food Preservation. USA Science and Engineering Festival. April 27-29, 2012. Washington, DC. 1500 persons.

d. Books and Book Chapters (7 since 2002, 6 at Purdue)

1. **Keener, K. M.** 2003. Heat Transfer. In "Encyclopedia of Agricultural and Food Engineering". Editor D. Heldman. Marcel Dekker, Inc. pg 462-468.
2. **Keener, K. M.** 2007. Food Processing Regulations. In "Food Machinery Design". Editor M. Kutz. Food Machinery Handbook. M. Kutz, ed. William Andrew Publishing, Norwich, NY. Pg 15-43.
3. **Keener, K. M.** 2007. Atmospheric, Non-Equilibrium Plasma. In "Encyclopedia of Agricultural and Food Engineering". Editor D. Heldman. Marcel Dekker, Inc. 5 pg.
4. J.D. Ducoste, K.M. Keener, J. Groninger, and L. Holt. 2008. *Fats Roots, Oils, and Grease (FROG) in Centralized and Decentralized Systems*. Report No. 03-CTS-16T. 83 pg. Water Environment Research Foundation. Alexandria, VA. 22314. www.werf.org
5. **Keener, K. M.** 2009. Chapter 21 - Prevention and Control Strategies: Cleaning and Sanitizing Operations. In "Microbiologically Safe Foods" Editors: N. Heredia, I. Wesley, and S. Garcia. John Wiley and Sons, Inc. Hoboken, NJ. pg 415-434.

6. **Keener, K.M.** 2011. Chapter 462: Rodents, Birds, and Insects. In “Encyclopedia of Dairy Science, 2nd Edition. Editor E. Collins. Worldwide: Academic Press. Pg 540-544.
7. **Keener, K. M.**, Jensen, J. L., Valdramidis, V. P., Byrne, E., Connelly, J. A., Mosnier, J. P., & Cullen, P. J. (2012). Decontamination of Bacillus subtilis spores in a sealed package using a non-thermal plasma system. NATO-Advanced Research Workshop: Plasma for Bio-Decontamination, Medicine and Food Security. Heidelberg, Germany: Springer. Pg 445-455.

e. Patents and Inventions Disclosures

1. P.A. Curtis, **K.M. Keener**, K.E. Anderson, D. Connor, and L. Hughes. Chinese Patent No. 99811669.6. "Use of CO₂ Cooling in Treatment of Poultry Eggs". Issued 9/8/2003.
2. P.A. Curtis, **K.M. Keener**, K.E. Anderson, D. Connor, and L. Hughes. European Patent No. 1102542. "Use of CO₂ Cooling in Treatment of Poultry Eggs". Issued 10/19/2005
3. P.A. Curtis, **K.M. Keener**, K.E. Anderson, D. Connor, and L. Hughes. Canadian Patent 2,339,366. "Use of CO₂ Cooling in Treatment of Poultry Eggs". Issued 11/27/2007.
4. B. J. Lloyd, **K. M. Keener**, and B. E. Farkas. U.S. Patent 7,307,243. “Dynamic Radiant Frying Process to Produce Fried Foods.” Issued 12/11/2007.
5. **K.M. Keener**. “Atmospheric, Non-equilibrium Plasma Generation inside multi-laminate film layers”. Purdue Invention Disclosure filed 3/17/2010.
6. **K.M. Keener**, P.A. Klockow. “Atmospheric, Non-equilibrium Plasma Generation in a Sealed Package”. US Patent Applications filed 3/25/2010.
7. **K.M. Keener**, P.A. Klockow. “Atmospheric, Non-equilibrium Plasma Generation in a Sealed Package”. PCT (international) Patent Applications filed 3/25/2010.
8. **K.M. Keener**. Microwave radiant food finisher combination technology. Purdue Invention Disclosure. 12/6/2010.
9. **K.M. Keener** and J.L. Jensen. Generation of Microbiocide Inside a Package Utilizing a Controlled Gas Composition. 3/9/2012. WO/2012/125435.
10. **K.M. Keener** and P.J. Cullen (DIT, Ireland). Plasma Activated Wound Care System. 9/3/2012. PCT Application – (Joint Purdue-DIT).

