The activities of Cornell Food Science Extension showcased in this report demonstrate the remarkable resilience of this team, a term which implies not only persistence but also adaptation. This resilience was evident in the work of the COVID-19 Food Safety Response Team, recipients of CALS' 2021 Outstanding Accomplishments in Extension Award. The team’s popular “Food Industry Virtual Office Hours,” established early in the pandemic, were adapted and expanded by IFS@CU to address new industry questions in 2021, and expanded internationally through a USAID ‘Feed the Future’ grant.

Other new programs – including an online certificate program in Product Development (by the Food Venture Center), a Spanish Language Produce Safety Educators’ Group (by the Produce Safety Alliance), and workshop courses on technical writing and adulteration vulnerability assessment (by Dairy Foods Extension) – further reflect our Extension team’s adaptiveness to the changing needs of stakeholders, their resourcefulness, and their creativity.

We and the entire Cornell Food Science department are proud of an Extension team that has used their resilience to create a new manual, for a new decade. Professor Bailey would no doubt have approved!

Sincerely,

Carmen I. Moraru  
Professor and Chair  
Department of Food Science  
Cornell University

Gavin Sacks  
Professor and Associate Chair  
Department of Food Science  
Cornell University

The COVID-19 Food Safety Response Team received the 2021 Outstanding Accomplishments in Extension/Outreach Team Award.

From left to right: Louise Felker, Robert Ralyea, Olga Padilla-Zakour, Kimberly Bukowski, CALS Dean Benjamin Houlton, Elizabeth Demmings, Anika Gianforte, Samuel Alcaine, and Anna Katharine Mansfield

Not pictured, but also recipients of the award: Davis Blasini, Christopher Gerling, Nicholas Luongo, Ricardo Orellana, Thomas Saunders, Alexander Solla, Aljosa Trmcic, Martin Wiedmann, Randy Worobo, and Bruno Xavier
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Collectively, the Food Science Extension programs have a significant impact on the communities they serve. CALS recognized the efforts of the COVID-19 Food Safety Response Team, composed of members across multiple Food Science Extension programs, with the 2021 Outstanding Accomplishments in Extension/Outreach Team Award (see photo inside cover). The team received the award for its work in helping the food industry respond to COVID-19 and in tackling challenges caused by the pandemic.

One branch of that COVID-19 response was funded by the Feed the Future Innovation Lab for Food Safety and supported five low and middle income countries in Southeast Asia and Africa with fragile food systems. The project built an international task force to develop resources and host international virtual office hours to address questions on COVID-19. Dr. Jaya Kumar Gurung, a task force member and the Executive Director of the Nepal Development Research Institute, said: “We received positive feedback from food businesses regarding office hours and translated resources. They gave a clear understanding of myths regarding COVID-19 and helped food businesses a lot to avoid disruptions and in responding to a COVID-19 outbreak at their business.”

Working to Strengthen Connections with Local, National and Global Communities

Beyond continuing to support the food industry with challenges stemming from COVID-19, Food Science Extension programs practiced resilience in 2021 and worked to strengthen their connections with local, national and global communities. Food Science Extension accomplished this through teaching adult education programs, conducting applied research, holding one-on-one consultations with businesses and entrepreneurs, and providing client-based services.

New in 2021

The Produce Safety Alliance launched the Spanish Language Produce Safety Educators’ Group, which assists produce safety outreach and extension educators in staying up-to-date on the latest educational resources, training opportunities, regulatory updates, and produce industry initiatives.

The Dairy Foods Extension program added two new courses to their roster, SOP & Technical Writing and Intentional Adulteration Vulnerability Assessments, as well as Spanish-language versions of Dairy Science & Sanitation and HACCP. They are also offering two new client services: food defense plan and food safety culture assessments.

The New York State Sea Grant initiated and coordinated a Seafood Processing and Marketing Task Force, providing a platform for industry, agency and academics working in the seafood and seaweed space to work collaboratively and meet common goals. They developed a series of regulatory guides and supplemental topical resources to assist seafood and seaweed producers in New York get their products to market and navigate the complex regulatory framework.
Practicing Resilience and Connecting with Communities

Robin Waite, Research and Quality Director of New York State-based Perry’s Ice Cream Co., Inc., spoke directly of how the Dairy Foods Extension program has helped her company succeed: “From providing support while working with NYS Agriculture and Markets, and Federal regulatory agencies, Third Party Food Safety certification, and training programs for our staff members, Cornell Dairy Extension has made it possible for our company to meet the regulatory and food safety standards that are required to be competitive in a global marketplace.”

