

# ACES MAGAZINE

COLLEGE OF AGRICULTURAL, CONSUMER AND ENVIRONMENTAL SCIENCES

VOLUME 11 | SPRING 2024

SPECIAL EDITION

## DISCOVERING VALUE-ADDED PRODUCTS

Ag researchers turn byproducts into profits for producers







### SKY'S THE LIMIT

NMSU's 164-acre agricultural district now includes the Food Science, Security and Safety Center, left, and Animal Nutrition and Feed Manufacturing Facility, right. Read more about the new facilities on Page 4.

Josh Bachman



# FROM THE DEAN

Greetings, alumni and friends of the College of ACES,

In this special edition of *ACES Magazine*, we focus on activities related to sustainable value-added agriculture – a top priority in the College of ACES. The priority has come to the forefront since last November, when we opened the Food Science, Security and Safety Center and Animal Nutrition and Feed Manufacturing Facility. These facilities weave together various components from our college that support value-added agriculture. This includes:

1. Hiring new faculty in bioprocessing engineering, food safety, and food and meat processing
2. Consolidating the Center of Excellence in Sustainable Food and Agricultural Systems
3. Outfitting our new buildings with state-of-the-art equipment
4. Obtaining final approval of our new Ph.D. program in food science

Together, these components are a game-changer. They will support and enhance agriculture in New Mexico and expand the reach of our researchers' work. Value-added agriculture is critical for the future of our state as it increases the use of alternative products and agricultural byproducts and creates new crops, industries and entrepreneurial activities.

We hope you enjoy the researchers and programs highlighted in this special issue. Thank you very much for your support.



Rolando A. Flores Galarza  
Dean and Chief Administrative Officer



Tomilee Turner



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Back: Govinda Sapkota analyzes wine samples in the Food Science, Security and Safety Center

*NMSU photos by Josh Bachman*



Tyler Gardner operates a conveyer belt in the new Animal Nutrition and Feed Manufacturing Facility, which houses state-of-the-art feed-mixing equipment used to create customized feed mixes for producers and researchers.

Josh Bachman

# MODERN EDGE

State-of-the-art facilities open doors to new learning opportunities

BY AMANDA BRADFORD

As her footsteps echo across the chilled metal surfaces of an enormous refrigeration room, Animal and Range Sciences Department Head Shanna Ivey leads a tour group through a wide doorway and into a classroom space where students in the College of ACES will soon have access to state-of-the-art training in food science and safety.

The new Food Science, Security and Safety Center, which Ivey and others in the college helped plan and design, is one of two facilities coming online this year as part of NMSU’s Agricultural Modernization and Educational Facilities project, funded by general obligation bonds approved by voters in 2018 and 2020. Construction on the center and the Animal Nutrition and Feed Manufacturing Facility across the street began in 2021, and a ribbon-cutting ceremony in November 2023 marked the completion of construction, though both buildings are still being outfitted with additional equipment. The bond projects also include a biomedical research facility that is under construction nearby and a student learning and outreach center that will begin construction soon.

The NMSU campus is unique among American collegiate campuses in that its agricultural district, which covers approximately 164 acres on the west side of the campus, is adjacent to the campus core. The last major facility added to the agricultural district was Skeen Hall, constructed in 1999 as the Center for Sustainable Development of Arid Lands.

“This facility catches us up – it allows us to be truly competitive with other schools and provide opportunities for students to stay here in New Mexico and learn food science,”

Ivey said. “There’s a lot of interest there and a lot of opportunity – particularly for our students who are fluent in multiple languages. It’s a big deal for our ag students to be able to have this background in food science.”

Once fully operational, the facility will also offer an additional revenue stream and student employment opportunities for the college, as it partners with local agricultural producers on everything from customized trainings for workers in their own processing facilities to harvesting, processing and selling fresh meats to the public through the Pistol Pete’s Premium Meats retail shop, which will be open to customers looking for locally raised meat products.

“This is the only USDA-certified facility in this part of the state, so producers who work with our facility can sell their product

anywhere in the U.S., and that’s significant to producers,” Ivey said. “We’re hoping to be a training site for people who want to start their own custom facility and for state meat inspectors. This offers a lot of opportunity for all kinds of teaching and training.”

