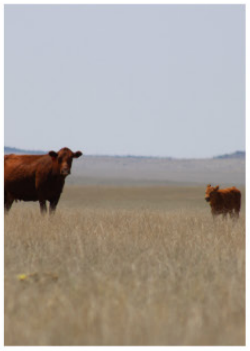
NM STATE

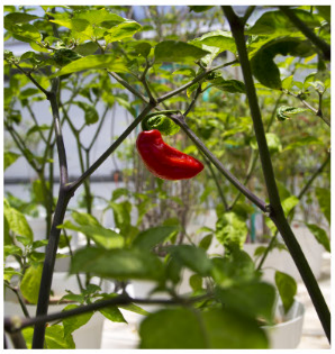
**College of Agricultural, Consumer and Environmental Sciences**
New Mexico State University

# 2024 Annual Report



NM STATE

BE BOLD. Shape the Future.
**College of Agricultural, Consumer and Environmental Sciences**



# Preamble

I'm delighted to present to you this annual report for 2024 from the College of Agricultural, Consumer and Environmental Sciences. In reading these pages, the reader will appreciate the breadth of the work that is conducted in the college, and also its full commitment and loyalty to our mission—to be an engine for economic and community development in New Mexico, improving the lives of New Mexicans through research, teaching, and extension.

Through this report, we hope you will glimpse the extent of our many activities related to these three areas of effort, in Las Cruces and at other campuses, at the agricultural science centers, and throughout the state. The tremendous effort that the faculty, staff and students make in the college of ACES does not go without recognition and impact. It reverberates in the lives of New Mexicans.

I hope you have the opportunity to read through these pages. Every year, I appreciate anew the amount of work that our college does. This is true not only in terms of the research that is conducted, the courses that are being taught to students, the educational offerings to New Mexicans in general, or the new programs and new PhD programs—but also in terms of the work that has been done to attract extensive funding into various areas of the college.

Please take the time to look through this report and enjoy it. We take pride in our teamwork and cherish our state and our partners. We are the land grant institution for all New Mexicans.

**Rolando A. Flores Galarza**
Dean and Chief Administrative Officer
College of Agricultural, Consumer
and Environmental Sciences
New Mexico State University

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# ACES Mission

The ACES College is an engine for economic and community development in New Mexico, improving the lives of New Mexicans through research, teaching and extension.


## Special Thanks

We gratefully acknowledge the combined efforts of the College of ACES, faculty, staff and students, as well as the 2025 ACES Annual Report Committee, including: Amy Muise, Cherylin Atcitty, Claire Montoya, Heber Lara, John Campbell, Julie Hughes, Karlei Olivarez, Karim Martinez, Laura Bittner, Marcus Krohn, Omar Holguin, Shelby Herrera, and Yesenia Palma.

# ACES Executive Summary, 2024

In 2024, our college continued a strategic focus on its core mission areas, organized around the ACES Pillars: Food and Fiber Production and Marketing, Water Use and Conservation, Family Development and Health of New Mexicans, and Environmental Stewardship. The college is committed to serving students, families, and all New Mexicans and ensuring that all participants can fully engage in their chosen educational, outreach and scholarly pursuits and feel a sense of belonging as individuals and community members. Through student recruitment, retention, preparation and placement, development of new academic programs, evaluation of existing academic programs, and increased global offerings, the college supports the land-grant mission of New Mexico State University and provides a holistic framework for advancing the College's academic programming. By continually strengthening relationships with counties and tribal communities, expanding educational resources, and fostering economic development,

ACES supports economic, educational, and community development in collaboration with more than 1,000 organizations, state and federal agencies, other universities, and 10,000 volunteers, through the Cooperative Extension Service. The college provides frameworks, research, and technical assistance at the county level to help organize access to the vital services essential for families to thrive, the mission of the Anna, Age 8 initiative. Through the Center of Excellence in Sustainable Food and Agricultural Systems (CESFAS), ACES supports industry partnerships, student development, research, and outreach, strengthening New Mexico's agricultural economy, communities, and intellectual property, and provides hands-on learning opportunities for students, research competitions, and digital learning initiatives to help produce a skilled, innovation-driven workforce. This includes engaging with the community and addressing critical local challenges, conducting needed sales and policy analyses, expanding understanding of commercialization opportunities, supporting efforts to reduce food insecurity, spreading food safety learning, and identifying areas for partnership and collaboration in New Mexico food and fiber supply chains.

# 2024 ACES Awards

The ACES Awards Selection Committee voted on the 2024 faculty and staff nominations that were submitted for our distinguished awards. The award winners are listed below.

*Fabiola Cabeza de Baca Diversity in Extension Award*
**Robert Hagevoort**

*Leyendecker Agriculturist of Distinction Award*
**Vince Hernandez**

*ACES Team Award*
**ACES IT**
**(Marcus Krohn, Carlos Herrera, Robert Jobe, Debi Janer, Brian Hinds, Emmanuel Gutierrez)**

*Charles Tharp Farms Distinguished Service Award*
**Barbara Hunter**

*Distinguished County Extension Agent Award*
**Dianne Christensen**

*Distinguished Cooperative Extension Service Award*
**Susann Mikkelson**

*Distinguished Professional Staff Award (Exempt Staff)*
On Campus: **Marcus Krohn**
Off Campus: **Brenda Weatherford**

*Distinguished On Campus Staff Award (non-exempt)*
**Autumn Martinez**

*Distinguished Teaching Award*
**Madhav Regmi**

*Malone Farms Distinguished Staff Award (non-exempt)*
Off Campus: **Maria T. Nunez**

*Mobley Family Endowed Distinguished Research Award*
Research Early/Mid-Career: **Rajan Ghimire**

*Outstanding Global Work Award*
**Richard "Rich" C. Pratt**

Awardees selected by the Departments:

*Family & Consumer Science Industry Leader Award*
**Merranda Marin**

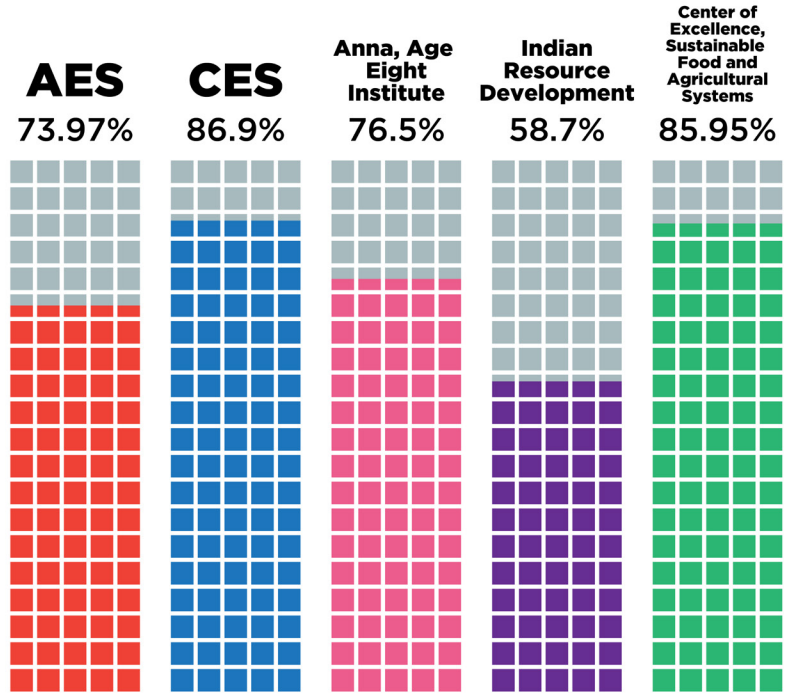
*Outstanding Family & Consumer Science Teacher Award*
**Aldemar Madrid**

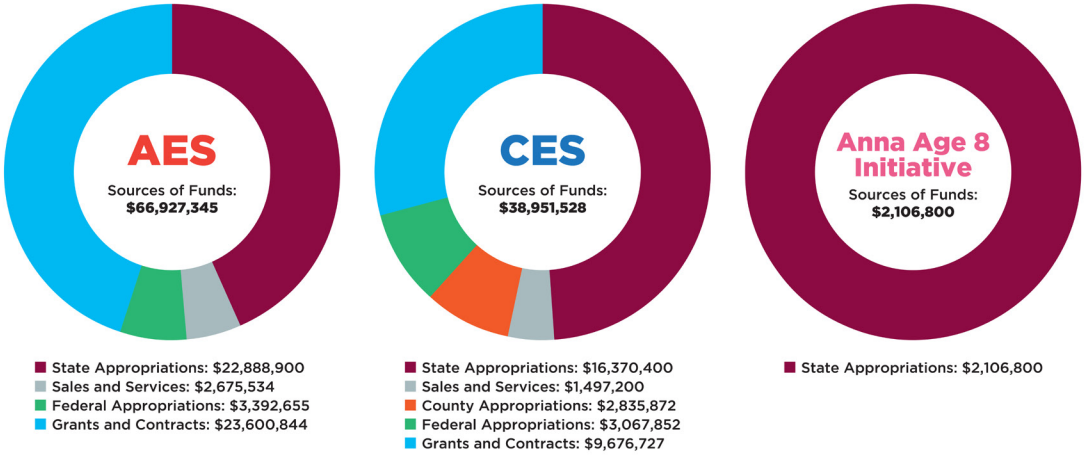
*Outstanding 4-H Agent Award*
**Savannah Daniels**

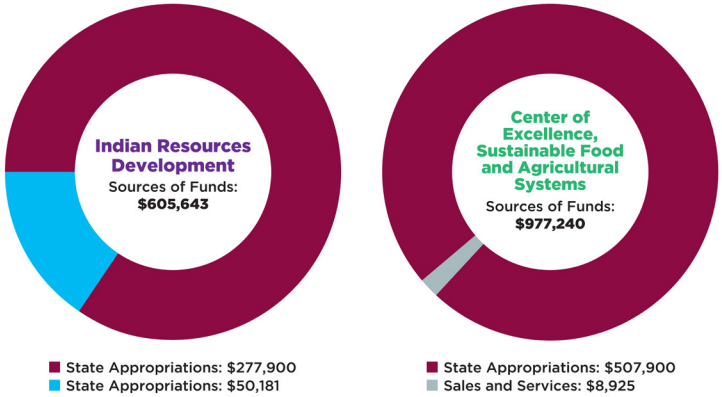
*School of HRTM Industry Leadership Award*
**Starvanna Locante**

# College of ACES

## Report of Actuals
## Las Cruces Campus FY2023-2024

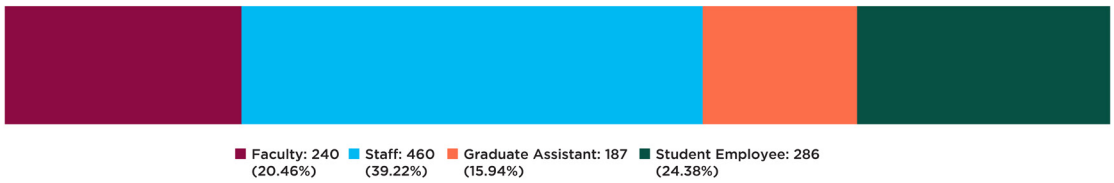


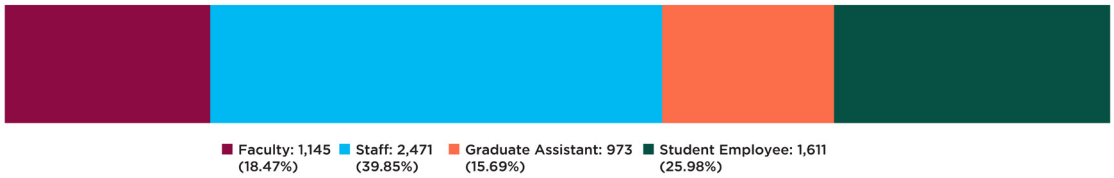



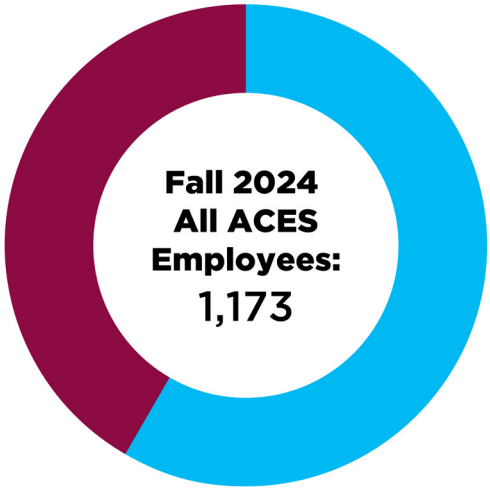

*Includes Funds for Future Reforestation Center

## College of ACES
Employee Demographics

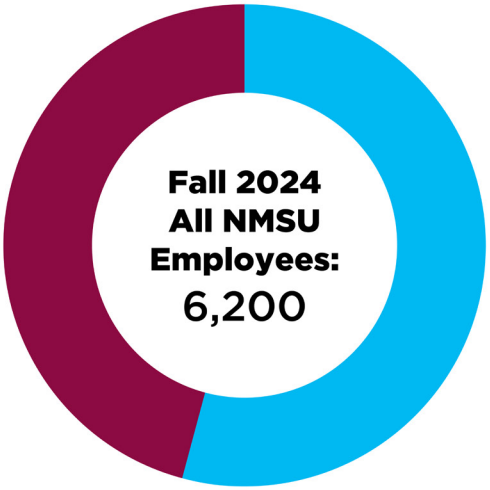



## NMSU
Employee Demographics



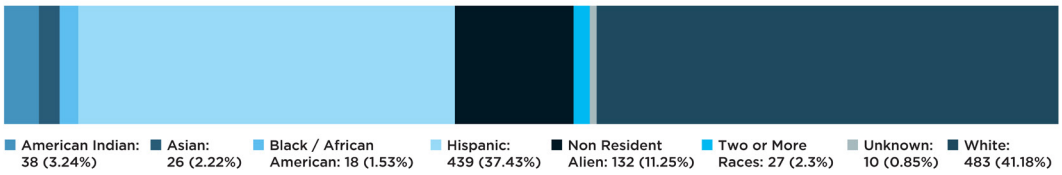




Female: 689 (58.74%)
Male: 483 (41.18%)