Brittany Burke, CP-FS, Food Safety and Quality Assurance from Wegmans Food Markets also praised the lasting impact of Food Science Extension programs, saying of the Cornell Sensory Evaluation Center’s customized workshops, “We are still finding value from the Sensory Workshops your team put on at Wegmans!”

Food Science Extension Programs Collective Output in 2021

Listed below are some additional highlights of how the Food Science Extension programs connected with the communities they served in 2021.

**Total Events**
- 266 Events Delivered or Presented
- 11,943+ Stakeholders Participated
- 70,757+ Total Contact Hours

**Adult Education**
- 86+ Courses Conducted
- 2,467+ Attendees/Participants

**Client-Based Services**
- 1,357 Businesses Served
- 8,970 Services Conducted
- 1,295+ Consultation Hours

**Applied Research**
- 39+ Research Studies Assisted

**New in 2021**

**The Cornell Craft Beverage Institute** launched a new online course, Good Manufacturing Practices for Cidery Owners and Operators.

**The Cornell Food Venture Center**, in collaboration with eCornell, completed and launched the Food Product Development Certificate program, which includes 5 courses that guide participants through the process of bringing a new food product or innovation to market.

**The Institute for Food Safety**, in collaboration with the PSA, Cornell Cooperative Extension and the University of Vermont, offered a new workshop for produce growers: Sanitation Operational Assessment and Writing a Sanitation SOP. The program also created a new webpage with supplemental resources on Cleaning, Sanitizing and Hygienic Design.

**Cornell Food Science Extension** welcomed 7 new team members to the Cornell AgriTech (Geneva, NY) and Cornell University (Ithaca, NY) campuses.
The Institute for Food Safety at Cornell University (IFS@CU) takes a comprehensive approach to providing training and conducting applied research to support the food industry in reducing foodborne illness risks. With expertise in fresh produce, dairy, juice and food processing, the IFS@CU aids the food industry in complying with federal regulatory requirements in the Food Safety Modernization Act (FSMA) and addresses food safety challenges that stretch from farms to consumers’ tables.

In 2021, the IFS@CU continued to deliver food safety curricula remotely with the on-demand and self-paced Good Manufacturing Practices (GMPs) Part 117 Online Course and five remote, instructor-led workshops on cleaning and sanitizing in fresh produce operations offered in collaboration with the PSA, Cornell Cooperative Extension and the University of Vermont. Additionally, the IFS@CU continued to host Food Industry Virtual Office Hours in the US (13 sessions) and supported the delivery of the series abroad in Bangladesh, Cambodia, Kenya, Nepal and Senegal (18 sessions).

Website: instituteforfoodsafety.cornell.edu
Contact: Nancy Long (foodsafety@cornell.edu)
The Cornell Institute for Food Systems Industry Partnership Program (CIFS-IPP) is a public-private partnership that facilitates and enhances the engagement of Cornell University faculty, staff, and students with industry scientists, technologists, and business leaders across complex global food systems. By combining expertise in scientific research, business economics, and industry practice, CIFS-IPP has a long history of finding solutions to today’s food systems challenges and shaping tomorrow’s discoveries.

The program continued to work in 2021 to advance industry practice with cutting-edge science to propel its food industry partners to the forefront of research, development, and technology. A key accomplishment for the year was the continued growth of the program’s corporate membership as CIFS-IPP welcomed three new industry members to the program.

A central focus of the program’s activities in 2021 was on supporting the food industry in its talent recruitment efforts to help ensure that people everywhere had access to nutritious, safe, and affordable food in the face of ongoing pandemic-related supply chain disruptions. The program resumed its annual Career Fair, offering students the opportunity to engage in person once again with corporate recruiters. Additionally, CIFS-IPP offered new virtual workshops with the assistance of its corporate partners to help prepare students at all degree levels for industry careers.