The college has been planning and preparing for the new outreach and learning opportunities provided by the new facility by expanding its food science curriculum and faculty, bringing back its meat judging team, and developing trainings for agents and agriculture teachers interested in starting meat judging teams in their communities. The college hopes to launch a butcher certification program and other training opportunities that can help producers and professionals in the agricultural industry to grow their businesses and reach new markets.



Josh Bachman

The Food Science, Security and Safety Center provides space for researchers to work with producers on everything from customized worker trainings to harvesting, processing and selling fresh meats.



The building also houses lab space where researchers can explore food science topics and create and test value-added agricultural products, alternative manufacturing processes and unit operations, helping producers better understand how their practices, feed mixes and other factors affect the quality and quantity of their products.

Across from the food science center, the newly opened feed mill looms large in the campus skyline, clearly identifiable to passersby on Interstate 10. Though it's not quite the tallest building on campus, it stands out as a landmark and was the first of the ag modernization projects to come online.

Inside, the building's vast height provides capacity for enormous overhead bins that will be added later to store large quantities of different grain varieties. Already, the facility is manufacturing feed in smaller quantities to supply producers and researchers with customized mixes of feed. Ivey said the facility provides needed additional capacity for feed milling in the area, filling a gap locally and providing additional revenue for the college and hands-on teaching and training opportunities for students.

"We're preparing students who work with this equipment to be able to get these specialized jobs right away – and training on this newer technology was a gap for us, so this is a really important aspect of that modernization," Ivey said. "With all these new facilities, we have the ability for students to see all aspects of the livestock production chain, from conception to harvest. In addition, these are all public facilities, so they provide opportunities for producers and industry folks to work with us, opportunities for them to identify future employees among our students, and to have input in how we train our students – to be partners in that process."



Josh Bachman

Gardner loads grain onto a conveyer belt in the Animal Nutrition and Feed Manufacturing Facility. The feed mill was one of NMSU's first agricultural modernization projects to come online last fall.





College of ACES faculty member Ivette Guzmán is working to develop and implement a farm-to-cell methodology to measure value-added nutrients in vegetables and foods.

# BOOST in VALUE

## NMSU researchers turn to value-added agriculture to grow New Mexico's economy

BY CARLOS ANDRES LÓPEZ

**R**olando A. Flores Galarza is optimistic about the future of agriculture in New Mexico.

Even amid dwindling resources and persistent limitations, the dean of the College of ACES at NMSU knows that the key to a thriving agricultural sector requires innovations that keep more of the food and fiber supply chain in New Mexico. But to do so, he said, producers must lean into transforming raw materials into new finished products of higher value.

Researchers from all backgrounds in the College of ACES have long recognized sustainable value-added agriculture as a critical component of their work. But a new era has dawned with the addition of the Center of Excellence in Sustainable Food and Agricultural Systems and two newly constructed buildings in the agricultural district on NMSU's Las Cruces campus.

"Value-added is our initiative to grow New Mexico's economy by enhancing our capacity in the rest of the food industry," Flores Galarza said. "Our new facilities will provide an unprecedented boost to this sector, supporting direct-to-consumer marketing of beef, wine evaluation and new dairy products while providing outlets for agricultural byproducts."

The College of ACES has established research teams in the following value-added areas: nutraceutical and functional foods, specialty markets for meat and produce, food safety and security, textiles, agribusiness and agricultural supply chain entrepreneurship.

In one project, Ivette Guzmán, an associate professor of horticulture, is working to develop and implement a farm-to-cell methodology to measure value-added nutrients in vegetables and foods. Mean-

Josh Bachman





José Inéz Palma-Escamilla, right, with two of his students, Alvidrez López Ignacio and Limones Núñez. Palma-Escamilla, an ACES alumnus, was part of a research team that improved the sotol plant in northern Mexico.

while, in two separate studies, Clint Löest, a professor of animal science, is analyzing potential benefits of feeding chile pepper-processing waste to livestock. Elsewhere, other researchers are breeding chile pepper cultivars for mechanical harvest and

using ultra-high irradiance blue light to inactivate foodborne pathogens. “Innovations will come from the work of talented and creative researchers in the College of ACES, including new faculty in the meat, food and dairy sciences and those

affiliated with the Center for Excellence in Sustainable Food and Agricultural Systems,” Flores Galarza said.

Since 2019, Jennifer Hernandez Gifford, a professor of animal and range sciences, has given her students hands-on

training in value-added agriculture through the New Mexico Heritage Wool Project.