f. Interdisciplinary Activities in Research

Dr. Keener has participated in a number of collaborative research projects with other departments and universities. He has provided food process engineering expertise on research projects with the following departments: Purdue University Departments of Animal Sciences, Agricultural and Biological Engineering, and Food Science; North Carolina State University Departments of Food Science, Poultry Science, Biological and Agricultural Engineering, Civil Engineering; Clemson University Department of Food Science and Human Nutrition; Auburn University Department of Poultry Science; and Dublin Institute of Technology, Dublin, Ireland. His collaborations are noted by a courtesy appointment in Purdue Department of Agricultural and Biological Engineering, and

adjunct faculty appointments in North Carolina State University Department of Poultry Science, and Clemson University Department of Food Science and Human Nutrition. He is internationally recognized as a subject matter expert (SME) in food process engineering and has provided expert opinion in numerous legal cases involving food manufacturing for both the U.S. government and private industry.

g. Graduate Student Involvement (*students at Purdue)

Students/ Graduation date	Thesis Title/Initial Employment	(Co-) Major Professor
<u>Brian Lloyd</u> Ph.D. 2002	Analysis of radiant heating to produce an alternative frying process/Process Engineer with Wyeth Vaccines	Co-Major FS and ABE
<u>K.C. McEvoy</u> M.S. 2002	Non-thesis /Sales Representative – GlaxoSmithKline Pharmaceuticals	Major FS
<u>Christina Sabliov</u> Ph.D. 2003	Cryogenic Carbon Dioxide Cooling of Shell Eggs - A Finite Element Analysis of Heat and Mass Transfer/Biological and Agricultural Engineering Faculty – Louisiana State University	Co-Major FS and ABE
<u>Michael Bashor</u> M.S. 2003	Effects of carcass washing systems on campylobacter contamination in large broiler processing plants: Product Development Scientist General Mills	Major FS
<u>Yifat Yaniv</u> M.S. 2006	Mathematical Modeling of High Intensity Infrared Heating of a Food Matrix: Ph.D. Student – North Carolina State University	Co-Major FS
<u>Supriyo Ghosh</u> Ph.D. 2007	Simulation, Network Modeling, and Imaging of Porous Media Drying: Research and Development Scientist - Bruker Optics	Major FS
* <u>Amy Biladeau</u> M.S. 2008	The Effect of Edible Coatings on Chicken Eggs Under Refrigerated Storage: Food Scientist – International Flavors	Major FS
* <u>Preetha Banerjee</u> M.S. (Dec) 2010	Characterization of Egg White Lysozyme Structure in Carbon Dioxide Solutions – Food Scientist – Kelloggs Company	Major FS

Current Students	Expected Graduation	Thesis Title	(Co-) Major Professor
* <u>Yi Chen</u> MS/Ph.D.	6/2015	Treatment of Alfalfa Sprouts with Atmospheric Cold Plasma for Bacterial Reduction and Shelf-life Extension	Major FS
* <u>Ximena Xeppez</u> M.S.	6/2014	Alteration of oil viscosity using Atmospheric Cold Plasma Treatment	Major FS
* <u>Kaitlin Kaczay</u> M.S./Ph.D.	12/2015	Dynamic Radiant Frying chicken products for reduced fat and calories	Major FS/ABE
* <u>Louis Nelson</u> Ph.D.	12/2013	Development of Radiant Frying Process for a Breaded Food Product – Process Engineer- Kellogg's Company	Major ABE

Student Committees	Thesis Title	Department
<u>Christina Moore</u> M.S. 2001	Development of time/temperature indicator tags for tracking poultry product quality throughout the cold chain	FS
<u>Kelly Connelly</u> M.S. 2000	Non-thesis: Characterization of analytes in odor emissions from swine animal buildings	FS
<u>Elizabeth Webb</u> Ph.D. 2003	Process control parameters for Skipjack tuna (<i>Katsuwonus pelamis</i>) precooking	Bio & Ag
* <u>Tarek Aziz</u> Ph.D. Dec 2009	Assessment of EPA 1664 Method and its Appropriateness for Quantification of Fat, Oil, and Grease in Food Waste	Civil, Construction, and Env. Eng (NCSU)
* <u>Jessica Butler</u> Ph.D. Dec 2012	Examination of Bacterial Loads and Process Management Strategies to Minimize Contamination in Poultry Chillers	Poultry Science (Auburn)
* <u>Corrie Whisner</u> Ph.D. May 2011	A Dietary Intervention to Study the Effects of Sucrose or Glucose and Fructose on Enamel Demineralization and Caries Risk	Interdepartmental Nutrition (Purdue)
* <u>Phil Sadler</u> M.S. May 2011	Inductively Coupled Heat Exchanger	FS (Purdue)
<u>J.D. McClurkin</u> Ph.D. 6/2013	Stabilization of Dried Distiller Grains Solids (DDGS) Atmospheric Plasma Treatment	(ABE)