**Website:** cifs.cornell.edu

**Contact:** Rajni Aneja (ra283@cornell.edu)
The National Good Agricultural Practices (GAPs) Program has helped to ensure the safety of fruits and vegetables since 1999, by working with growers and packers to reduce microbial risks during growing, packing, storage, and transportation. Through a comprehensive education and extension program, National GAPs Program personnel facilitate the development of farm food safety plans to increase understanding and implementation of GAPs, as well as how they align with FDA’s regulations under the Food Safety Modernization Act (FSMA) Produce Safety Rule and third-party audit requirements.

Program personnel focus on in-person and online training to small and mid-sized farm and packing house owners, farm workers, beginning farmers, socially-disadvantaged farmers, small processors, and small fresh fruit and vegetable wholesalers. In addition, National GAPs Program personnel conduct needs-based research including evaluating microbial risks associated with soil amendments and water used during fresh produce production. Supporting growers, packers, and farm workers to effectively implement food safety practices helps to keep safe and wholesome produce available for consumers and maintain farm economic viability.

Website: gaps.cornell.edu
Contact: Michele Humiston (mmc15@cornell.edu)
The Produce Safety Alliance (PSA) provides fundamental, science-based, on-farm food safety knowledge to fruit and vegetable growers, packers, educators, regulatory personnel, and others interested in the safety of fresh produce. Established in 2010, the PSA is a collaboration between Cornell University, FDA, and USDA to prepare produce growers to meet the regulatory requirements in the Food Safety Modernization Act (FSMA) Produce Safety Rule (PSR). The PSA team trains and mentors PSA Trainers and Lead Trainers to ensure high quality courses are available globally so that growers can comply with the FSMA PSR training requirement in § 112.22(c).

In addition to its focus on effective training, the PSA team also provides technical assistance to growers and trainers. These efforts include the development of English and Spanish novel educational materials, supplementary training information, and one-on-one bilingual consultation. Helping the produce industry implement food safety practices protects consumers and ensures the economic viability of farms and rural communities. Recognizing that the produce industry is comprised of diverse growers from all over the world, the PSA team continues to expand accessibility to information through additional translations of its training manual. This includes Chinese, Portuguese, and Korean manuals, the development of illustrations for low literacy individuals, and updated policies that allow trainings to be extended to growers regardless of the language they speak or literacy level.

Website: producesafetyalliance.cornell.edu | es.producesafetyalliance.cornell.edu
Contact: Michele Humiston (mmc15@cornell.edu)

*Note: the data on this page represents training activities conducted by the PSA team, along with their national and international cadre of trainers, as a cumulative total since September 2016.

New illustrations have been developed to enhance PSA trainings, highlighting Good Agricultural Practices to reduce microbial risks as well as FSMA PSR requirements.
Cornell Food Venture Center (CFVC) provides comprehensive assistance to new and established food entrepreneurs, processors and farmers to enhance food safety, satisfy regulatory compliance and promote economic development. Services include scheduled process and process review validation for processed foods, laboratory services and consultation for product safety and stability, reduced oxygen packaging hazard analysis and validation, heat penetration studies, food classification letters, and training.

In 2021, the CFVC worked with over 750 food businesses to evaluate the food safety parameters of 2,200 samples and to approve 2,100 scheduled processes for food products. This paved the way for 1,700 new food products entering the marketplace, 1,400 of which were from first time producers. In addition, the CFVC’s Small-Scale Food Entrepreneurship Guide for Food Ventures was viewed more than 1,200 times.

Website: cfvc.foodscience.cals.cornell.edu
Contact: cfvc@cornell.edu
**CFVC Fruit and Vegetable Processing Pilot Plant**

The **CFVC Fruit and Vegetable Processing Pilot Plant** is a newly renovated facility that has the perfect combination of established food processing and preservation technologies with innovative equipment to promote the development and production of healthy, high quality foods. With a variety of equipment available, the CFVC Pilot Plant grants clientele the ability to make their final food product in the same location, from starting materials to the final packaged product. It also provides a unique setting allowing the comparison of different equipment and technologies utilizing the same materials to address the final quality and stability (shelf-life) of the food produced and to determine the best manufacturing process that meets the needs of each particular client. The CFVC Pilot Plant assists most clientele with research and development, scale-up trials, and start-up runs.