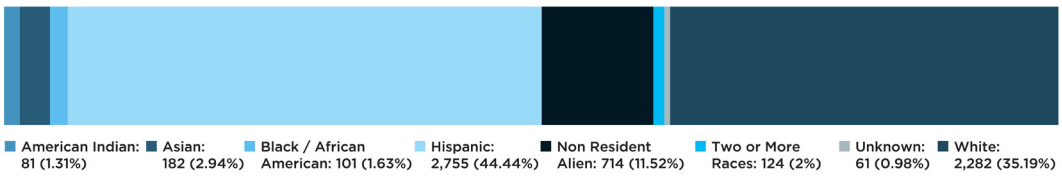



Female: 3,350 (54.03%)
Male: 2,849 (45.95%)

## College of ACES
Employee Demographics




## NMSU
Employee Demographics




## Executive Summary

In 2024, the ACES Academic Programs Office continued to strategically focus on its core mission areas of student recruitment, retention, preparation and placement. Additionally, a process to evaluate the entire ACES academic portfolio was initiated in which each department began evaluating their curricula to ensure students attain the needed knowledge and skills for future career success upon graduation. In support of advancing the College's academic and research missions, two new PhD programs were developed and approved, and ACES offerings for NMSU Global increased in 2024. The outcome of these academic efforts will help chart the direction and ultimate success of ACES academics well into the future. Other accomplishments were related to facilitating and promoting the success of our students, faculty and ultimately, the College of ACES. These accomplishments directly support the land-grant mission of New Mexico State University and provide a holistic framework for advancing the College's academic programming.

# Selected Accomplishments

## 1. Student Recruitment and Retention

Student Recruitment and Retention. As part of strategic focus on its core missions  of student recruitment, and retention, Academic Programs reached out to potential students through print, digital, and social media; participation and visibility at key state, regional, national and international events; linkages and support of 4-H and FFA youth development programs; college tours, visits and events; partnerships with community colleges; offering of dual credit ACES courses; and personal contact and communication. Overall, ACES enrollment increased slightly in 2024 at both the undergraduate and graduate levels.

This past year, we strengthened ties with the Cooperative Extension Service (CES) to increase the visibility of ACES academic programs in all NM counties. These efforts expanded beyond the existing Aggie Next Step program. For the county and state CES newsletters, a recruitment message was provided each month. Additionally, NMSU recruitment videos were shared with all CES offices, as were updated NMSU recruitment materials.

The ACES Ambassadors continued to be an integral part of the overall ACES student recruitment efforts. The 2024-25 cohort of Ambassadors included 17 members who represent four different ACES Departments. Interestingly, five Ambassadors are from Arizona

primarily through high school presentations, participation in key events in NM, AZ and CA, support of College of ACES events such as Homecoming and the Sam Steel Induction Ceremony, and social media posts.

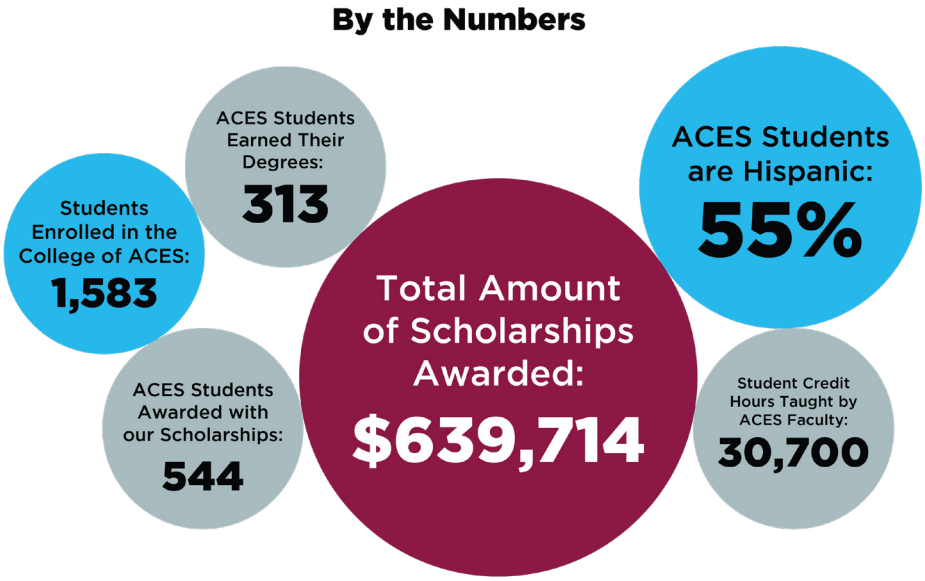
ACES Academic Programs continued to strengthen efforts to retain our students and prepare them for success during their studies and upon entry into their career paths. The faculty in the College of ACES provided a wide range of experiential learning opportunities to students, including hands-on learning, internship/pathway programs and international involvement. ACES also provided excellent leadership and connection for our students through student organizations, including one of the newest organizations, Minorities in Agriculture, Natural Resources and Related Sciences (MANRRS). Overall, ACES had approximately 20 student organizations in 2024. In addition to student clubs, the College sponsored a number of events through each semester to engage students and instill a sense of belonging. Many of these events brought in ACES alumni and engaged NMSU as a whole.

One of the College's stronger retention efforts was the availability of student success courses offered at the college level. These support courses were:

**ACES 1120 New Student Orientation**
**ACES 1210 Financial Fitness**
**ACES 1220 Academic Excellence**
**ACES 301/305 Leadership/Advanced Leadership**

The overall goal of this array of the courses was to equip student to succeed in their academic pursuits, build leadership skills, and grow professionally.

Another retention effort was our scholarship program. In 2024, ACES provided $639,714 to more than 540 ACES students. This funding generally was beyond any financial aid provided centrally by NMSU.




## 2. Evaluation and Improvement of ACES Academics Programs

With the completion of Hanover Research studies in early 2024, the College of ACES began guiding the departments through an evaluation and potential revision of each of their academic programs (e.g., undergraduate majors and graduate programs). This ongoing process proceeded well and was complementary to NMSU's assessment and accreditation efforts. Additionally, three departments developed and submitted proposals for new doctoral degree programs: Food Science (FCSC), Human Dimensions of Agriculture (AXED) and Applied & Agricultural Biology (EPPWS). The Food Science and Applied & Agricultural Biology proposals were fully approved, while the Human Dimensions of Agriculture gained NMSU support but will have to be revised and resubmitted for state approval in 2025.

Additionally, 2024 was a development year for the College of ACES with NMSU Global. In January of 2024, the College of ACES had four programs offered through NMSU Global: Bachelor of Science in Hotel, Restaurant & Tourism Management, Bachelor of Science in Human Development and Family Science, Master of Science in Family and Consumer Sciences, Hotel Restaurant and Tourism Concentration, and the Master of Arts in Agricultural and Extension Education. The Master of Agriculture in Domestic Animal Biology launched in August. Development of a Master of Science in Family and Consumer Sciences, Food Science and Technology Concentration, and the Master of Agriculture, Agribusiness progressed well in 2024 and will launch in 2025. In addition to the degree programs, several other courses and minors were also developed for the NMSU Global audience. Departments across the college developed plans and strategies to propose additional offerings for NMSU Global.

Evaluating and modernizing the ACES academic portfolio, while under consideration for some time, became a primary focus for our ACES academic programs in 2024. The outcome of these academic efforts will help chart the direction and ultimate success of ACES academics well into the future.

## 3. Student, Faculty and College Success

The success of the College's academic efforts is a direct reflection of the success of ACES students and faculty; therefore, support and promotion of our people and College remained a strong motivation in 2024. To complement students' academic progress, some support of professional growth opportunities was provided for students. With financial support from the NMSU Student Success office, some students were provided with travel support to conferences and events. ACES participation in AG-NGINE, a multi-university graduate student recruitment effort, was initiated in 2024. Throughout the year, ACES students, staff and faculty participated in numerous industry and scientific events. The Academic Program Office served as the main contact for the promotion and tenure (P&T) process in the College. In terms of the latter, the P&T calendar for the 2024-2025 cycle was revamped. In total, these selected efforts help support student and faculty success in ACES.

## Selected Academic Updates

### AEAB

Enrollment saw a significant increase in 2024. Undergraduate enrollment increased 25%, while graduate enrollment increased 55%

### ANRS

Undergraduate enrollment continued to grow, with an increase of 7% in 2024. The department continued strong linkage with the Texas Tech Vet School, and at present there are 23 New Mexicans in the Texas Tech program. An NMSU Global masters program in Domestic Animal Biology was developed and launched.

### AXED

A new PhD in Human Dimensions of Agriculture was developed and approved by NMSU. Full approval is expected in 2025.

### EPPWS

A new PhD in Applied and Agricultural Biology was developed and fully approved. Recruitment for this program is ongoing.

### FCSC

A new PhD in Food Science was developed and fully approved. Recruitment for this program is ongoing. The department rebranded from the Sam Steel Café to ACES Coffee and Gifts and increased marketing and foot traffic in this highly visible storefront in GTH.

### FWCE

Undergraduate enrollment increase 4.8% in 2024 and the department is now mentoring over 40 graduate students. A proposal for a new PhD program was initiated from submission 2025. FWCE hosted a Natural Resources Career Fair, which included a weeklong residency week where numerous professional development workshops were available for students and faculty.

### HRTM

Virtual Reality headsets, along with other technologies, were piloted in HRTM 2130, Hotel Operations. Eight faculty members completed the NMSU Course Development Institute and Quality Matters for nine courses to ensure high standards for their coursework.

### PES

Engaged several of the Agricultural Science Centers in the state to provide experiential learning experience for their students.

### Agricultural Education and FFA

Increased FFA participation in NM to 5,326 students in 91 chapters. Promoted 235 unique careers among participants. Held three major statewide events, each of which drew 600–1,400 youth participants.

### NMSU Rodeo

The team average GPA was 3.2, with eight student athletes earning a 4.0 GPA. Fifteen members of the team qualified and competed in College National Finals Rodeo in Casper, WY. Based on home states of 2024 team members, six of the fourteen western states are represented on NMSU Rodeo, and all NMSU colleges are represented, also.


## Looking Ahead

In concert with the priorities of NMSU, the College of ACES will emphasize student recruitment and retention and look at innovative ways to improve both efforts. In 2025, the academic departments will likely begin to finalize evaluation of their curricula and propose any needed changes that will improve learning outcomes, career preparation, and appeal to a wider range of today's students. It is anticipated that the overall outcome will be a more efficient and relevant academic portfolio in ACES.


## Bridging Borders: NMSU Expands Agricultural Partnerships in Mexico

In 2024, NMSU's College of ACES made significant strides in strengthening its ties with Mexico, forging academic collaborations, securing scholarships, and expanding student recruitment. These efforts have positioned NMSU as a key player in international agricultural education, creating new opportunities for students and institutions alike.

## Expanding Academic Networks

January set the foundation for engagement, with ACES collaborating with the NMSU Foundation to start conversations regarding the creation of the Fabián García Chapter, NMSU's first Mexican alumni network. Meetings in Chihuahua and Casas Grandes paved the way for stronger ties, while faculty from UACH and NMSU discussed dual-degree programs in food science, ecology, and wildlife management.

By February and March, outreach continued with institutional visits, including a key discussion with CONAHCYT in Mexico City on scholarship funding, emphasizing NMSU's ability to support students in their pursuit of graduate and post-graduate degrees. Talks with the University of Coahuila introduced research collaboration opportunities for graduate students.

## Securing Scholarships & Training Initiatives

April brought a major development when ACES staff met with Mexico's Secretary of Agriculture to revive a grant program that previously trained Mexican agricultural extensionists. The proposal gained traction, with new leadership assigned to explore the program's reinstatement.

In May, ACES secured 15 scholarships through IMEBECAS for Mexican and Mexican American students, while a partnership with CBTa 90 Agricultural High School led to five students

enrolling at NMSU. June saw recruitment efforts ramp up, with two students from Ciudad Juárez sponsored to attend Youth Ranch Management Camp, where one committed to joining NMSU's Animal Science program.

## Expanding Industry & Government Collaborations

### Building Industry Partnerships & Recruiting Future Leaders

In October, ACES engaged directly with students at ExpoGAN, where two graduate students were recruited for animal science programs. Discussions with the National Women Cattle Growers Association centered on establishing a scholarship for women in agriculture, ensuring greater access to higher education.

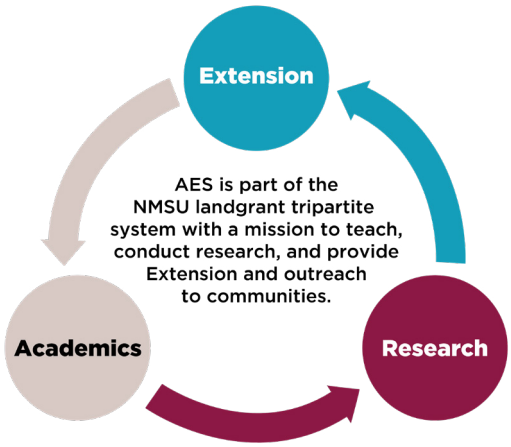
A total of 12 students from Chihuahua were recruited.