Hernandez Gifford and her students maintain the 75-head flock of sheep in NMSU’s West Sheep Unit. Each year, they use wool harvested from the flock to create and sell artisanal items. Their first two products generated enough profit to support the sheep and sustain the project.

“We take the animals through the entire production cycle every year, and that’s a huge value for our students,” she said. “Returns on investments in agriculture are typically very low. But this project shows students how to think outside the normal production cycle to extend profits.”

Many of the current value-added projects have the potential to bring economic windfalls to producers in New Mexico. But moving up the supply chain also presents challenges. This includes additional costs and increased risks, said Jay Lillywhite, assistant dean for economic development in the College of ACES.

“You have to be willing to take on new responsibilities,” Lillywhite said. “If you’re talking about vertically integrating into the supply chain, and you’re now not only a farmer but also a processor, you have new skills to develop and learn.”

Still, Flores Galarza is hopeful that the renewed emphasis on value-added products in the College of ACES will lead to industry-shifting breakthroughs. He pointed to NMSU alumnus José Inéz Palma-Escamilla and his pioneering work in the sotol industry in Mexico.

Sotol, an earthy spirit distilled from a desert succulent that grows in northern Mexico’s Chihuahua region, is a popular alternative to tequila and mezcal. But three



ACES students Iliana Rubio, left, and Michelle Gutierrez weigh wool harvested from sheep in NMSU’s West Sheep Unit. The wool will be milled, processed and turned into a product to support the New Mexico Heritage Wool Project, founded in 2019 by Jennifer Hernandez Gifford to raise awareness of New Mexico wool.

decades ago, a certain variety of sotol faced peril in its natural habitat.

Palma-Escamilla, a horticulturist and faculty member at the Universidad Autónoma de Chihuahua, learned of the plant’s plight in 1990 when he met a group of harvesters on a mountain range near his home. He saw dire conditions.

“It was really bad,” he said. “The natural habitat was being destroyed. It was overproduced and overworked. If we didn’t do anything, the plant would have eventually died out.”

From there, Palma-Escamilla devoted much of his career to restoring the plant for sotol production. Backed by funding from a private company, he went to work and assembled an interdisciplinary team of researchers, which included a fellow ACES alumnus, Alvaro Anchondo. The team spent the next decade trying to reproduce the plant with improved traits. By 2000, the researchers had successfully domesticated the plant, making it easier to grow outside steep mountainsides.

“Our research laid the groundwork for reproduction,” Palma-Escamilla said. “Nobody knew how to reproduce this plant, but we figured it out.”

No longer threatened, the plant today grows in abundance in the Mexican states of Chihuahua, Coahuila and Durango, where sotoleros produce more than 5,200 hectoliters of sotol each year.

Palma-Escamilla, who earned a Ph.D. in horticulture from NMSU in 2004, also continues to study the plant at the Universidad Autónoma de Chihuahua.

“It is wonderful to see Dr. Palma-Escamilla apply the knowledge he learned at NMSU to develop value-added products in Mexico,” Flores Galarza said. “His success is a testament to the College of ACES. We hope for similar successes as students and faculty work with our new resources to address the agricultural industry’s most pressing needs.”



# INNOVATORS *in* ACTION

Seven researchers in the College of ACES are at the forefront of sustainable value-added agriculture. Here's a snapshot of their groundbreaking work.



## Craig Gifford

► BoviPrime Health test

Bovine respiratory disease (BRD) continues to be the largest challenge facing the beef industry in the United States. Craig Gifford's lab at NMSU speculated that uncontrolled histone toxicity could be contributing to lung damage during BRD. Gifford's team developed a novel assay to determine an animal's ability to protect against histone toxicity and evaluated how the ability to protect against histone toxicity related to susceptibility to severe cases of BRD. Researchers found that cutter bulls that suffered severe cases of respiratory disease after arriving at the feedlot had reduced ability to protect against histone toxicity. A subsequent study was conducted in heifers and combined a measurement of another immune pathway, the complement system. Utilizing a ratio of both assays generated a value that was predictive of which heifers would suffer mortality in response to BRD. This novel marker was named BoviPrime Health. Gifford's team then worked with producers from the Tucumcari Bull Test to collect samples from bulls consigned to the Bull Test. Bulls were evaluated using the BoviPrime Health test to determine which bulls may be more likely to produce calves with increased resistance to severe cases of BRD. A patent has resulted from Gifford's research.