In 2021, the CFVC Fruit and Vegetable Processing Pilot Plant conducted product trials with 60 different clients. They assisted 10 clients with launching new products into the market and 6 clients with obtaining their New York State Department of Agriculture and Markets 20C Food Processing Licenses. In addition, Cornell faculty, staff, and students conducted a total of 13 research trials utilizing the state-of-the-art equipment located in the pilot plant.

**Website:** [cals.cornell.edu/cfvc-pilot-plant](cals.cornell.edu/cfvc-pilot-plant)

**Contact:** Roger Morse (rtml@cornell.edu)
Dairy Foods Extension’s mission is to provide comprehensive training and consulting to the dairy industry to assist in the sustainable manufacture of safe, quality dairy products. Courses provide training to dairy processors in vital topics including milk and dairy product quality and safety, basic dairy microbiology, GMPs, unit operations, sanitation, food safety plans, audits, and state and federal regulations. The program offers an extensive set of live and virtual workshops that lead towards certificates in fluid milk production, cheese production, ice cream production, and production of yogurt and other cultured dairy products.

In 2021, Dairy Foods Extension launched two new courses, SOP & Technical Writing and Intentional Adulteration Vulnerability Assessments as well as Spanish-language versions of Dairy Science and Sanitation and the program’s HACCP course. The program is also offering two new client services: food defense plan assessments and food safety culture assessments.

Website: cals.cornell.edu/dairy-extension
Contact: Louise Felker (lmf226@cornell.edu)
The Cornell Dairy Plant is an IMS-rated, New York State Department of Agriculture and Markets licensed, Kosher certified facility with 4,760 sq. ft. of processing area and over 10,000 sq. ft. of climate-controlled refrigerated and frozen storage. Capabilities include: fluid transportation, raw and pasteurized fluid milk storage, a computer generated batching system, HTST pasteurization, a homogenizer two-stage system, a cold milk separator, a yogurt room (minimum batch size 50 gal.), ice cream production and packaging (minimum batch size is 100 gal.), fluid packaging, and butter production and packaging (minimum batch size is 10 gal.).

In addition to producing products for Cornell and other campuses, the plant is designed to support Dairy Foods Extension efforts by providing a hands-on training facility to more than 200 industry professionals and students during an average year. Specific trainings that take place in the Dairy Plant include Dairy Science and Sanitation, Fluid Milk Processing for Quality and Safety, HTST and Vat Pasteurizer. The Cornell Dairy Plant is also used to conduct three department courses: Unit Operations and Food Packaging, Food Microbiology, and Food Systems Approach to Food Safety.

Website: cals.cornell.edu/cornell-dairy
Contact: cornelldairy@cornell.edu

82,895 gal. of Milk Bottled
80,225 lb. of Yogurt Produced
27,050 gal. of Ice Cream Produced
2,530 lb. of Butter Produced

3 Courses Offered
127 Students
The Food Processing Development Lab (FPDL) is a 6,000 sq. ft. pilot plant that serves as a statewide center for food and dairy processing education and training, product development, and cutting-edge food processing research. The facility is ideal for manufacturing test runs of new formulations, producing consumer samples, and testing the shelf-life of samples on a scale that mimics real production.

The FPDL is a licensed New York State dairy plant and meets all state and federal regulatory requirements for processing food for human consumption. It is equipped with a wide selection of pilot-scale equipment with capabilities including drying, evaporating, HTST and vat pasteurizing, separating, and packaging. The FPDL also maintains a cheese making area with various equipment. Experienced full-time professionals are able to assist in all aspects of development and processing.

**Website:** cals.cornell.edu/fpdl  
**Contact:** Robert Ralyea (rdr10@cornell.edu)
The Cornell Sensory Evaluation Center has served the Department of Food Science, the larger Cornell Community and a variety of businesses, large and small, since the early 1990s. Its mission is to provide learning opportunities to students interested in the fields of sensory and consumer research, to advance research in sensory evaluation, and to help businesses develop and improve their consumer product offerings through consumer and sensory testing.