## Looking Ahead

With formal agreements in place and recruitment efforts thriving, NMSU's presence in Mexico is stronger than ever. These initiatives continue to open pathways for students and professionals, fostering international collaboration and ensuring agricultural education remains accessible to future generations.


## Executive Summary

The Agricultural Experiment Station (AES) is a fundamental part of the land-grant university system. The AES system involves scientists at NMSU's main campus and 12 agricultural science centers (ASCs) across the state. These centers serve as outdoor research facilities, reflecting New Mexico's diverse geography and environment. Their research supports the state's varied landscapes, farms, ranches, forests, and communities, both rural and urban.




The AES supports more than 370 full-time equivalent positions, made up of faculty, support staff, professional positions, and students. Faculty researchers conduct research at the NMSU main campus or one of the ASCs off-campus. The science centers provide critical infrastructure for researchers and students to conduct agricultural experiments in real-world settings that reflect the agricultural and natural resource diversity that is found in New Mexico.

# Agricultural Science and Research Centers

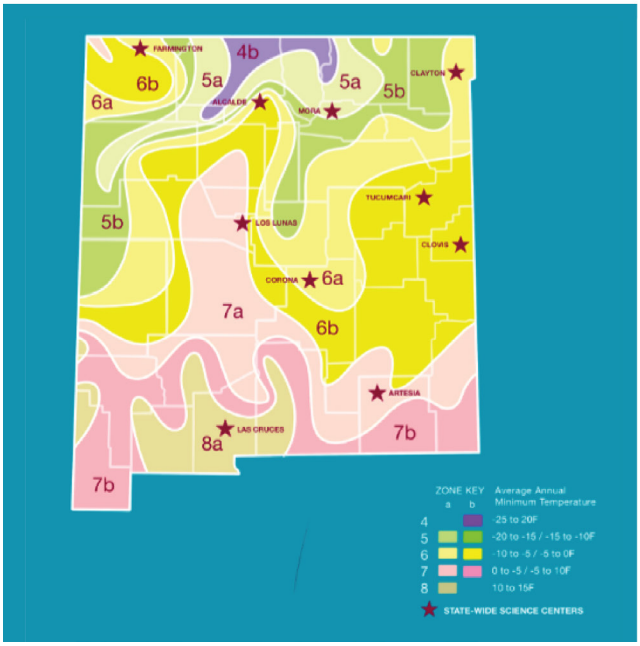
**Sustainable Ag Science Center at Alcalde**: Located in north-central New Mexico to serve as a resource for small-scaleproducers (most farms in the area are under 100 acres). Researchprograms focus on native and high-value crops for sustainableagriculture including jujube cultivars, saffron, cover cropping in winter and spring, and acequia irrigation.

**Artesia Ag Science Center**: Located in the heart of ag production for southeast NM and plays an instrumental role in solving issues facing producers in the area. Research is focusedon soil issues as it pertains to fertility and water salinity. The center is also at the forefront of insect pest infestations. In the near future, the ASC plans to add agrohydrology as an additional focus.

**Chihuahuan Desert Rangeland Research Center**: The facility is utilized by NMSU faculty, students, and collaborators for conducting research in the use of novel ranching technologies, rangeland management, and ecosystem health. With a focus on providing knowledge from research to livestock producers and natural resource managers for the improvement of ranching operational efficiencies, rangeland monitoring, and ecosystem services.

**Clayton Livestock Research Center**: Sustainable beef production focusing on livestock health and performance through harvest. One of the largest university feedlots in the nation with group and individual animal intake capability.

**Clovis Agricultural Science Center**: The research at ASC Clovis focuses on multiple conservation and regenerative farming practices that improve soil health and water use efficiency in various crops and cropping systems while meeting the needs of local dairy and grain crop producers.




**Corona Range and Livestock Research Center**: A working ranch research facility with a focus on sustainability. 39 wind turbines are installed and operational in partnership with Pattern Energy.

**Farmington Ag Science Center**: Weather in the Four Corners region is variable due to a high elevation of >5,600 ft and intermountain climate. Research at this center focuses on adaptability of crop varieties and cropping systems fitting its shortened growing season. A unique partnership with the Navajo Agricultural Products Industry (NAPI) provides a strong connection to local agricultural producers and regional cultural values.

**Fabian Garcia Research Center**: The Center supports a diverse variety of agricultural research focusing on sustainability, water-wise agriculture, and advancing agriculture technology for chile peppers, onions, alfalfa, viticulture, algae for biofuel, and many other crops.

**Leyendecker Plant Science Center**: Issues being addressed include irrigation management in various cropping systems, agrovoltaics in vegetable production, soil health management, weed management, management of plant diseases, breeding of crops for higher yields and environmental resilience, and the development of alternative crops.

**Los Lunas Agricultural Science Center**: Near Albuquerque in central New Mexico and within the middle Rio Grande agricultural region, this location allows for specialized programs in small farming and urban horticulture. Research focuses on tomatoes, chile peppers, cover crops, tree fruits, forage crops, and experimental wine and table grapes.

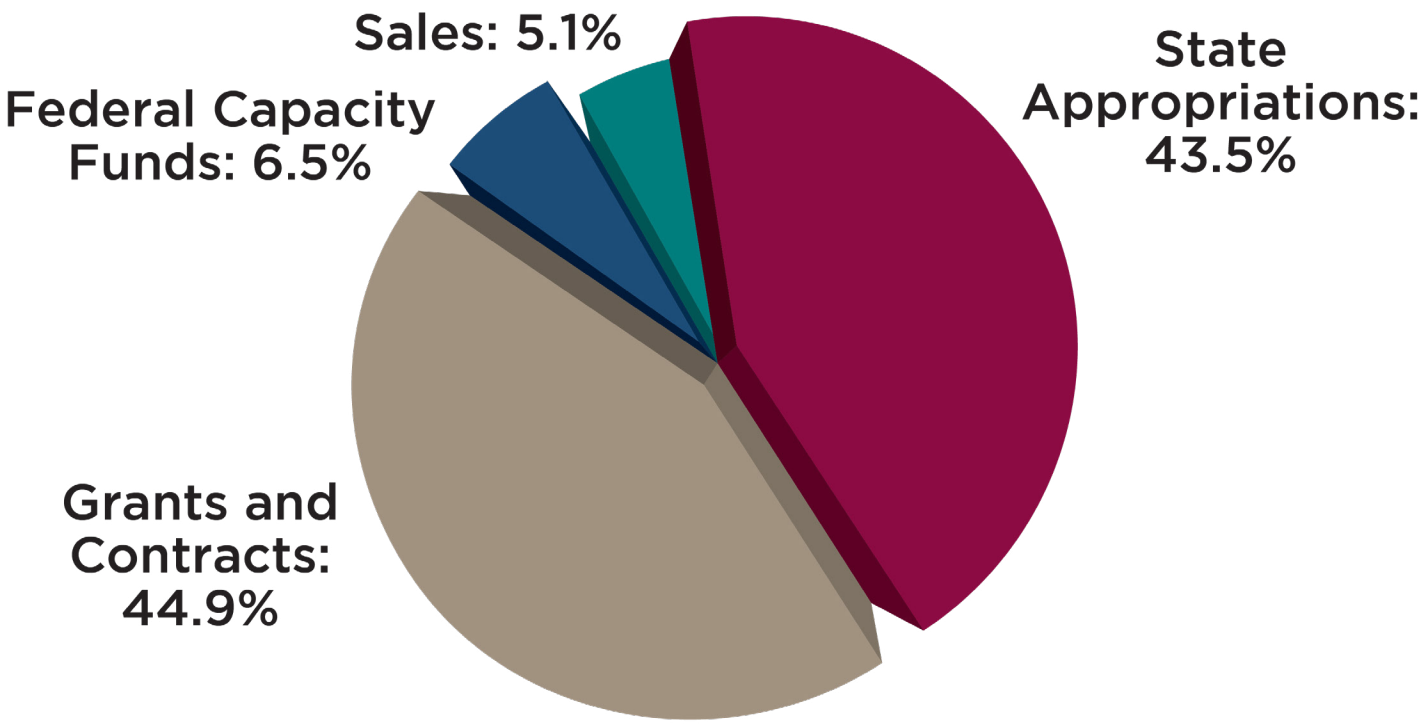
**John T. Harrington Forestry Research Center at Mora:** The only research center in the southwest US focusing on forest nursery technologies, tree improvement, and ecophysiology of young forest trees to facilitate ecological restoration.

**Rex E. Kirksey Ag Science Center at Tucumcari**: One of the few centers with the capability to conduct both crop and livestock research. Research focuses on irrigated and dryland cropping systems, including the use of treated municipal wastewater for agricultural irrigation, and efficiency testing to improve New Mexico's beef herd genetics.

**Agricultural Science Centers (ASCs) are strategically located throughout the state to conduct research in various climate zones. New Mexico is unique, with three crop production regions, ten plant hardiness zones, five defined watersheds, and 126 distinct soil types. Agricultural production varies greatly from north to south and east to west. Each ASC conducts research that provides best practices applicable to agricultural producers in specific climate zones.**

## FY24 AES Sources of Revenue

The total amount of operating revenue for AES for FY24 was $52.5 million. AES is dedicated to expanding the ACES research portfolio with grants and contracts and ensuring that New Mexico's investment in agricultural research is matched by more than a 1:1 ratio.




## AES Ongoing Research Initiatives and Special Projects

### Digital Agriculture

#### Virtual Fencing

Virtual fencing is being researched to improve livestock grazing and land management for ranchers. It uses GPS collars with audio cues and mild electric pulses to keep cattle within boundaries without physical fences. This system, tested at the NMSU Chihuahuan Desert Rangeland Research Center, allows for adaptive grazing management in desert and mountain pastures, reducing the need for costly infrastructure. The technology is being evaluated for scalability and cost-effectiveness in conserving rangeland resources.

### Smart Feeding Systems

The Corona Range and Livestock Research Center continues to use C-LOCK Super Smart Feeding Systems, which use electronic ear tags to provide specific feeds to individual animals. These solar-powered systems help researchers study strategic supplementation and improve livestock management. Future integration with weighing and water monitoring systems, along with artificial intelligence, could enhance data collection and optimize feeding strategies while monitoring animal health and performance.

### Green Feed Systems

The Clayton Livestock Research Center uses C-LOCK Smart Feeders and Green Feed Systems to monitor individual cattle feed intake and measure greenhouse gas emissions from digestion. These systems enable the study of carbon flux and rumen emissions, comparing different feeding practices and supporting carbon management research for both backgrounding and feeding phases.

### Agrivoltaics

AES has secured funding to support the installation of solar panel arrays at three agricultural science centers throughout the state (rangeland and cropland). The goal for agrivoltaic systems is to maintain and enhance agricultural productivity and environmental benefits while providing renewable energy and diversified income opportunities for farmers, ranchers, and rural communities. New Mexico is fortunate to be one of the top three states in the U.S. for Solar Energy Potential, making it an ideal location to study the potential of agrivoltaics, particularly the benefits to agriculture that might be provided through shading and reduced stress. This research program is one way that NMSU is supporting research and development on the nexus of renewable energy generation and sustainable food production in arid and semi-arid environments. The design process for this project is underway, anticipating at least one array installed by 2026.

## Carbon Management and Soil Health

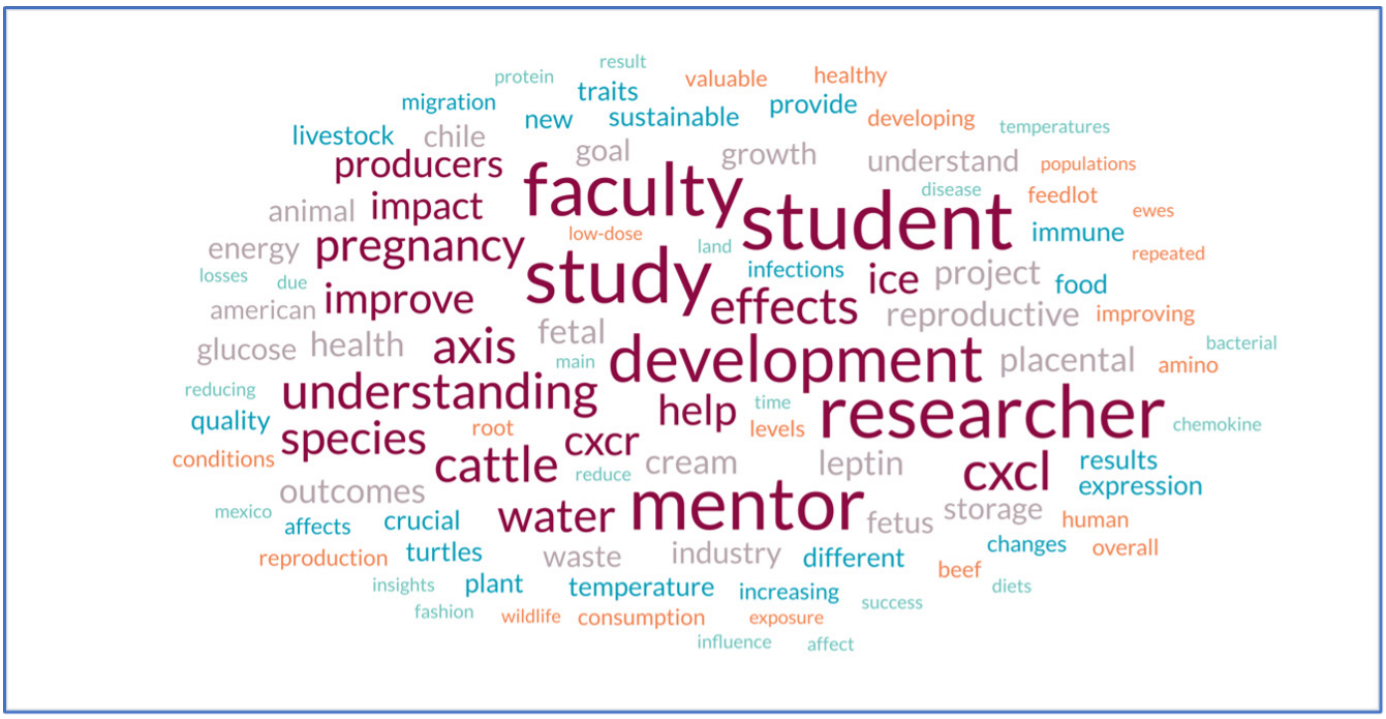
### National Center on Carbon Management and Soil Health in Arid and Semi-Arid Environments

The main goal of the National Center on Carbon Management and Soil Health in Arid and Semi-Arid Environments is to identify, verify, and disseminate cost-effective practices for soil health and carbon management in all major land use types, i.e., croplands, rangelands, forests, and urban lands. In 2024, researchers continued to engage farmers, ranchers, and other stakeholders in carbon management and soil health research, outreach, and extension activities. Research and demonstration activities are underway at seven of the twelve Agricultural Science centers, and an outreach conference on Soil Health and Carbon Management occurred in July 2024, attracting more than 140 farmers, ranchers, and landowners. More than 600 soil samples collected in 2023 and 2024 have been analyzed for soil C and N fractions and greenhouse gas (GHG) emissions. Results show the benefits of regenerative agriculture in soil

health and C storage. For example, assessment of the biochar-mediated changes in soil properties and their contribution to C stabilization and GHG mitigation using greenhouse, laboratory, and modeling experiments revealed pine wood biochar could reduce cumulative N2O-N emissions by 69%-74% and CO2 equivalent emissions by 67%-72%, compared to unamended control. Biochar derived from cattle manure (CM), hemp wood (HW), and pecan wood (PW), locally available in NM, show these residues are essential for SOC storage, but the response on GHG emission was inconclusive. Details can be found at https://nccmsh.nmsu.edu/.