## Ivette Guzmán

► Development of Farm-to-Cell Methodology to Measure Value-Added Nutrients in Vegetables and Foods

Ivette Guzmán's project aims to develop and implement a simulated human digestion model to measure the health-promoting phytonutrients in value-added products, such as vegetables and food products, that are available for gut absorption, and align with traits, like flavor, that are important for consumer preference. This project is important for value-added products from the farm to the human cell because the human digestion protocol is the best way to measure the nutritional value of any vegetable in its raw form and also in its cooked or prepared form. The model identifies specific nutritional and medicinal compounds, and it is a good value-added indicator in terms of how healthy a crop is to humans. This project is examining chile and chile value-added products.



## Omar Holguin

► Investigating the metabolism of renewable traditional agronomic, specialty and alternative crops that can adapt to various abiotic stresses

Focusing on the potential of biobased compounds, Omar Holguin's laboratory investigates the metabolism of renewable traditional agronomic, specialty and alternative crops that can adapt to various abiotic stresses. Holguin's research team aims to identify and characterize the molecules responsible for, or contributing to, those adaptations. These molecules/natural products are often a source of bioactivity that can enhance human health and/or are in favorable industrial applications and as a source of value-added products or co-products. Holguin's lab leads in identifying value-added compounds compatible with New Mexico renewable feedstocks. His research involves many NMSU researchers and a network of regional and national labs, industrial partners, other academic institutions and, of course, ACES students.





### John Idowu

- ▶ Development and Adaptability of Glandless Cotton Varieties in New Mexico

John Idowu's project aims to develop new lines of glandless cotton and test their adaptability to New Mexico agroecosystems. In cotton production, a considerable amount of seed is produced, constituting more than 60% of the harvest. The presence of the poisonous chemical gossypol in conventional cotton seeds limits their suitability for human consumption and as animal feed for non-ruminant animals. However, glandless cotton seeds do not contain gossypol, thus expanding the utility of the seeds for aquatic animal feeds. They can also serve as a high-protein source in the human diet without any additional processing to remove gossypol. Three new cotton varieties that are gossypol-free, called "glandless cotton," have been successfully developed in New Mexico and tested for adaptability. These glandless cotton varieties will expand the utility of cotton seeds and add value to cotton production in New Mexico.



### Clint A. Löest

- ▶ Improving the Value of Chile Pepper-Processing Waste as Livestock Feed
- ▶ Using Chile Peppers to Reduce Inflammation and Improve Health of Livestock

Clint A. Löest's projects seek to identify potential benefits of feeding chile pepper-processing waste to livestock. The first project aims to increase the use of chile pepper-processing waste as livestock feed by evaluating effective methods of feeding management and chile pepper-waste preservation. The second project looks at the potential anti-inflammatory effects of the capsaicin in chile byproducts for cattle. These projects add value to a byproduct of the chile pepper-processing industry by increasing its value as a feed for livestock.



### Luis Sabillón

- ▶ Potential of UHI Blue Light to Control Foodborne Pathogen Contamination in Dry Food Processing Environments

Low-moisture foods have been increasingly implicated in foodborne illness outbreaks. The control of salmonella and *E. coli* contamination in dry food-processing environments represents a significant challenge. The Food Microbiology Research Laboratory has been exploring the use of ultra-high irradiance blue light to inactivate foodborne pathogens on food-contact surfaces by photochemical and photothermal means. In this study, researchers inoculated stainless-steel and cast-iron coupons with a five-strain cocktail of salmonella and *E. coli* O157:H7, which were then allowed to air dry. Then, they shined UHI blue light onto the dried suspensions of cells on the coupons to determine the most effective energy doses and wavelengths. The results showed that blue light treatments caused significant oxidative and thermal damage to microbial cells, resulting in substantial microbial inactivation levels.



### Stephanie Walker

- ▶ Breeding New Mexico Chile Cultivars for Mechanical Harvest

New Mexico green chile significantly contributes to the state's economy. However, the increasing expense and difficulty in sourcing sufficient field labor threatens long-term sustainability of the crop. To address this challenge, NMSU initiated research in traditional breeding methods to develop new efficient mechanical harvest chile cultivars with excellent flavor and quality. The first of these new cultivars, 'NuMex Odyssey,' was released to farmers in 2022. The use of cultivars improved for mechanical harvest, along with best harvest machines and production practices, will increase farmer profits and sustain New Mexico green chile production. These efforts promise to strengthen the state's agricultural landscape against mounting production challenges, ensuring the legacy of New Mexico green chile for generations to come.