The Sensory Evaluation Center conducts contract sensory evaluation and consumer product testing for commercial clients. It also offers consultations and custom learning experiences in all matters related to sensory product testing. The Sensory Evaluation Center supports the Food Science Milk Quality Improvement Program through its milk sensory panel, the Dairy Foods Extension program through teaching sensory modules within Dairy Foods Extension courses, the New York State Dairy Industry by preparing defective milk kits and providing consultation services, and other Cornell extension programs (e.g., the Cornell Maple Program, and the Viticulture & Enology Program) through sensory product testing.

In 2021, the Sensory Evaluation Center continued using its COVID-19 safe testing protocols and conducted numerous at-home and in-person studies, following all of the University, New York State and CDC public health guidelines.

Website: blogs.cornell.edu/sensoryevaluationcenter
Contact: Alina Stelick (ap262@cornell.edu)
**Cornell Craft Beverage Institute** provides resources to help winemakers and cider makers with important decisions from fruit sourcing and fermentation techniques to quality assurance and regulatory compliance. CCBI staff deliver extension support and research-based innovations to benefit growers, producers and consumers.

In addition to training and workshops, the extension program also offers services through the Cornell Craft Beverage Analytical Lab. Services include chemical, microbiological and sensory analyses of juice, wine, cider, beer, and distillates for quality assurance, troubleshooting and regulatory compliance.

**Website:** cal.s.cornell.edu/cornell-craft-beverage-institute

**Contact:** Cortni Stahl (ckm53@cornell.edu)

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The Vinification & Brewing Laboratory provides winemaking services to Cornell research groups and New York wineries.

- **15 Events Delivered or Presented**
- **634 Total Attendees/Participants**
- **12,896 Total Contact Hours**
- **252 Industry Clients Serviced**
- **2,800 Industry Samples Analyzed**
- **1,462 Research Samples Analyzed**
- **3,980 Individual Tests Conducted**
**Cornell’s Microbial Food Extension Lab** specializes in evaluating the microbial safety of fruit and vegetable processed foods and beverages. The lab offers services to conduct UV validations, product shelf-life studies, and microbiological analyses. In addition to analytical services, the team provides training and assistance to the food and beverage industries as well as state and federal inspectors. In 2021, they provided client-based services to 228 businesses for a total of 796 consultation hours.

**Website:** blogs.cornell.edu/worobolab/worobo-service-lab

**Contact:** Ann Vegdahl (acv45@cornell.edu)
High Pressure Processing Validation Center

The High Pressure Processing (HPP) Validation Center conducts cutting-edge research and tests HPP-processed food products requiring a validation to establish processing conditions that meet regulatory requirements. HPP is a non-thermal alternative to thermal pasteurization, allowing food products to maintain sensory qualities and nutritional characteristics that are often diminished in heat-treated products.

The HPP Validation Center offers three types of customized services, including validation studies to provide HPP processing conditions that meet regulatory requirements for pathogen inactivation; physicochemical evaluations to detail color, texture and overall product quality after varying HPP treatments; and microbiological shelf-life studies to evaluate variable HPP treatments of packaged products for spoilage bacteria, yeast and molds.

Website: cals.cornell.edu/hpp-validation-center
Contact: Andy Humiston (gah78@cornell.edu)
The New York Sea Grant (NYSG), a cooperative program of Cornell University and the State University of New York (SUNY), is one of 33 university-based programs under the National Oceanic and Atmospheric Administration's National Sea Grant College Program. Since 1971, NYSG has represented a statewide network of integrated research, education and extension services promoting coastal community economic vitality, environmental sustainability, citizen awareness and understanding about the State's marine and Great Lakes resources. The NYSG: Seafood Safety Training program works with the seafood industry to promote safe, sustainable production of high quality seafood by providing training and resources for consumers, producers, processors and fishermen.

In 2021, NYSG continued to offer virtual Seafood HACCP Segment Two courses. NYSG led four Seafood HACCP courses and assisted colleagues in delivering an additional five trainings, which resulted in a total of 145 participants earning their Seafood HACCP certification.

Website: nyseagrant.org/seafood

Contact: Michael Ciaramella (mc2544@cornell.edu)
For More Information

Department of Food Science Extension Programs
cals.cornell.edu/food-science/outreach-extension

TO CONTACT US
Sarah Lincoln
Cornell AgriTech
125 Food Research Lab
Geneva, NY 14456
sjl38@cornell.edu
315.787.2255