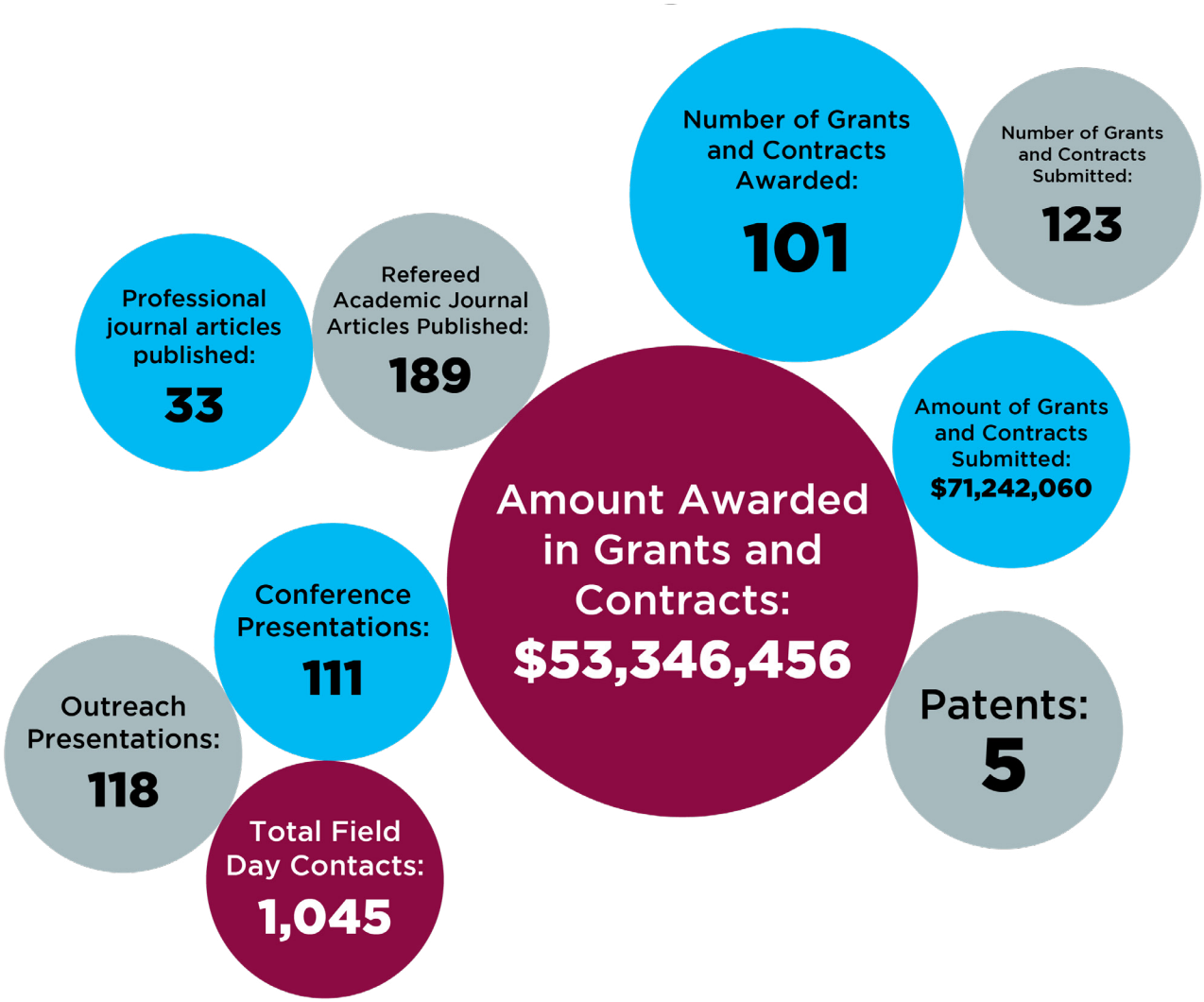
## ACES Undergraduate Research Program

A program initiated in the 2023–2024 academic year emphasizes undergraduate research and provides an opportunity for students to gain hands-on research experience with a faculty mentor. Dr. Jennifer Hernandez Gifford is the Program Director overseeing this project. The inaugural year (FY24) had eight student participants and six mentors. In the 2024-2025 academic year, the program more than doubled and has 18 student participants and 13 faculty mentors.




To learn more about the program and review research summaries from 2024-2025, visit: **https://aes.nmsu.edu/research/aces-ug-research-application.html** or use the QR code.

## AES Research Performance Metrics




## Impact Highlights

New Mexico State University's College of Agricultural, Consumer, and Environmental Sciences (ACES) has a mission to improve the lives of New Mexicans, the nation, and the world through research, teaching, and extension. AES research programs are organized by four critical issues facing New Mexico. These critical issues are the ACES Pillars, which help guide planned programs and research focus. The pillars are Food & Fiber Production and Marketing, Water Use and Conservation, Family Development and Health of New Mexicans, and Environmental Stewardship.

To view all recent AES impacts visit: **impacts.aces.nmsu.edu** or use the QR code.

# Food & Fiber Production and Marketing

## Bringing Financial Benchmarking to New Mexico Farmers and Ranchers – Dr. Maryfrances Miller (Agricultural Economics and Agricultural Business)

Too frequently, farmers use their financial information only for tax compliance. The New Mexico Farm and Ranch Management (NM-FARM) Program offers training and individual support to help New Mexico farmers and ranchers use their financial information for their benefit, allowing them to better understand the financial opportunities and risks for their farm or ranch. Working through the USDA Farm Business Management and Benchmarking program, making financial benchmarking data available online through the FINBIN database will dramatically improve the accuracy of economic information about New Mexico's agricultural production. This supports the ability to promote the adoption of agricultural research, improves the ability of agricultural researchers to make economically viable recommendations, and most importantly, helps New Mexico producers improve their economic sustainability.

## Impact of cattle genetics in arid environments – Dr. Gregory L. Torell (Agricultural Economics and Agricultural Business)

Significant challenges for raising beef cattle exist in the arid and semi-arid regions of the United States. Limited forage availability and small profit margins are among the greatest concerns in Western U.S. ranching operations. One potential option for ranchers in these regions is using alternative cattle genetics, such as Raramuri Criollo (RC), a Mexican heritage biotype of cattle. RC cattle exhibit behavior traits that result in foraging patterns that could reduce the environmental footprint of rangeland animal agriculture. Researchers investigated the profitability of raising this biotype in a grass-finishing production system in the Chihuahuan Desert by producing enterprise budgets for a herd of RC cattle. Results show that RC cattle have lower operating and overhead costs when compared to Angus x Hereford (AxH) crossbred cattle, resulting in the RC cattle operation having greater net returns to land and risk when compared to an AxH cattle operation

## Advancing Sustainable Beef Production: Innovations from the Clayton Livestock Research Center – Dr. Mozart A. Fonseca (Animal and Range Sciences/ Clayton Livestock Research Center)

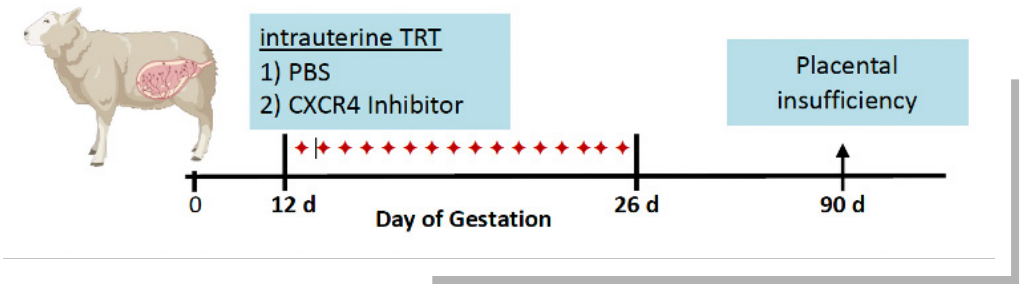
The Clayton Livestock Research Center (CLRC) is working to advance sustainable beef production by addressing key challenges in water use, environmental stress, and nutrient management. Research has led to the improvement of the Water Evaluation System (WES) for optimizing water requirements/use and insights into epigenetic responses to stressors like wildfire smoke. Innovations in nutrient delivery technologies enhance feed efficiency and cattle resilience, translating into significant performance improvements. Through impactful outreach, CLRC equips producers with practical tools and knowledge to sustainably manage resources, ensuring the long-term viability of beef production systems.

## Chinese Consumers' Preferences for Imported Beef Products – Dr. Carlos E. Carpio Ochoa (Agricultural Economics and Agricultural Business)

The U.S. beef industry faces significant challenges, including declining domestic consumption and international competition. A potential strategy to overcome the US beef industry challenges is promoting US beef products in international markets. This research project examined Chinese consumers' preferences for imported beef and other attributes using data from a survey of 2,016 Chinese consumers. Study results show that Chinese consumers strongly prefer domestic beef but are also willing to pay premiums for attributes like enhanced food safety and organic and "green food" certifications. U.S. beef ranked lowest in consumer preference among imported options, indicating the need for strategic efforts to improve its reputation. Targeted strategies to enhance the perception and demand for U.S. beef in China could result in increased prices and contribute to the industry's economic sustainability.

## What Ewe Should Know: Leveraging Sheep as a Model to Improve Reproductive Success in Farm Animals and Women – Dr. Ryan Ashley (Animal and Range Sciences)

Pregnancy complications are a leading global cause of maternal, fetal, and neonatal morbidity and mortality, imposing over $15 billion in annual economic burdens in the U.S. alone. A deeper understanding of placental development is essential to reduce pregnancy loss and adverse health outcomes in both farm animals and humans. Sheep are ideal models for studying



placental mechanisms due to similarities in implantation and placentation with cattle and humans. Using an innovative approach, ACES researcher Dr. Ashley delivers treatments directly into the uterus to explore fetal-maternal interactions driving placental development. This model allows comprehensive analysis of parameters that are unfeasible to study in humans. This research focuses on the chemokine CXCL12 and its role in regulating critical biological processes essential for placentation and successful pregnancies.

## Evaluating Short-Day Onion Cultivars Suitable for Mechanical Harvesting in New Mexico – Dr. Christopher Cramer (Plant and Environmental Sciences)

For the New Mexico onion industry to remain economically viable, the current hand harvesting methods need to be replaced with mechanical harvesting due to high costs and limited availability of hand labor. For that transition to occur, short-day overwintering onion cultivars, that are suitable for mechanical harvesting without suffering damage, need to be grown. This study identified several onion cultivars whose bulbs are harvested at different times that possess higher levels of bulb firmness than other cultivars and may be suitable for mechanical harvesting by sustaining less bulb damage during the harvesting process.

## Soil Health Management in Irrigated Arid Cropping Systems – Dr. John Idowu (Extension Plant Sciences)

Soil health challenges are a growing concern for farmers and land managers in the arid Southwest. Soil health issues include low organic matter, low microbial abundance and diversity, soil compaction, poor moisture retention, and erosion. Soil health practices to address these issues are being investigated to enhance sustainable crop production. A long-term research site in Las Cruces, NM, is testing various management practices, including tillage, cover crops, and organic amendments. After three years of treatment applications, winter cover crops and compost–biochar amendment improved soil health indicators and crop water-use efficiency, while reduced tillage did not significantly impact soil health. By implementing soil health practices, net farm profit could increase by $45 per acre while delivering environmental benefits.

# Water Use and Conservation

## Aquaponics – Sustainable Urban Agriculture – Dr. Wiebke Boeing (Fish, Wildlife and Conservation Ecology)

In the arid Southwest, freshwater resources are dwindling at a dazzling rate. To continue growing crops, researchers are considering more efficient ways for agriculture to reduce overconsumption of our water sources, protect natural aquatic ecosystems, and work towards a sustainable future. In response, an NMSU researcher has established an aquaponic research facility at New Mexico State University, with 16 simple-to-operate flood-and-drain systems. Aquaponics is a way to simultaneously grow fish and crops with minimal land and water usage. They are currently researching how to optimize our systems and further increase sustainability. Fifteen students have learned how these aquaponic systems function and need to be maintained and have been trained on how to properly conduct research experiments.