NMSU students Laura Muñoz, far left, Sierra Chopito, second from left, and Joy Agbawodike, far right, work with visiting professor Victor Velazquez-Martinez, center, in the Food Science, Security and Safety Center.

# GAME-CHANGER

New buildings foster cutting-edge research that will benefit regional economies

BY ADRIANA M. CHÁVEZ

When the NMSU Center of Excellence in Sustainable Food and Agricultural Systems (CESFAS) began in 2019, it was envisioned as a university hub in the College of ACES to encourage transdisciplinary and collaborative activities, including research, teaching and outreach for sustainable value-added agriculture.

With the 2023 debut of the Food Science, Security and Safety Center, along with the Animal Nutrition and Feed Manufacturing Facility, faculty and students working in CESFAS are eagerly diving into several research projects that will benefit student education, agricultural science and regional economies.

“It’s a fantastic opportunity for us,” said Jay Lillywhite, who co-directs CESFAS. “We have had older facilities that we have used to the extent possible, but it is challenging to conduct cutting-edge research without cutting-edge equipment. These new buildings and equipment will allow us to improve student experiential learning and, at the same time, assist agricultural stakeholders throughout the state. It’s a game-changer.”

Lillywhite said the buildings will complement the center’s work. This involves developing meat-processor trainings, testing grape juice and wine, increasing the shelf-life of food products using micro-encapsulation, and exploring ways to better use agricultural byproducts.

Efren Delgado, who also co-directs CESFAS, said the new facilities provide additional opportunities to work in value-added agriculture while giving researchers more space and equipment to mentor students. A new Ph.D. program in food science would, when approved, allow more students to work in the buildings’ new laboratories, Delgado added.

“It’s a good opportunity for faculty to conduct research, but also as a teaching facility that allows students to have new resources,” he said.

The new facilities and equipment will also provide workforce development opportunities such as food safety and food-processing training.

“A lot of our commodities go out of state and come back to New Mexico consumers as ready-to-eat products at a higher price,” Delgado said. “This gives us an opportunity to collaborate on research with the food industry, so specific problems help in the development of new products and also support new businesses in this field.”

The research impact from the new facilities could potentially extend far beyond New Mexico, especially when coupled with research from NMSU’s Agricultural Experiment Station.



The Center of Excellence in Sustainable Food and Agricultural Systems has launched several research projects to benefit student education, agricultural science and regional economies.

“New Mexico’s agricultural growing regions are similar to other parts of the Southwest and the world,” Lillywhite said. “While our focus is on supporting New Mexico, much of the work we do can benefit other parts of the country and world.”

Lillywhite said he is grateful for the support of New Mexico lawmakers, taxpayers and others who have made the new facilities possible.

“It shows that the state is committed to this process of value-added agriculture,” Lillywhite said. “When you see a significant investment, it provides an environment where we want to work harder.”

Lillywhite and Delgado succeeded Natalie Goldberg and Priscilla Bloomquist, who developed the CESFAS framework and oversaw its initial projects.

For more information about CESFAS, visit [nmsu.news/CESFAS](https://nmsu.news/CESFAS).



# EXPANDING EDUCATION

## College of ACES launches the first doctoral food science program in New Mexico

BY TIFFANY ACOSTA

**F**eeding a growing global population is a significant challenge facing the food and agricultural sectors. Projections show that by 2050, food production will need to increase by 60% to 70% to feed a world population expected to reach approximately 9 billion.

“As a consequence, science-based improvements in food science and food systems are critically significant,” said Efren Delgado, department head for Family and Consumer Sciences and Extension Family and Consumer Sciences. “NMSU will become a leading Hispanic-serving institution in the food science, safety, engineering and technology fields, providing relevant education and research to the food production, processing and regulatory communities.”

The construction of NMSU’s new Food Science, Security and Safety Center and Animal Nutrition and Feed Manufacturing Facility has allowed the College of ACES to expand its educational offerings to include a new Ph.D. program in food science – an interdisciplinary field that combines chemistry, biochemistry, microbiology, physics, engineering, nutrition, biology



Govinda Sapkota, a postdoctoral researcher in the Department of Family and Consumer Sciences, works in the new Food Science, Security and Safety Center. The department has developed a new Ph.D. program in food science.

and math. Of the 45 food science graduate programs in the United States, only one is within 500 miles of Las Cruces.