h. Technical Staff: Post-Doctorate, Research Scientists, and Research Engineers (*staff at Purdue, 5 prior to 2002)

Extension Associate	Date	Support Area
*Deidre Bush	2005-2007	Assist with food entrepreneurship program
*Angie Honeywell	2007-2010	Provides assistance with creation of Environmental Compliance Center for Food Processors, technical assistance to food processors, and coordinating Extension Workshops

Post-Doctoral Associate	Date	Research Area
Ming Li	1999-2003	NMR and MRI investigation of Frying Oil Degradation

Research Scientist	Date	Research Area
Jonathan Rivin	2002-2003	Development of Analytical Methods for Characterization of Odors Interspersed with Particulate Matter
*Jean Jensen	9/2008-present	Development of Process Technology to Reduce Bacteria in Textured Beef Products
*Tim Dunaway	9/2009-6/2010	Evaluation of FOG blockages in sanitary sewers

Research Engineers	Date	Research Area
Lydia Kuykendahl	2004	Characterization of Gas Porosity of Chicken Eggs
*Abhijit Saxena	1/2006-12/2007	Development of Process Technology to Reduce Bacteria in Textured Beef Products
*Paul Klockow	2006-2008	Development of Non-Equilibrium Atmospheric Plasma Treatment for Raw and Processed Foods.
Ben Anderson	2011-present	Sealed Package Atmospheric Cold Plasma Treatment of Foods

3. Service on Editorial Boards:

Poultry Science (Associate Editor, 2006-2008)

Journal of Food Process Engineering (Editorial Board Member, 2006-2008)

Reviewer:

Journal of Agricultural and Food Chemistry

Journal of Biotechnology

Journal of Food Science

Transactions of the ASABE

Applied Engineering in Agriculture

Chemical and Engineering News

Journal of the Air and Waste Management Association

Journal of Food Processing Preservation

4. Service on Grant Programs:

Food Industry Energy Research (FIER) Grant Program (Reviewer)

International Science and Technology Center – Ukraine (Reviewer)

U.S. Civilian Research and Development Foundation (Reviewer)

USDA - National Research Initiatives Grants Review Panel (2005)

USDA - National Research Initiatives Grants (Reviewer)

EPA-SBIR National Research Grants (Reviewer)

United States- Israel: Bi-National Agricultural Research and Development Fund (BARD) (Reviewer)

California Energy Grants (Reviewer)

D. EXCELLENCE IN LEARNING

1. Courses Taught

a. Courses Taught (5 since 2002, 4 prior to 2002, * indicates at Purdue)

Course	Course Name	Credits	Students	Course Evaluation	Instructor Evaluation	Dates
*FS 361	Food Plant Sanitation	1	32	3.8/5	4.2/5	08/09-10/09
*FS 591A	Food Plant Sanitation (on-line)	3	2	N/A	N/A	08/09-12/09
*FS 591A	Food Plant Sanitation (on-line)	3	4	9/10	N/A	05/08-09/08
NCSU FS 495K	Food Plant Sanitation (on-line)	3	68	9/10	N/A	08/02-06/05
NCSU	Introductory HACCP	3	32	4.0/5	4.1/5.0	01/04-

FS 350						05/04
¹ NCSU FS 780	Food Science Graduate Seminar: Technical Writing and Technical Presentations	1	40	4.0/5	4.0/5.0	08/00- 06/02

¹Six out of 16 students won national research presentation awards after taking Dr. Keener's class

b. Guest Lectures (* indicates at Purdue, 9 prior to 2002, 17 since 2002, 13 at Purdue)