## Improving Productivity and Resource Use Efficiency through Crop Selection and Soil Nutrient Management – Dr. Murali K. Darapuneni (Plant and Environmental Sciences/REK Agricultural Science Center at Tucumcari)

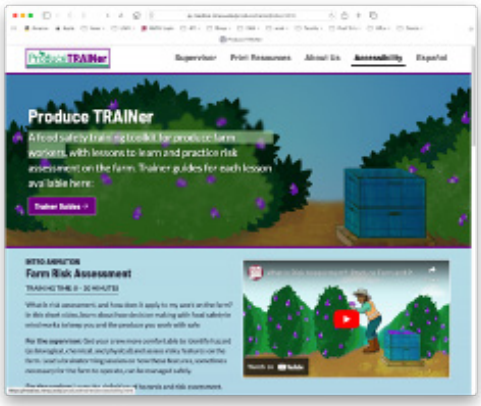
Identification of water use efficient alternate/cover crops to reduce the fallow losses in arid and semi-arid cropping systems will have a potential production impact on more than 200,000 acres, equivalent to approximately 27% of the total agricultural area in New Mexico. Impacts can be much more substantial when applied to similar environments globally. Alternative cropping to achieve higher resource use efficiency (especially water and nutrients) and productivity will not only generate higher farm-level income for producers but also promote broader marketing and economic opportunities in New Mexico. Implementation of better potassium and manure management practices in alfalfa, as illustrated in the cropping systems research, will have a positive production impact on 125,000 acres in New Mexico alone.

### Drought-Modulated Herbicide Responses in Turfgrass Weed Management – Dr. Ryan Goss (Plant and Environmental Sciences)

Managing water effectively in arid regions presents a global challenge for turfgrass, exacerbated by government restrictions on non-essential potable water use. Our research at NMSU delves into the intricate interplay between water scarcity and herbicide impacts on turfgrass. By conducting precise field and greenhouse experiments, we've uncovered insights crucial for turfgrass managers. The research provides a decision-making tool to optimize herbicide efficacy on weeds while minimizing damage to desired turfgrasses. Golf courses and athletic fields in New Mexico have already benefited, protecting their turfgrass from herbicide injury and ensuring strategic applications aligned with plant water status.

## Family Development and Health of New Mexicans

### Research-Based Games, Animations, and Interactive Programs Which Address Educational Content – Dr. Pamela Martinez, Dr. Barbara Chamberlin, and Amy Muise (Innovative Media Research and Extension)




Digital educational media developed by ACES's Innovative Media Research and Extension Department (IMRE) reach millions of users each year. These products, used in outreach education and training, improve food safety, farm production, and nutrition. For example, "ProduceTRAINer" helps train workers working on small and medium-sized farms that grow produce about federally required food safety procedures. "iTips" provides better access to training tools for underserved communities to enhance food safety practices and regulatory compliance. "Night of the Living Debt" helps build financial literacy by supporting learning about credit scores. "Cozy River Valley" explores the complexity of decision-making around water in an agricultural system. The educational tools developed by the IMRE Department were accessed more than 6 million times in 2024. Interactive modules and games were played 3.8 million times, YouTube videos had 2.3 million views. Researchers continue formative research and evaluation of our products, including specific products, such as ProduceTRAINer, iTIPS, Theme Park Kitchen, and Cozy River Valley. Feedback from presentations and demonstrations reveals that nearly 70% of participants would recommend our products to others.

### Connecting Culinary and Hospitality High School Teachers with Sustainable Agricultural Systems – Dr. Jean Hertzman (School of Hotel, Restaurant and Tourism Management)

With a $500,000 grant from the USDA NIFA AFRI PDAL program, "Professional Development for High School Teachers: Connecting Culinary Arts with Sustainable Agricultural Systems," the School of Hotel, Restaurant, and Tourism Management and the Arrowhead Center Innoventure program developed and provided five online courses and an in-person immersive summer workshop for high school culinary arts and hospitality instructors. Over 60 teachers participated in the program in 2024, including five online courses and an immersive workshop. The ultimate goal is training the next generation of culinarians and hospitality managers with the skills to ensure the effective and socially responsible use of resources from the producer to the end-user and consumers.

### New Beginnings for Navajo Nation Students – Dr. William Norris (Agriculture Extension and Education)

Through this USDA-NIFA funded project, educators at Diné College, working with educators in the College of Agricultural, Consumer, and Environmental Sciences, will increase Tribal student retention and graduation rates by instituting plant/growing focused dual credit programs at six area high schools. The dual credit program will establish a pipeline from high school to undergraduate degree completion with a pathway to graduate studies at New Mexico State University. The program will involve training and professional development for high school teachers, as well as peer mentoring at the high school, undergraduate, and graduate levels. New Mexico State University will provide plant science expertise to the education/research team based at the Agricultural Science Center Farmington, mentor student(s) associated with the project, and help build capacity for the Diné College Agriculture Degree Program/NMSU-ASC Farmington in student mentoring.

## Environmental Stewardship

### Improving Climate Resilience through Improved Soil Carbon Management: Assessing Understanding and Knowledge of Producers and the Public – Dr. Brian H. Hurd (Agricultural Economics & Agricultural Business)

New Mexico farmers, ranchers, and citizens continue to support and value stewardship of the state's many and varied environmental resources, importantly including its agricultural resources. Carbon management is an important lever that assists in both mitigating long-term climate change and adapting soils to withstand weather extremes. Through careful assessment of both awareness and practices, this project aims to discover how well New Mexico agriculturalists and citizens understand soil–carbon–food–climate concepts and connections. The research helps identify approaches that improve soil carbon conservation and sustainable soil management, while maintaining (or perhaps raising) farm and ranch incomes and profit reliability. Furthermore, research findings are expected to assist agricultural and climate program development by providing important feedback on information sources and flows, and program perception. These results can aid in the assessment program and policy effectiveness, particularly those concerning climate policy and natural resource conservation within the context of food and fiber production.

## Unraveling migratory routes of a nectar-feeding bat in the US–Mexico borderlands – Dr. Theresa Laverty (Fish, Wildlife and Conservation Ecology)

NMSU researchers in collaboration with others used passive integrated transponder (PIT) tag technology to monitor for tagged lesser long-nosed bats at roosts across the species' migratory range in the southwestern U.S. and Mexico. They found movements as far as 1,631 km between

roosts in the Mexican state of Jalisco and the Sonoran Desert as well as back-to-back overnight movements across the Gulf of California. Observations of where and when this pollinating bat moves inform conservation efforts for this recently delisted bat, including the restoration and management of nectar and fruit resources and recommendations for future offshore wind energy development.

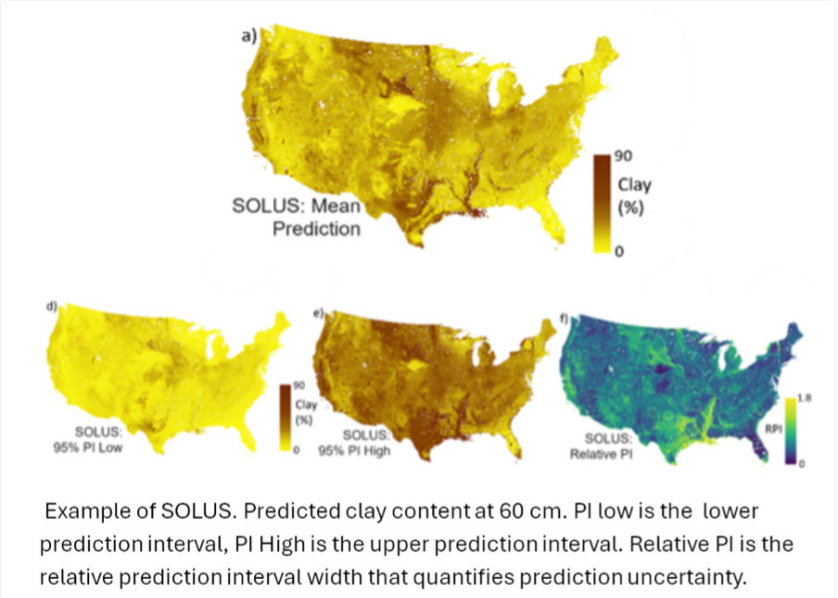
## Horizon Scan of Research Needed to Advance Post-Wildfire Forest Recovery and Restoration – Dr. Kelly Jones (Fish, Wildlife and Conservation Ecology)

Developing a proactive and integrated response to the wildfire crisis in the western U.S. is necessary to ensure ecosystems, ecosystem services, and the people affected by wildfire can recover and be more resilient to future events. An NMSU researcher led a horizon scan that identified 12 topics as having the most potential impact and being the most time-sensitive to address for post-wildfire forest restoration and recovery. Four topics were related to forestry, including the reforestation pipeline, outplanting strategies, post-fire forest trajectories, and climate-informed reforestation; three to hydrology, including soil erosion mitigation, flood and

debris flow mitigation, and post-fire water quantity and quality trajectory; and five to the social and policy sciences, including institutional coordination, collaborative governance, pre-fire planning, community engagement and equity, and workforce development. Addressing these topics would improve the equity, effectiveness, and efficiency of post-wildfire forest restoration and recovery responses. Several of these topics also need immediate action to reduce the large social and economic costs that communities face due to catastrophic wildfires. Information from this horizon scan is being shared with researchers and policymakers through a peer-reviewed journal article, presentations and webinars, and a policy brief. Additionally, participants in the horizon scan increased their knowledge of the integrated social and ecological needs of post-fire restoration and recovery that are expected to lead to future research collaborations and funding.

## Mapping soil properties across all of the Continental United States – Dr. Colby Brungard (Plant and Environmental Sciences)

Soil, the fascinating three-dimensional body of loose mineral and organic matter at the earth's surface, is foundational to human societies. We derive 90% of our food and all of our fiber from the soil. Knowledge of baseline soil properties and conditions and the geographical distribution of these soil properties and conditions is foundational for the management of healthy soil. This baseline knowledge is created through soil survey, which is the inventory of existing soil resources across a landscape. However, existing soil surveys are limited, and new sources of soil survey data are needed. An NMSU researcher has addressed this issue through the creation of "SOLUS: Soils and Landscapes of the United States." SOLUS is a nationwide 2.37-billion-acre geospatial grid of 20 different soil properties that were predicted at 7 standard depths, along with prediction uncertainty for each soil property and depth.  Information on the spatial distribution of soil properties is foundational for anyone responsible for land management, including federal and state land managers.




Example of SOLUS. Predicted clay content at 60 cm. PI low is the lower prediction interval, PI High is the upper prediction interval. Relative PI is the relative prediction interval width that quantifies prediction uncertainty.

## A New Approach to Reforestation: Nucleation Planting Strategies for Climate-Resilient Forests – Dr. Owen Burney (Plant and Environmental Sciences/ JTH Forestry Research Center at Mora)

The JTH Forestry Research Center, in collaboration with the University of New Mexico, is researching nucleation planting to improve forest resilience in the southwestern U.S. This innovative approach mimics natural regeneration by planting small tree clusters, aiming to reduce fire risk and enhance drought resistance. Key research foci include using seedling survival models to guide planting locations, testing a range of planting densities, and evaluating the impact of competing vegetation. In 2024, over 5,000 seedlings were planted in the Hermit's Peak/Calf Canyon wildfire-impacted area, with active contributions from tribal communities. This long-term study seeks to optimize reforestation practices, leveraging model-based site selection and fostering collaboration to promote sustainable and climate-resilient ecosystems.

## Advancing Algal Technologies for a Carbon-Free Energy Future – Dr. Omar Holguin (Plant and Environmental Sciences)

Advancing algal technologies offers a scalable solution for achieving a carbon-free energy future, aligning with national goals to develop a clean and equitable energy economy. By leveraging algae and innovative CO2 gas-to-liquid transfer systems, we have significantly improved CO2 gas transfer efficiency from 56% to over 86% and enhanced carbon fixation efficiency to over 81%. Additionally, as a byproduct, we produce a value-added bio-stimulant that has been shown to improve agronomic plant performance. These advancements demonstrate the potential of algae as a renewable carbon feedstock for fuels and products. Our work supports climate crisis mitigation, reduces carbon emissions, and integrates renewable practices into existing municipal infrastructures, contributing to a sustainable and economically viable future for all.