“Our proposed Ph.D. program will allow us to serve underrepresented minori-

ties such as the Native American population in our state, which will differentiate us from Texas Tech,” Delgado said. “Currently, doctoral programs in food science do not exist in New Mexico, leaving interested NMSU



Efren Delgado, department head for Family and Consumer Sciences and Extension Family and Consumer Sciences, helped develop NMSU’s new Ph.D. program in food science.

graduates and New Mexico residents to pursue such a degree out of state.”

Delgado, who co-directs the NMSU Center of Excellence in Sustainable Food and Agricultural Systems, said the Ph.D. program aims to meet the needs of employers in New Mexico by providing advanced training in food science and offering advanced degrees to Native Americans, Hispanics, other minorities and first-generation students. It also seeks to transfer research-based information and technology to consumers, food companies and government agencies; train students for teaching, research and industry careers in food science that do not currently exist in the state; prepare students for leadership positions in the food industry, academia

and government; and offer a research-based teaching and learning model.

Delgado added that the Ph.D. program will establish working ties with various public and private sectors engaged in food production and improve collaborations between academia and private industry that provide technical assistance to regional food processors.

The U.S. Bureau of Labor Statistics predicts overall employment of agricultural and food scientists will grow by 6% over the next decade, faster than the average for all occupations.

The program will offer undergraduate students majoring in food science and technology a chance to continue their

studies and gain professional development and career advancement. The coursework will build students’ cultural employability skills, research networks, leadership abilities, cultural competencies, self-efficacy beliefs, ethics, and scientific writing and data-mining capabilities.

Students will conduct competitive national and international research that aims to solve critical problems across food science and technology and food safety. After completing the program, students will graduate with the ability to apply scientific research to develop technology for the rational use of natural resources.

To learn more about the program, visit [fcs.nmsu.edu](https://fcs.nmsu.edu).



# Extension food specialist helps ‘bring science to life’

BY ELIZABETH MCCALL

When Nancy Flores was a student at NMSU, she followed the College of ACES motto: “Bring science to life.” A 1988 graduate, she has practiced this phrase throughout her career.

After graduating from NMSU with a bachelor’s degree in animal science, Flores interned at a meat-processing company, a role that allowed her to further her research. She received a master’s degree in food science and nutrition from the University of Missouri-Columbia and then worked for Oscar Mayer Foods in Iowa. She returned to NMSU in 1995 to work as an Extension associate in food technology.

“Before this position, I had no experience in Extension, but I was a food safety trainer at Oscar Mayer Foods,” she said. “I knew how to teach people with direct applications for hygiene and best practices in a food-processing environment, so becoming an Extension educator was natural.”

This experience as an Extension educator encouraged Flores to return to school. After receiving a Ph.D. in meat science from Kansas State University, she accepted a position at NMSU as an Extension food technology specialist, which she has held since 2001.

As someone who educates and assists food entrepreneurs and companies, Flores is grateful to see NMSU developing new facilities for students. She believes the Food



Science, Security and Safety Center and Animal Nutrition and Feed Manufacturing Facility will serve to produce more academic achievement and leadership regarding the global issues of food safety and insecurity.

“I have always loved the NMSU campus and faculty and staff who support

the mission of the land-grant university,” she said. “The new buildings are great assets that will help to develop a strong ACES culture in the local community. Students will use the facilities to make, develop and test new products. It will be a source of innovation and student success.”

# Food scientist works to develop efficient systems and products

BY TATIANA FAVELA

With a focus on developing innovative, efficient and effective food-processing and packaging systems, John Floros has extensive experience in leading the type of research that will benefit from the new state-of-the-art facilities on NMSU’s Las Cruces campus.

“They will facilitate our fundamental work in food chemistry, food microbiology, sensory science, food processing and food engineering,” said Floros, a professor of food science and technology in the College of ACES. “The state-of-the-art pilot plants will provide opportunities for us to scale up our basic findings into more applied results that could be used directly by the New Mexico food industry to increase the value of our primary agricultural production.”