Course	Course Name	Students	Lecture	Date
*FS 341L	Food Processing I Labs (2 sections)	40	Food Processing Plant Waste	02/05/09 02/07/08 01/11/07
*FS 341	Food Processing I	40	Describing Food Processing Waste Treatment Systems	02/3/09 02/05/08 01/11/07
*FS 340	Introduction to Food Law and Regulations	35	HACCP and Prerequisite Programs in the Food Industry	01/28/09 01/29/08 01/11/07
*FS591F	Emerging Technologies in Food Processing	9	Food Technologies: Radiant Frying and Atmospheric, non-Thermal Plasma	10/15/08
PS 301	Evaluation of Live Poultry (NCSU)	32	Introduction to Poultry Processing/ Food Safety Programs in Poultry Processing	04/03/07 04/05/07
*FS 341	Food Processing I	40	Describing Food Processing Plant Waste	01/09/07
*FS 443	Food Processing III	40	HACCP and Food Processing	09/11/03
*FS 443	Food Processing III	40	Food Irradiation and its Long Term Potential in the United States	09/09/03
NCSU MDS 302H	Contemporary Science, Technology and Human Values	45	Food Irradiation: The Facts and the Fiction	02/11/03 9/19/02

2. Undergraduate Research Students

a. Undergraduate Exchange Student Researchers (5 since 2002, 4 at Purdue)

Exchange Student	Research Area
*Alvaro Chiriboga, Zamorano University, Honduras, 1/08-5/08	Measurement of CO ₂ uptake into shell eggs during rapid cooling using liquid CO ₂
*Willy Decurtins, University of Zurich, Zurich, Switzerland, 5/07-8/07	Lysozyme activity in chicken eggs
*Anne Spantzel, Frederick Schiller University, Jena, Germany, 10/06-3/07	Gas permeability of chicken egg membrane
*Sarah Ukariwo, Clafin University, Orangeburg, SC, 5/06-8/06	Evaluation of cryogenic cooling on shell eggs
Kristin Bjornsdottir, University of Reykjavik, Iceland, 5/02-8/02	Antimicrobial activity of chicken eggs

b. Undergraduate Student Researchers (55 since 2002, 14 prior to 2002, 28 at Purdue)

Student	Major	Research Project	Date
Iva Na	Food Science	Fat Oil and Grease Blockage Formation	2013-present
Elijah Whitney	Food Science	Radiant Frying Raw Potato Products	2013-present
Dongdong Ma	ABE	High Voltage Atmospheric Plasma Treatment of Raw Red Meat	2013 – present
Chelsea Ramsey	Food Science	In-package ionization	2010-present
Joshua Jackson	Food Science	Sealed Package Atmospheric Cold Plasma	2011-current
Erika Mendoza	Food Science	Fat Oil and Grease Blockage Formations	2011-current
Rebecca Kady	Food Science	Treatment of Meat Using Atmospheric Cold Plasma	2011-current
Bill Shafer	Food Science	Extending Frying Oil Life Using Natural Filter Media	2009-2011
Austin Donner	Food Science	In-package Atmospheric Cold Plasam	2008-2011
Holly Fiock	Business	Reducing Salmonella on Tomatoes using ANEP	2008-2010
German Rendon, Miladin Crnkovic Paul McCain	Chemical Engineering	Soybean Competition – Soy Based ‘Silly String’	2009
Stacey Konkle	Food Science	Quality measurement of lipid coated shell eggs	2007-2010
Elise Brown, Ryan Davis, Matt Smoker, Sabrina Stone	Ag & Bio Engineering, Food Science, Ag Econ	Development of Biodegradable Picnic Supplies Using Modified Corn and/or Soybean Proteins.	2008
Jeff Lai	ABE	Characterization of Contact Angle for sewer pipe materials	2008-2009
Erin Stefanuti	Food Science	Enhancement of egg white lysozyme activity using CO ₂ treatment	2007
Lita Katopo	Food Science	Non-equilibrium plasma treatment of spices for bacterial spore removal	2006
Amy Lee	Food Science	Non-equilibrium plasma treatment of chicken for bacteria removal	2006
Lee Chee (Alexis) Chong	Food Science	Non-equilibrium plasma treatment of flour for biotoxin removal	2006
Rosaline Rosaline	Food Science	Carbon dioxide treatment of egg albumen for lysozyme enhancement	2006
Aaron Pleitner	Food Science	Non-equilibrium plasma treatment of chicken for bacteria removal	2006
Wyatt Roth	Ag & Bio Engineering	Non-invasive detection of egg quality using NMR	2006
Tonomi Tanaka	Food Science	Development of a ready to eat deviled egg using liquid egg	2006

c. Purdue Undergraduate Research Abstracts (29 total abstracts, 24 at Purdue Undergraduate Research Symposiums (not shown), 5 at professional meetings – students underlined):