## Executive Summary

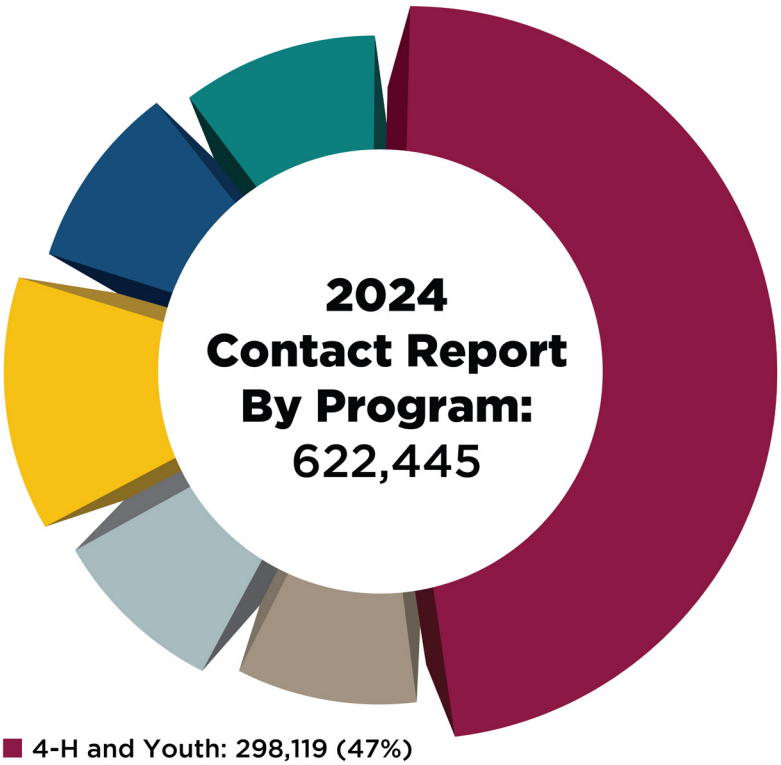
The New Mexico Cooperative Extension Service (CES) provides practical, research-based knowledge and programs to serve the citizens of New Mexico. This has been our mission for more than 100 years and will remain the focus of our efforts in the future. CES is a unique federal, state, and county partnership. CES has staff in all 33 counties and many Tribal areas in New Mexico, and collaborates with more than 1,000 organizations, state and federal agencies, other universities, and 10,000 volunteers.

We focus on collaboration to foster economic, educational, and community development, keeping the needs of our neighbors at the forefront of our work. While our mission endures, the delivery and areas of study evolve. In 2024, Extension efforts related to agriculture and natural resources, positive youth development, community development and the health and wellness of New Mexico families have been priorities.

Extension work will continue to evolve, and specialists and agents will seek additional resources to remain responsive and advance our diverse outreach programs and research in areas we have identified as critical to our state's future. The programs highlighted here are just a sample of the amazing work done across the state this past year to improve the lives of New Mexicans.

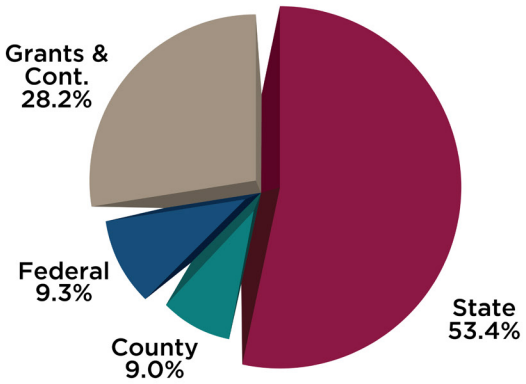
# Cooperative Extension Service

Reaching our Clientele




- 4-H and Youth: 298,119 (47%)
- Animal Sciences & Natural Resources: 59,412 (9%)
- Community & Economic Development: 57,073 (9%)
- Family & Consumer Sciences: 82,377 (13%)
- ICAN: 60,097 (9%)
- Plant Sciences: 63,083 (10%)

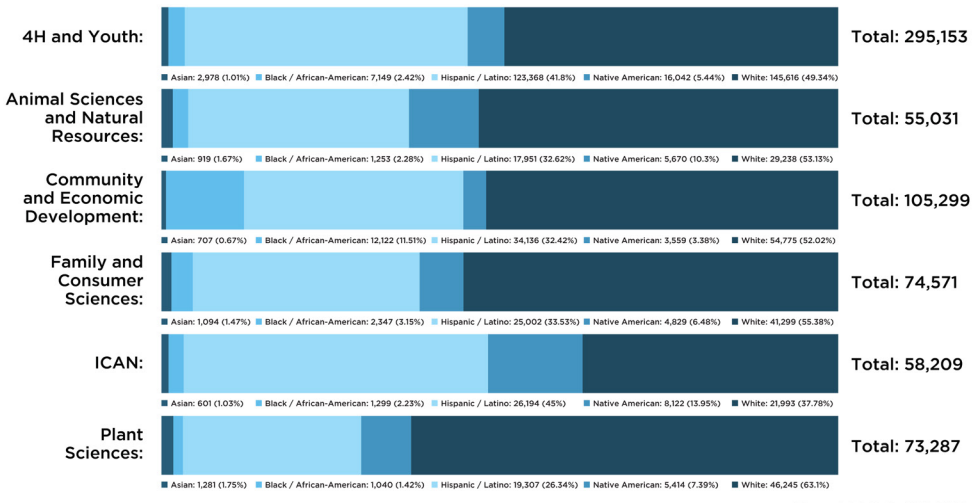
**CES Funding Sources**





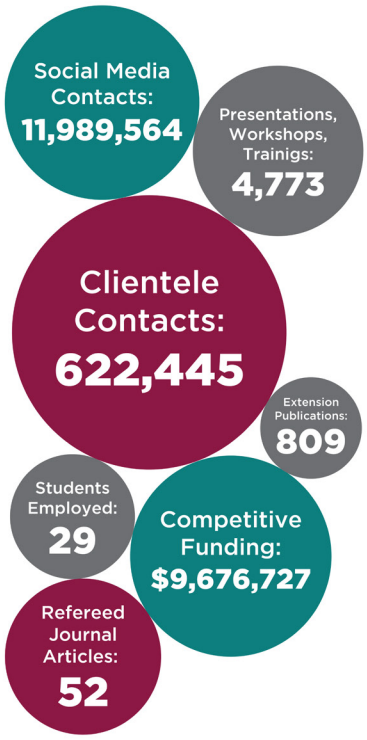
- Female: 346,724 (55%)
- Male: 275,721 (44%)

**Cooperative Extension Service**
Extension Personal Contact by Ethnicity




Grand Total: 661,550

**CES by the Numbers**

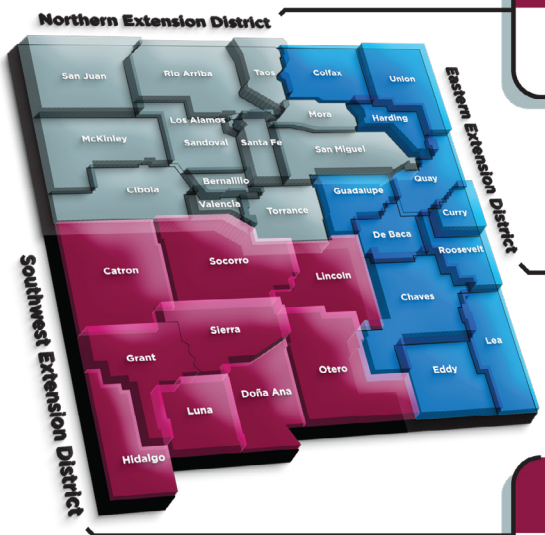


# Reaching New Mexicans: District Departments Selected Highlights

The Cooperative Extension Service (CES) is a unique federal, state, and county partnership. Part of the College of Agricultural, Consumer, and Environmental Sciences, CES has staff in all 33 counties and many Tribal areas in New Mexico who provide communities with effective leadership and collaboration to foster economic, educational, and community development. Each county has unique programming to tackle emerging issues for their communities, with annual and one-time programs offered in many different modalities to reach a variety of audiences, from traditional youth programs and workshops for producers to family and senior wellness programs. Below are selected highlights of programs and events in 2024.


*Cooperative Extension District Department Heads Tom Dean, Christina Turner and Patrick Kircher showcase Extension careers at the College of ACES Career Fair.*

## Cooperative Extension District Departments




**Northern District:**
Department Head: **Christina Turner**

13 Counties and Tribal Extension
District Population 1,418,895
94 Agents/Staff

**Eastern District:**
Department Head: **Patrick Kircher**

11 Counties
District Population 297,462
46 Agents/Staff

**Southwest District:**
Department Head: **Tom Dean**

9 Counties
District Population 399,520
48 Agents/Staff

# Embracing Aging: Helping Seniors Live Full and Active Lives

To help address the needs of senior citizens in Quay County, the Extension Family and Consumer Sciences Agent worked in collaboration with the Tucumcari Senior Citizens Center to discuss topics that affect everyone as they age. According to 2020 U.S. Census data, 27% of those living in Quay County are 65 years old or older. With more people living longer, different challenges arise for them. The way in which you take care of yourself through the years, both physically and mentally, will impact the way in which you age.

The Quay County Agent meets monthly with members of a group of senior citizens who participate in the Foster Grandparents and Senior Companions program for two hours to discuss topics including physical activity, mental wellness, social activity, financial planning, healthy eating, and positive thinking. The group consists of men and women of different ethnicities and 56 to 85 years of age. Members of the group share their knowledge and wisdom to help everyone better engineer a positive attitude as they age. The agent provides information and resources for the seniors to implement into their daily lives to address their needs and to help them plan for the future.

The FCS Agent also incorporated balance and mobility activities at every meeting to help ensure that the seniors continue to live independently and to allow them a chance to continue to be social and spend time with family and friends.

One participant said, "I have started using the exercises at home, and my balance has improved. I can now walk longer unassisted, and I haven't tripped in over a month."

Based on follow-up evaluations, 98 percent of seniors indicated they have focused on trying to have a more positive attitude and avoid negativity, 86 percent said they are making healthier food and nutritional choices based on what they have learned, and 92 percent said they are focused on being more physically active through walking and other activities such as dancing.

One participant said, "Changing habits is hard, but when you look at aging this way it makes you want to do a better job at taking care of yourself."

**Erin Smith,** ***Quay County, Family & Consumer Sciences & 4-H Agent***

**ACES Pillar: Family Development and Health of New Mexicans**

# Small Acreage Stewardship & Homesteading Skills Workshop Series 2024

The Small Acreage Stewardship & Homesteading Skills Workshop Series in 2024 was developed in response to an increasing number of constituents purchasing and living on small parcels of land with no experience on where to find non-biased, science and research-based information.

The workshops, which ran between May and October 2024, were a collective effort by Rio Arriba, Taos, Los Alamos, and Santa Fe counties, as well as Tribal Extension and the New Mexico State University Sustainable Agriculture Science Center at Alcalde.

Programs included a blend of instruction modalities, including hands-on construction workshops, informational presentations, and farm-walks at the Alcalde Science Center. Presentation topics included a wide range of subjects, including fruit orchard establishment, irrigated pasture, farm machinery safety and added value product and marketing. About 146 individuals participated in at least one workshop, which included about 87 percent who were new to Extension and about 96 percent who were first-time visitors to the Alcalde Science Center.

This series was instrumental to local and emerging audiences to the Northern New Mexico area and providing education in the areas of natural resource stewardship, sustainability, regenerative agriculture, animal husbandry and land and resource conservation.

Chicken Tractor Construction Workshop led by Del Jiminez. This was Del's last program, capping a 30-year Extension career.

"I attended the last session this fall on high value crops and medicinal plants," said one participant. "I am sorry I missed all the others. They were great topics of interest to me, such as composting, worm beds and other ways of enriching the soil. It was inspiring just to be with others excited about gardening and growing vegetables. I could tell a community had started among those attending."

**Will Jaremko-Wright, *Taos County, County Director/Agriculture & 4-H Agent***

**ACES Pillar: Food and Fiber Production and Marketing, Environmental Stewardship**

# Innovative Program Develops Critical Life Skills in Non-Traditional 4-H Youth

Socorro Cooperative Extension Service is delivering enriched and engaging learning opportunities to at-risk youth not previously reached in Socorro County. The 4-H Skills Schools and 4-H STEM Afterschool program provide a safe environment for youth to build life skills and social skills and inspire a love of learning.

A Socorro County 4-H STEM Afterschool student participates in a Plant the Moon data collection.

A review of data from Socorro County reveals 32.3 percent of middle school students have experienced frequent mental distress, and the poverty rate for children under 18 is 35 percent, more than double the rate in the United States. Socorro County had a graduation rate of 67.2% in the 2018-2019 school year, which is the 6th lowest rate out of the 33 New Mexico counties.

4-H STEM Afterschool is offered at the extension office weekly for one hour for students to explore engineering design process, 4-H STEM curriculums and to participate in Institute of Competition Sciences Plant the Moon Challenge. In the Fall of 2024, the Plant the Moon Challenge was expanded to include Sarricino Middle School Mathematics, Engineering, and Science Achievement (MESA) class.

4-H Skills School is a partnership with the City of Socorro Youth Center to provide their participants with weekly lessons to help inspire healthy, confident and resilient kids. The lessons encompass the full range of hands-on activities offered by Socorro Cooperative Extension Service. Lessons are presented in 4-to-6-week units, covering leadership development, STEM and agricultural literacy: plant science, animal science and agricultural industry.

The Socorro Youth Center 4-H Skills School and 4-H STEM programs engaged 71 participants, 69 of whom were not previously enrolled in 4-H, and 95 percent of these students attend Socorro Consolidated Schools, which qualify for free or reduced-price lunch. This serves as an indicator of socioeconomic need and ensures that Socorro Cooperative Extension Service is reaching the targeted youth population.

Most participants agreed that their teamwork, social and communication skills increased, and 100 percent indicated that their understanding and use of planning/organizing and problem-solving increased. One student said, “Teamwork can be tricky, but negotiating gets the best aspects of each plan. Planning keeps the project realistic. Always communicate what you’re doing, or chaos ensues.”

**Jamie Fassett,** ***Socorro County, 4-H Agent;*** **Emily Bruton,** ***Socorro County, County Director/ Agriculture Agent***

**ACES Pillar: Family Development and Health of New Mexicans**

# Extension Offers Green Chile Preservation and Food Safety Webinar

For the health and safety of New Mexicans and anyone consuming green chiles, it is important to understand how to safely store and preserve green chile. The Green Chile Preservation nationwide webinar focused on up-to-date, accurate, and research-based information on food safety and food preservation of green chiles.

Consuming raw food, or improperly preserving raw food, can bring botulism, listeria, and other foodborne illnesses. The CDC estimates 48 million people get sick, 128,000 are hospitalized and 3,000 die from foodborne diseases in the United States each year.