Floros’ research focuses on improving the value, quality, safety and shelf-life of food products while advancing methodology for better processes and packaging systems. His goal is to help the food industry in New Mexico grow and become more profitable, sustainable and competitive.

“My projects have addressed the understanding and modeling of several complex physicochemical and biochemical phenomena that occur during food processing and food packaging, and the development of many food manufacturing operations,” he said. “We hope every citizen in New Mexico will benefit by having broader access to a



higher-quality, safer and more affordable food supply.”

Floros, who served as the president of NMSU from 2018 to 2022, said the new facilities allow researchers to address some of the most significant issues facing the food system today, which include sustainability, water use, energy consumption, value-addition, cost, palatability, food waste, food safety, health and wellness, availability, shelf-life and other areas. They will also be a game-changer for undergraduate and graduate research and learning, he added.

“The new facilities will elevate the quality, breadth and depth of the education, teaching and training we provide to our students,” he said. “Our outreach and Extension efforts will also benefit because we will be better equipped to train industry, government and regulatory personnel with new cutting-edge technologies through workshops, short courses, hands-on technical conferences, Extension training and other means.”



# Researcher uses a non-additive approach to improve ice cream

BY TATIANA FAVELA

In food science, it's all about striking the right balance between theory and practice. For Sergio Martinez-Montea-gudo, finding that perfect ratio makes his research “sweet-er” in a safer way.

“One distinctive feature of food science is having a sense of fundamental knowledge and real-world applications,” Martinez-Montea-gudo said. “Without the right balance, desirable skills – such as problem-formulation, problem-solving and critical thinking – become much more daunting to develop.”

Martinez-Montea-gudo is an associate professor in the Department of Family and Consumer Sciences and the Department of Chemical and Materials Engineering at NMSU. His appointment also supports the Center of Excellence in Sustainable Food and Agricultural Systems.

“I am working on new technologies to manufacture ice cream with improved creaminess and reduced melting without the addition of synthetic additives,” he said. “More specifically, my work involves applying acoustic technologies – ultrasound and cavitation – that are known to create several fluid dynamics phenomena.”

As Martinez-Montea-gudo works to improve popular frozen treats, he follows a non-additive approach, a method that has generated attention nationwide.

“The ability to obtain desired creaminess and slowed melting of ice cream by



controlling the molecular modifications of ingredients will allow commercial manufacturers to eventually phase out of using additives,” he explained. “For instance, Blue Bunny and Perry’s Ice Cream have formalized a research agreement to develop this concept further.”

Another aspect of Martinez-Montea-gudo’s research involves upcycling. And he believes the new Food Science, Security and Safety Center will provide more opportunity for researchers to transform waste into valuable new materials.

“Overall, the generation of waste and byproducts is ubiquitous throughout the entire agricultural chain. Instead of going to the landfill, these materials can be turned into value-added products, such as fine chemicals, micronutrients, ingredients and additives,” he said. “The new Food Science, Security and Safety Center is one of a handful of facilities of its kind in the world. It will provide the opportunity to create a more sustainable agriculture within a trans-disciplinary environment.”

# Meat science professor strives to educate future leaders

BY ELIZABETH MCCALL

Although Las Cruces is far from Francine Mezzomo Giotto’s hometown in Concórdia, Brazil, she is happy to begin her journey as a meat science professor in the College of ACES.

“I feel so privileged to represent this institution and plan to work hard to support NMSU’s mission to improve the lives of New Mexicans while educating the next generation of industry and educational leaders,” Mezzomo Giotto said.

Inspired by her father, who worked for a food-processing company, and her mother, an agricultural educator, Mezzomo Giotto attended Centro-Oeste State University, where she received a doctor of veterinary medicine. But rather than take the traditional career path that most veterinarians follow, she decided to continue her education and become a professor.

Mezzomo Giotto eventually received a master’s degree in animal production from Maringá State University and a Ph.D. in animal science from Londrina State University. At Londrina State, she received an opportunity to study abroad at the University of Nevada, Reno, and it was there that she earned a four-year scholarship to pursue a second Ph.D., this time with an emphasis in meat science and food safety.

“An important aspect in my decision to join NMSU is that it serves a multicultural population, and I immediately felt embraced,” she said.



NMSU’s new state-of-the-art facilities, which boast ample space for meat science education, also factored into Mezzomo Giotto’s decision to join the College of ACES. She plans to use the Food Science, Security and Safety Center to conduct teaching, research and Extension activities.