1. S.A. Shore, **K.M. Keener**, B.W. Sheldon, and J.J. Cuomo. 2005. Atmospheric Plasma Treatment to Eliminate Food Pathogens. Undergraduate Poster Session. ASAE Annual International Meeting. July 17-20, 2005. Tampa, FL.
2. **K.M. Keener** and M. Chen. 2007. Dielectric properties of chicken eggs and their components. Paper # 076102. ASABE Annual International Meeting. June 17-20, 2007. Minneapolis, MN.
3. E. McKenzie, P.A. Klockow, and **K.M. Keener**. Inactivation of on Spinach Using an Atmospheric, Non-Equilibrium Plasma (ANEP) System. July 1, 2008. Undergraduate Research Competition (**invited**). Institute of Food Technologists Annual Meeting. June 30-July 2, 2008. New Orleans, LA.
4. A. Donner, H. Fiock, J. Jensen, **K.M. Keener**. 2010. Inactivation of Salmonella *enteritidis* on Raw, Shell Eggs Using an In-Package Ionization Process. Indiana IFT Scientific Symposium. March 31, 2010. Food Science Building, Purdue University.
5. W. Shazer, A. Donner, J.L. Jensen, **K.M. Keener**. 2010. Reducing Bacteria on Fresh, Raw Cranberries using an In-Package Ionization Process. Poster Symposium. Advancing Manufacturing Summit IX: Creating Connections: The Importance of Building Business Networks. May 11, 2010. Purdue Memorial Union. Purdue University.
- 6.

E. CONSULTING (KEENER TECHNOLOGIES, LLC): (selected from over 50)

1. Scientific expert providing economic data on the impact of Food Safety Modernization Act (FSMA) regulations on specific food industry segments. (2012-13)
2. Scientific expert on the manufacture of pasteurized shell eggs – Evaluated patent claims in legal case between two pasteurized egg producers (2011-12)
3. Participated in FDA expert panel on impact of FSMA across food industry sectors (2011)
4. Air Liquide – Provided technical assistance in the design and evaluation of a liquid nitrogen food freezing tunnel that can meet European Hygienic Engineering Design Group (EHEDG) criteria (2010)
5. Consultant – FDA Task Order #6 – Food Traceability: Economic Subpanel Expert (2009)
6. Consultant for USDA-FSIS – Designed and developed 9-module on-line course on RTE not shelf-stable meat and poultry products for Food Safety Inspector Training (2008)
7. United States Humane Society – Provided food safety and poultry processing expertise (2006-2008)
8. Toffler and Associates – provided expertise on emerging food processing technologies to a global food company (2006-2007)
9. Technical consultant on in-shell microwave egg pasteurization project between Michigan Research Institute, Diamond Systems, and Illinois Institute of Technology (IIT). (2005-2006)
10. Oblon, Spivek, McClelland, Maier and Neustadt, P.C. – Expert witness in smoking of meat products. (2005-2006)
11. One of three scientific advisors for the USDA-FSIS Delegation to Tenth Session of Codex Alimentarius Committee on Meat Hygiene Meeting. Auckland, NZ February 16-20, 2004.
12. Consultant for USDA-FSIS survey studying the impact of Salmonella Performance Standard on meat and poultry processing plants. (2002-2003)
13. Consultant for USDA-FSIS survey studying the impact of Clostridium Perfringens Performance Standard on meat and poultry processing plants. (2002-2003)
14. Consultant for ONA Foods – potential risk from importation of SARS into Russia on poultry meat imported from China (2002-2003)