With green chile being such an important staple in the diet of New Mexicans, the webinar was offered for home food preservers throughout the state, with 72 participants joining from New Mexico, Arizona, California, Texas and Colorado.

The FCS Agents/Master Food Preservers held four separate 1-hour weekly webinars in October. Each webinar covered a different preservation method of green chile, including freezing, which included education on types of chile; drying, which included sun drying methods, oven, and machine dehydration methods; freeze-drying, which included the scientific process of freeze drying and benefits with comparison to drying green chile; and pressure canning, including the differences between water bath canning and pressure canning and the importance of knowing which process is needed to properly process home canned food for consumption.

All webinars ensured that participants understood that green chile is a raw food and that roasting or blistering green chile is different from cooking green chile to temperature which will properly kill harmful bacteria.

Overall, 100 percent of participants were satisfied that they took part in this workshop and the knowledge they received through the webinar and understood how to properly prepare and store green chile. About 90 percent said they had a deeper understanding of how to safely prepare, dry, and store green chile and how to adjust for high altitude in pressure canning.

“I did not realize that roasting did not count as fully cooking green chile,” said one participant.

Another said, “I learned that my pressure canner needs to be checked annually and that my Extension Office can do it.”

The presentations were recorded and will be available through on all county cooperative extension websites and NMSU’s Chile Pepper Institute website.

**Amber Benson, *Bernalillo County;* Patricia Largo, *McKinley County;* Michelle Stizza, *Santa Fe County;* Phillip Alden, *Bernalillo County;* Crystal Garcia-Anaya, *Valencia County;* Madeline Gurney, *Sandoval County***

**ACES Pillar: Family Development and Health of New Mexicans, Food and Fiber Production and Marketing, Environmental Stewardship**

# 4-H Develops Youth Leaders

The New Mexico 4-H Youth Development Program ensures that every youth involved will have the opportunity to participate in 4-H experiences that strengthen a young person's sense of belonging, generosity, independence and mastery. The commitment is to empower youth to become active agents of change, utilizing their unique perspectives to tackle challenges and build a stronger future.

Youth development research emphasizes the importance of meeting the four basic human needs of belonging, generosity, independence and mastery. Studies indicate that youth whose needs are met in positive ways are likely to develop into active citizens and contributing members of their families and communities.

Curry County 4-H Council Song and Rec Leader Presley Rush teaches young 4-Hers about the baking projects at Project Exploration Day.

In Curry County, youth ages 5 to 19, as well as currently enrolled 4-H members and potential 4-H members, completed a survey to assess their leadership engagement in the 4-H Program. Youth in the 4-H club program gain leadership and teamwork skills through leadership opportunities at the club, county and state levels and demonstrate effective leadership and teamwork skills to local community members, organizations and projects, and provide primary leadership to statewide events.

Of the 50 youth participants, 55 percent reported serving in club officer roles, 25 percent have also served in leadership roles at the county level, and five percent are currently serving as officers at the state level. Participants also (70 percent) contribute at least an hour per week to 4-H engagement, and 44 youth completed a survey on the Likert scale designed to measure communication and leadership skills gained through 4-H. The participants believe they can communicate their skills and qualifications and ensure that others understand the message they are trying to project, and 95 percent agree they can resolve conflict in positive ways, work with people who are different from themselves and once they know what needs to be done, they can develop a plan. Over 90 percent agree they can set goals for themselves and know how to handle unexpected situations, can consider all the choices before making a decision, and will teach others what they have learned.

**Mindy Turner,** ***Curry County, County Director/Family & Consumer Sciences Agent;*** **Kandy Hutchins,** ***Curry County, 4-H Agent***

**ACES Pillar: Family Development and Health of New Mexicans**

# Cattle Herd Health & Noxious Weed Workshop

Sustainability in herds requires considering different factors such as herd health, nutrition, and marketability. Beef and cattle ranches often seek out new knowledge to maintain sustainability in their operation, and providing producers with such knowledge is crucial when considering the value of beef cattle, severe drought conditions, and difficult management decisions.

Hidalgo and Luna County's Extension offices collaborated with New Mexico Cattle Growers, NMSU specialists, local large animal veterinarian, and representatives from Zoetis and Purina to host 50 producers for the Cattle Herd Health and Noxious Weed Workshop.

A high school student tries palpating a cow to practice diagnosing pregnancy stage at the Cattle Heard Health & Noxious Weed Workshop.

The three-hour program included presentations by John Wenzel, NMSU Extension Veterinarian, who discussed different noxious weeds that were causing harm to cattle operations in the Southwest and gave advice to producers on what to be concerned about. Gary Sides, with Zoetis, discussed "Growth Enhancements on the Ranch," and Clay Burson, from Purina, discussed cattle nutrition and supplementation. Cole Wenzel, Southwest Veterinary Clinic, reported on veterinary medicine updates and the importance of a vet–patient relationship and Roy Farr, NMCGA Southwest Regional Vice President, discussed the importance of Cattle Growers and why producers should join.

Of the participants who completed the program evaluation, 85 percent agreed that they had acquired knowledge that will enhance efficiency, profitability, and quality of life, 100 percent reported that they acquired knowledge pertaining to managing range and pastureland, and 72 percent of the participants are likely to implement techniques into their operation that they learned from the program, while the other 28 percent reported they would consider implementing the techniques. The producers agreed that through the program they had an awareness of potential threats and noxious weeds that may affect their operation.

**Jack Blandford,** ***Luna County, County Director/Agriculture Agent;*** **Savannah Daniels,** ***Hidalgo County, County Director/Agriculture & 4-H Agent***

**ACES Pillar: Environmental Stewardship**

# Extension Develops Camp for Military-Connected Youth

The 2024 Adventures in Leadership Camp was designed to provide a comprehensive educational and recreational experience for military-connected youth, focusing on building leadership skills, enhancing teamwork, and fostering a deeper understanding of healthy living practices.

With a diverse range of activities that included physical challenges, skill-building workshops, and team-oriented tasks, the camp aimed to create a memorable and impactful experience for all attendees. Key activities included White Water Rafting, High Ropes Course, Outdoor Cooking and Knife Skills, Real Colors Training, Etiquette Tea and 4-H Healthy Living Lessons.

The 2024 Adventures in Leadership Camp had a significant positive impact on the participants, both in terms of personal growth and awareness of healthy living practices. Over 70 percent of participants found the information provided during camp activities to be very helpful. Every participant expressed a strong likelihood of attending similar camps in the future.

One of the camp's core objectives was to promote healthy living, with participants saying they gained significant awareness and understanding in several key areas, including nutrition and healthy eating, physical activity, and managing screen time and understanding risky behaviors.

During the 2024 Adventures in Leadership Camp, White Water Rafting stood out as a particularly popular activity, frequently cited as a favorite.

The 2024 Adventures in Leadership Camp not only provided an engaging and enjoyable experience for its participants but also made a significant impact on their awareness and understanding of healthy living. The camp successfully integrated the 4-H Healthy Living principles into its activities, resulting in participants who are now more informed and motivated to lead healthier lives. Additionally, the camp successfully achieved its goal of providing an enriching, educational, and enjoyable experience for its participants, leaving them with enhanced skills, greater confidence, and a strong connection to the 4-H community.

**Brittany Sonntag,** ***Bernalillo County;*** **Phillip Alden,** ***Bernalillo County;*** **Cheryl Butterfield,** ***State 4-H;*** **Will Jaremko-Wright,** ***Taos County***

**ACES Pillar: Family Development and Health of New Mexicans, Food and Fiber Production and Marketing, Environmental Stewardship**

# 4-H Livestock Projects Help Youth Develop Critical Life Skills

The experience of youth owning and working with animals, being responsible for their care, health, and growth, and exhibiting them in a competitive environment is a tremendous character-building process, but without proper guidance raising an animal can be very daunting. In Doña Ana County, the Livestock/4-H Agent worked with an increasing number of 4-H students interested in showing livestock to ensure the youth participants were prepared.

The agent held various tag days as well as traveling to members' houses to verify ownership, tag, tattoo, and pull DNA for the NMSF. The agent also coordinated with the Livestock Inspectors to travel along with the agent to write hauling papers (Form-1) for the kids at the same time. Over 180 youth were visited to prepare them for the upcoming shows. 4-H members were also provided with training through a Livestock 101 Workshop, a Poultry 101 Workshop, and a Dairy Heifer Camp. The events allowed them to prepare for the show season.

By participating in these animal projects, 4-Hers build or improve upon important life skills including hard work, responsibility, critical thinking and decision-making. 4-H livestock projects provide an excellent opportunity for youth to develop valuable positive life skills that will benefit them as they become adults. Being in the show ring also teaches several life lessons and introduces young people to competition. Healthy competition teaches resilience and perseverance, which prepares youth for real-life situations. Exhibiting livestock teaches kids the importance of sportsmanship. They learn at an early age how to win and lose gracefully.

4-Hers are encouraged to practice animal welfare and responsibility and take ownership of their project and be responsible for the animal's daily care, while receiving oversight from an adult volunteer. 4-Hers learn how to provide adequate feed, water and shelter to their animal and give the animal opportunities for normal socialization. Livestock projects also teach youth how to raise a high-quality product for the consumer, as well as important business skills such as f inancial management, marketing, and record management. The 4-H member tracks expenses, income, and the profit/loss of their project and reports these in the form of a record book.

**Teresa Dean,** ***Doña Ana County, County Director/Livestock & 4-H Agent***

**ACES Pillar: Family Development and Health of New Mexicans, Food and Fiber Production and Marketing**

# Colfax County Extension Tackles Grasshopper Outbreak

In the summer of 2024, the Colfax County Extension office partnered with the New Mexico State Land Office, the Kiowa Grasslands, Colfax Soil and Water Conservation District, the Town of Springer, Aero-Tech Aerial Services, and the Federal Aviation Administration to organize a meeting with landowners and lessees about their interest in a grasshopper control program.

The Colfax County Extension agent recognized there were over 24 grasshoppers per square yard, which would constitute an outbreak. The outbreak was on private land, state land, and forest service land. The agencies, landowners, and lessees worked together to acquire a company to get estimates to apply some control methods to the rangeland to prevent complete loss of grass on the rangeland grasses and liquidation of cattle herds.

About 100,000 acres were surveyed for the infestation and tested positive for a qualifying outbreak. The impact in the 2024 growing season resulted in a 60 percent loss of grass. This resulted in a reduction of 400 commercial cows that are on 30,000 acres and a reduction of 1,400 yearlings that are on 70,000 acres. The tax impact to the county at $747 per cow and $988 per yearling ($494 for six months) was $298,000 for the commercial cows and $691,600 for yearlings that are in the county for six months, totaling $990,400 loss. In 2025, the tax rate on all livestock in the county will increase over 38 percent, with the exception of horses and goats. The impact in 2025 if the infestation is allowed to continue will result in a minimum loss of $1,366,752.

In collaboration with the State Land Commissioner's Office, federal legislative delegations, local, regional, and district elected officials, Colfax County Extension helped get approvals for the control methods being proposed to apply on state and federal land. The Extension office organized a meeting for USDA APHIS to present the process that will need to be completed to do the actual control in summer of 2025.

**Boe C. Lopez,** ***Colfax County, County Director/Agriculture Agent***

**ACES Pillar: Food and Fiber Production and Marketing, Environmental Stewardship**

# Developing Resources: Specialist Departments Selected Highlights

Extension Specialists provide research-based information on important and relevant topics that affect individuals, families, and communities. Specialists work directly with County Agents and provide educational programs to numerous commodity and special interest groups throughout New Mexico. They also conduct regional and state workshops, and demonstrational and short-term research projects. Often these Extension faculty represent the single state-wide or regional source for research-based information on a particular topic. Below are selected highlights of programs and research in 2024.

## Cooperative Extension Specialist Departments

### Animal Sciences and Natural Resources
Department Head: **Shanna Ivey**
12 Specialists/Faculty/Staff

Mission Statement: The Department of Extension Animal Sciences and Natural Resources is committed to providing the citizens of New Mexico with research-based, practical, and applied educational programming that meets the demands New Mexico has in the agricultural and natural resource communities.

### Plant Sciences
Department Head: **Anowar Islam**
26 Specialists/Faculty/Staff

Mission Statement: The mission of the Extension Plant Sciences Department is to extend research-based knowledge and technology that enables our clientele to improve the quality of their lives and enhances the agricultural, economic, environmental, and social well-being of the state.

### Economics
Department Head: **Carlos Carpio Ochoa**
13 Specialists/Faculty/Staff

Mission Statement: The 21st century presents many challenges and opportunities concerning our agricultural, natural, and human resources. Our mission is to enhance the well-being of the citizens of New Mexico, the nation, and the world through the cornerstones of teaching, research, and Extension programs.

### 4-H Youth Development
Department Head: **Jaime Castillo**
9 Specialists/Faculty/Staff

Mission Statement: 4-H provides youth with opportunities to learn skills, gain knowledge, have fun, and make contributions in such areas as environmental education, community service, and current youth issues. As the world's largest youth organization, 4-H grows youth into capable, responsible, and caring individuals.

### Family and Consumer Sciences
Department Head: **Efren Delgado**
54 Specialists/Faculty/Staff (Includes 27 Nutrition Educators assigned throughout the state.)

Mission Statement: The mission of the Department of Extension Family and Consumer Sciences (EFCS) is to improve the quality of life for the citizens of New Mexico by distributing research-based information on community and environmental health, food technology, nutrition and wellness, personal and family finance management, and family life and child development.

### Innovative Media Research and Extension
Department Head: **Barbara Chamberlin**
25 Specialists/Faculty/Staff

Mission Statement: The mission of this educational research and design studio is to translate university-based research into high-quality educational media tools, such as games, apps, virtual labs, animations and videos. Ongoing faculty research on digital and interactive media topics informs development of effective tools and contributes to the larger body of knowledge.