“The new facility is a dream come true for me, NMSU, stakeholders and the community,” she said. “The facility will

enable me to provide the best teaching experience for my students while exposing them to research that addresses industry and farmers’ needs. In addition, it will help me strengthen collaborations with NMSU and other national and international institutions to promote the development of value-added agriculture and support the economic development of New Mexico.”



# New facilities bring meat program into 21st century

BY CARLOS ANDRES LÓPEZ

**D**ina Chacón-Reitzel remembers when beef fabrication classes were among the most popular courses at NMSU. With the new Food Science, Security and Safety Center and Animal Nutrition and Feed Manufacturing Facility on the Las Cruces campus, she's eager for the meat science program at her alma mater to return to its former glory – and for New Mexico's agricultural economy to reap the benefits.

“When I was in the ag college, they had to limit the number of students in the beef fabrication classes,” she said. “Once again, we have state-of-the-art facilities to give hands-on experiential opportunities to all students at New Mexico State.”

Chacón-Reitzel, who sits on the NMSU Board of Regents, has long supported efforts to modernize NMSU's agricultural district. She serves as the executive director of the New Mexico Beef Council, which helped outfit NMSU's new Meat Science Laboratory, a component of the Food Science, Security and Safety Center.

“This project will have an immense impact,” she said, “and our new ag facilities will serve as an economic driver for the



Dina Chacón-Reitzel, center, and staff from the New Mexico Beef Council attend the ribbon-cutting ceremony for NMSU's new Food Science, Security and Safety Center and Animal Nutrition and Feed Manufacturing Facility in November 2023.

College of ACES, NMSU and the state for years to come.”

Chacón-Reitzel pointed to the benefits of the Meat Science Laboratory, which has the capacity and equipment to harvest

and fabricate custom cuts of meat, including beef. Historically, she explained, New Mexico lacked cattle-harvesting plants, which forced producers to send their animals to other states for processing. That



The New Mexico Beef Council and the Texas-based Caviness Beef Packers supported efforts to modernize NMSU's agricultural district through financial contributions.

meant lost revenue for the state and additional costs for producers, she said.

“The new meat lab changes that by providing custom harvesting services to help New Mexico producers enter the value-added beef market,” she said.

Chacón-Reitzel said the new food science center, coupled with a new meat science faculty member, brings NMSU's meat science program into the 21st century. She noted that students will get hands-on training in raising livestock on NMSU ranches, fabricating beef in the Meat Science Laboratory, and selling products in the New Mexico Beef Council-sponsored store, Pistol Pete's Premium Meats.

“That's the entire supply chain,” she said. “For students to have that kind of education is just superior. The innovative research and hands-on learning will benefit students and the agriculture industry – which is a win-win for the state and Beef Council.”

## With help from Caviness family, NMSU educates future meat processors

BY ELIZABETH MCCALL

**C**aviness Beef Packers, a Texas-based, family-owned business, strives to encourage future meat processors, which is why the Caviness family contributed to the development of new agricultural facilities at NMSU.

“We just like collaborating with eastern New Mexico and West Texas universities that have programs that are involved in meat processing since that is our business,” said Trevor Caviness, the president of the company. “We like to help hopefully bring up the next generation of bright, young folks who can contribute to our industry, and what better way than to support the local universities that have great programming?”

In 1962, Pete Caviness established Caviness Beef Packers, and in 1969, his son, Terry, joined the family business. Terry's son, Trevor, then joined in 1998, followed by another son, Regan, who joined in 2002. Terry is currently the company's CEO, and Regan serves as its vice president.

Today, the company operates at two locations and processes approximately 2,900 cattle each day.

The family believed NMSU's initiative to build new facilities for the College of ACES was a vital step for student success in the meat-processing industry. They encouraged the development of the Food Science,



Terry Caviness, left, and his son, Regan, toured the Food Science, Security and Safety Center and the Animal Nutrition and Feed Manufacturing Facility in September 2023.

Security and Safety Center and the Animal Nutrition and Feed Manufacturing Facility through a financial contribution.

With these new resources, Trevor said, NMSU is advancing its educational programs and becoming a leader in the meat-processing industry.

“We took a tour of the facility, and it looked great,” Regan said. “We are glad to see that NMSU has a new state-of-the-art processing facility to train future students.”



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