15. Consultant for ONA Foods – importer of U.S. poultry into Russia (> 200 million pounds per year). Visited Russian processing facility in Kaliningrad, Russia. Provided a food processing and safety audit of their operations. (2001-2002)
16. Provided food process engineering expertise in Federal Court Case – government regulations, processing equipment, food safety requirements, HACCP, etc. Expert witness for government. (2001-2002)
17. Provided food processing and biotechnology expertise on FDA survey of food processing plants and their use of genetically modified foods (2000)
18. Provided food process engineering expertise in Federal Court Case – government regulations, processing equipment, food safety requirements, HACCP, etc. Expert witness for industry. (2000)
19. Consultant for Committee on Environmental Health. December 2000. Technical Report: Irradiation of Food (RE0033). American Academy of Pediatrics. Committee Chair K. M. Shea. J. Pediatrics 106(6) 1505-1510. (2000)
20. Provide food safety auditing and food safety training for processing plants – HACCP, GMP's, SSOP's, thermal processing regulations (FDA and USDA), and HACCP verification. (1999)

F. EXCELLENCE IN PROFESSIONAL SERVICE

Departmental Committees (Purdue University only)

- Food Science Department Pilot Plant Committee (2012-present)
- Food Science Extension Position Search Committee (2012)
- Food Processing Position Search (2005)
- Food Processing Position Search Chair (2006-07)
- Department Head Review Committee (2006)

College/University Committees and Service (Purdue University only)

- Extension Council (2009-Present)
- Townsend Debate Judge– College of Agriculture (2009)
- PUCESA (2006-present)
- Purdue Undergraduate Research Symposium Judge (2006,2007, 2008,2009)
- Agriculture and Natural Resources CORE (2006-2008)
- Extension Strategic Planning (2008)
- Associate Dean and Director of Extension Search (2007)
- Consumer and Family Science CORE (2007-2009)
- Extension Cost Recovery Study (2006)
- New Ventures Team (2005-present)

National Committees

- NC-1023: Improvements of Thermal Processes for Foods (1997-present)
- S-1027 & S-292:: The Poultry Food System: A Farm to Table Model (1997-present)
- S-295: Enhancing Food Safety Through Control of Foodborne Disease Agents (1999-2006)
- SERA-IEG:- Southern Extension Research Activities Information Exchange Group (1999-2005)

National Committees with international impact

- National Poultry Waste Management Symposium (1999-present):
 - Co-Chair Processing Section: 1999-2003
- National Egg Processing Center (2009-Present)
- National Egg Products School (2003 – present)
- Scientific Advisory Panel for United Egg Producers (2010-present)
- [UEP is a cooperative that represents over 90% of U.S. egg producers]

International Committees

CODEX Committee on Meat Hygiene – United States Delegation – Non-government advisor, (2004-2006)

Council for Agricultural Science and Technology (1997-2005)

National Alliance for Food Safety and Security (2007-present)

- Associate Center Director for the Education and Outreach Center (2007-2008)

Professional Organization Service

American Society of Agricultural and Biological Engineers (1993- present)

- Agricultural Engineering Exam Committee, ASABE ED 414 Committee (2003-present)
- Food Processing Committee – FPE703 (1993-present), Chair (2001-2003), Vice-chair (1999-2000), Secretary (1998-1999)
- Member of Steering Committee-FPE02 (2000-present), Chair (2005-2006)
- Member of General Program Committee – FPE06 (2000-present),
- Member of Physical Properties of Agricultural Products Committee – FPE701 (1993-present), Chair (2001-2003), Vice-chair (1999-2001)
- Member of Fruit and Vegetable Post Harvest Operations Committee-FPE712 (1994-2009)
- Member of Environmental Air Quality Committee- SE305 (1996-2005)
- Member of Professional Engineering Institute of ASABE (1999-present)
- IAFIS-FPEI Award Committee (2005-2009)
- Representative for Food and Process Engineering Institute to Nominating Committee (2007-2008)
- Agricultural Engineering PAKS (P.E. Exam Review) Committee (2008-09, 2012-13)

Institute of Food Technologists (1997-present)

- Councilor for the Dogwood Section (1999-2005)
- FDA Task Order: Food Traceability – Economic Subpanel expert (2009)

Poultry Science Association (2001-present)

- American Egg Board Research Award Committee (2006-present)
- Ag*IDEA - Poultry Science Distance Education Task Force (2007-2011)