# 2024 Western Pecan Growers Association Conference Draws Growers

Pecan growers in New Mexico are challenged with drought, salinity, alkaline pH soils, insect pests, and increasing input costs. Additionally, tree nut prices have been lower than average for the past four seasons. The 2024 Western Pecan Growers Association (WPGA) Conference was held March 2024 in Las Cruces for growers.

The program included 15 presentations by scientists or other experts in the area. Topics included agricultural marketing, caterpillar pests, pecan weevils, water use efficiency, hedging/topping, artificial intelligence, and farmer stress management. Educational presentations were interspersed with vendor presentations about products used in pecan production.

Of 635 attendees that responded to a conference survey, 100 percent said they planned to use information acquired at the conference in their orchards in the coming season. Information about drought, soil health, and insects were highlighted as particularly important for several growers.

One grower said, "Lots of good information," and another said, "Good mix of content." Furthermore, 97.5% of respondents indicated that they already planned to attend the WPGA conference in 2025 and would recommend this conference to other growers.


Jamin Miller, an NMSU graduate student, gives a presentation about efficient irrigation of pecan orchards at the Western Pecan Growers Association Conference and Tradeshow.

On average, pecans contribute $177.7 million to New Mexico's economy, but this industry is threatened by drought. A survey showed that growers plan to put into practice new knowledge about water use efficiency that they obtained from presentations at the 2024 WPGA Conference. This knowledge will help them to increase the amount of nut yield produced per volume of irrigation water applied.

**Richard Heerema,** ***Extension Pecan & Pistachio Specialist, Extension Plant Sciences***

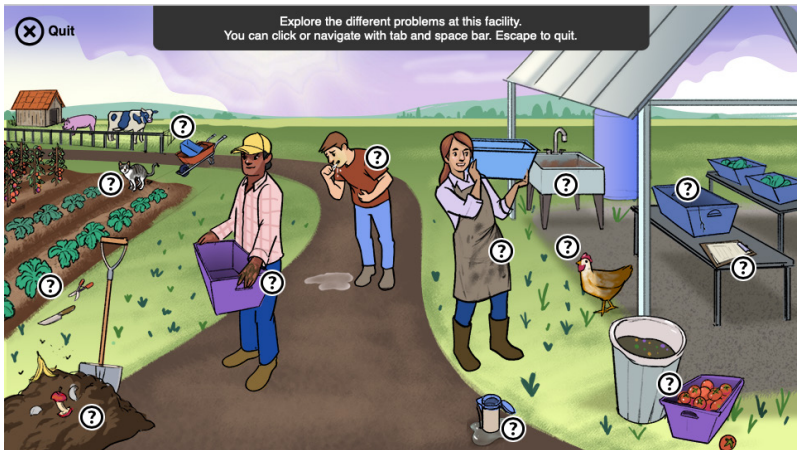
**ACES Pillar: Water Use and Conservation**

# ProduceTRAINer: A Food Safety Training Toolkit for Produce Farm Workers

In response to a needs assessment of small and medium-sized agricultural producers that identified gaps in worker training related to the Food Safety Modernization Act Produce Safety Rule (FSMAPSR), New Mexico State University's Innovative Media Research and Extension team created a mixed-media toolkit for supervisors of farm workers.

The FSMA-PSR sets forth basic requirements for the safe growing, harvesting, handling, packing, and storage of produce, especially those typically eaten raw. The toolkit drew insights from the agricultural community that supports the Train-the-Trainer workshop developed by the University of Maryland.

Training under the FSMA-PSR is aimed at individuals who handle or oversee covered produce and/or surfaces that come into contact with food. Alongside general health and hygiene, specific training relevant to tasks is essential, as workers can potentially introduce foodborne pathogens if they lack awareness of risks and preventive measures. While farm managers must take mandated training, many of those workers must then train farm workers, and few resources exist to fill that gap.




The ProduceTRAINer website and toolkit are hosted by New Mexico State University's Innovative Media Research and Extension Department at https://producetrainer.org

The ProduceTRAINer website and materials, including an animation, interactive materials, and translator services so that all material is available in English and Spanish, is hosted by NMSU and were used 2,506 times in 2024.

Project researchers conducted outreach and engagement workshops, webinars, presentations, and podcasts for academia, farmers, and growers with unexpected audiences of middle school students and teachers. These efforts reached over 700 participants through workshops, presentations, and virtual events.

Four lessons, six activities, and a supervisor manual were developed to aid workers' understanding of risk assessment and improve their decision-making processes during a typical day on a produce farm. Most activities focus on encouraging group discussions and highlighting why this behavior is essential to public health, a best practice for adult education.

The project was a collaborative effort between New Mexico State University Innovative Media Research and Extension and the University of Maryland Eastern Shore, University of Maryland Extension, and The Acheson Group (TAG). These entities provided the initial research and needs assessment, content expertise and continued outreach.

**Pamela Martinez,** ***Extension Specialist Educational Technology, Innovative Media Research and Extension***

**ACES Pillar: Food and Fiber Production and Marketing**

## Extension Hosted 4-H Shooting Sports Leader Training in 2024

Over 100 New Mexico 4-H adult volunteers convened in February 2024 at the Albuquerque Shooting Range Park for the New Mexico State 4-H Shooting Sports Leader Training. Outdoor recreation related projects such as 4-H Shooting Sports projects are some of the most visible programs and projects offered in 4-H. Youth participating in 4-H projects learn valuable life skills.

Adult 4-H volunteers who participated in the 15-hour training learned how to teach 4-H youth life skills and other crucial aspects of 4-H positive youth development, through 4-H age-appropriate techniques of teaching safe and responsible handling of firearms and archery equipment.

Youth who participate in 4-H programs and projects such as shooting sports are nearly two times more likely to make healthy living choices, and two times more likely to participate in STEM programs outside of school.

By participating in a 4-H Shooting Sports Leader Training, 4-H volunteers gain valuable skills including critical thinking, safety, risk management, age-appropriate teaching methods, responsibility, and decision-making.

Over 97 percent of the 4-H Shooting Sports volunteers who completed the training agreed that they felt more comfortable and able to provide an age-appropriate, safe, positive youth development 4-H environment that allows members to pursue an interest in the Shooting Sports.

A volunteer who participated in the Leaders Training said, "Education is the foundation of all 4-H programs, including 4-H Shooting Sports."

**Sam Lowry,** ***State 4-H Agent, Agriculture and Natural Resources***

**ACES Pillar: Family Development and Health of New Mexicans**

## New Mexico Crop Enterprise Budgets Program Provides Updates

The New Mexico Crop Enterprise Budgets Program has been an ongoing since 1930. Its objectives are to generate information to help both experienced and beginner farmers make decisions about their crop choices and adjust to their locations, to evaluate farmers' performance compared to that of representative farms, to assist state lawmakers in making crop policy decisions for farmers, to support local governments, bankers, real estate agents, and crop processors in making farming decisions, and to provide researchers and extension agents with basic farming data in New Mexico.

This year, 129 crops from 15 counties have been updated. The updated crop budgets are crucial to understanding the New Mexico farming situation, which continues to evolve, adjusting to climate variations, shocks, and technological adaptations, such as flooding irrigation systems disappearing. The updated data are published on the NMSU CES website. The tracking statistics indicate about 3,000 annual views of the data.

Updates were completed in conjunction with 15 counties of agricultural county agents, NMSU extension specialists, agricultural input industries including seeds and chemical companies, American AgCredit, crop farmers, 10 county governments, and New Mexico water districts.

**Pilja Vitale,** ***Extension Economist, Extension Economics***

**ACES Pillar: Food and Fiber Production and Marketing**

# NMSU Extension Collaborates on Dairy Partnership with Indonesia

Nearly 80 years ago, the national school lunch program began in the United States. Indonesia is attempting to establish its free lunch program for an estimated 80 million schoolchildren, and the New Mexico Department of Agriculture, working with New Mexico State University's Cooperative Extension Service, is collaborating to help the fourth-most populated country achieve that ambitious feat.

As members of the U.S. Indonesia Dairy Partnership, or USIDP, the U.S. Dairy Export Council, New Mexico Department of Agriculture, NMSU and Indonesian industry and academic partners are working on a dairy farmer training project to educate small and medium-scale Indonesian dairy farmers on various best practices for growing milk production and improving quality. USIDP officially launched in November 2024.

This project has been more than a year in the making, and Robert Hagevoort, Extension dairy specialist, and Dustin Cox, NMDA dairy division director, have made several trips to Indonesia.

With Indonesia's population of 277.5 million people and more than 17,000 islands, the virtual curriculum development of short, topic-specific videos enables a wider set of Indonesian farmers to access the training materials. NMSU and NMDA, working with Indonesian technical consultants, developed and directed the training videos.

Robert Hagevoort, second from right, Extension dairy specialist, and Dustin Cox, fourth from left, New Mexico Department of Agriculture dairy division director, met with technical consultants and U.S. Dairy Export Council representatives about the U.S. Indonesia Dairy Partnership.

The project has four objectives, farm management, including administrating farm operations from budgeting and personnel to infrastructure and sanitation, animal welfare and ongoing training; dairy animal nutrition, including feed management and trends, nutrition practices and reducing caloric stress; improving quality and increasing yields, including herd and pasture techniques, adaptation practices and weather management; and animal health, including treatment of diseases, vaccines and animal hygiene.

According to the U.S. Department of Agriculture, Indonesia was the seventh-largest dairy export market for the U.S. in 2023 with a total value of $304.85 million.

**Robert Hagevoort,** ***Extension Dairy Specialist, Extension Animal Sciences and Natural Resources***

**ACES Pillar: Food and Fiber Production and Marketing**

## Kitchen Creations: A Cooking School for People with Diabetes and their Families

Kitchen Creations empowers New Mexicans to manage diabetes effectively, improving health outcomes while increasing community awareness of Extension's and partnering organizations' broad support efforts. The Kitchen Creations program's potential healthcare and productivity cost savings exceed $345,000 in 2024.

New Mexico has the fifth highest diabetes mortality rate in the country. Diabetes costs New Mexico residents about $2 billion annually. Many families affected by diabetes face challenges in adopting eating habits that support effective health management. Access to nutrition and diabetes professionals is limited, particularly in rural areas and among uninsured residents.

The NMSU Cooperative Extension Service partnered with organizations throughout the state to provide 24 Kitchen Creations diabetes cooking schools to 289 participants in 16 counties. Classes provide 12 hours of hands-on group instruction led by Extension Agents, Registered Dietitian Nutritionists, and Certified Diabetes Care and Education Specialists. Participants received a comprehensive manual and diabetes-friendly cookbooks. For more information on the program, please visit https://kitchencreations.nmsu.edu.

There was a 99 percent satisfaction rating on program content and delivery. On average, participants adopted four recommended behaviors, including reading food labels to monitor carbohydrate intake, using herbs and spices instead of salt or fat, measuring food portions, and planning balanced meals using the 50/50 or Diabetes Plate method.

One participant said, "My blood sugars are lower, and I have lost 8 lbs. since the start of the class." Another said, "Blood sugar daily level has dropped by 35 pts and I'm using less insulin."

**Cassandra Vanderpool,** ***Extension Associate, Extension Family and Consumer Sciences***

**ACES Pillar: Family Development and Health of New Mexicans**

## Supporting Healthy Environments by Increasing Awareness of Insects in New Mexico

Insects and other arthropods are extremely important for healthy ecosystems and agriculture. There are many important services that arthropods provide, such as pollination, predation of pest insects/arthropods, and decomposition.

Around 80 percent of our crops in the United States require pollination by insects. Native bees and other insects are experiencing population declines due to overuse of broad-spectrum insecticides and habitat loss. Teaching insect identification, and strategies to support beneficial insects/arthropods, can help reduce population declines of these important animals.

As a result, in partnership with the Alto Coalition for Environmental Preservation and the ENMU-Ruidoso Branch Community College Extension, Entomology Specialist Joanie King presented in 2024 Insects of New Mexico: The Beneficials & The Pests. Preserved insects and live arthropods were also used so that participants could experience actual insects and arthropods (preserved and alive critters were used). One of the highlights for the live arthropods was a vinegarroon, which is a native and beneficial arachnid found in New Mexico.

About 98 percent of the participants said they learned something of value from the lecture and 30 percent said they would make physical efforts to modify their landscapes to be more suitable and "friendly" for beneficial insects in New Mexico. One participant said they would use lady beetles for biological control of aphids as part of their integrated pest management.

**Joanie King,** ***Extension Entomology Specialist, Extension Plant Sciences***

**ACES Pillar: Environmental Stewardship**

## Youth and Media Literacy: 2024 Games Lab Think Tank Sessions

In 2024, the Learning Games Lab hosted 53 middle school youth in summer and spring Think Tank sessions. Youth tested games like the USDA-NIFA funded Dr. Eugene's Biotech Lab and the Extension Foundation funded browser-based game Night of the Living Debt. They learned about game design, presented pitch ideas, and explored topics like DNA science and inclusive design.

Parents and youth both said the sessions were very useful for building skills in digital tools, teamwork, and creativity. Researchers collected valuable feedback from participants to improve educational media.

The Think Tank sessions gave youth new skills and confidence. About 76 percent of the participants said the program was "extremely good." Youth learned how to think critically about media and became more interested in coding and game design.

One participant described it as "an enriching experience full of diverse activities." Parents noticed improvements in creative thinking, problem-solving, and teamwork.

Today's youth need chances to learn digital skills and media literacy to succeed in a world of technology. They need practice evaluating online information, thinking about their use of media, and working with digital tools to create


Learning Games Lab consultants engaged in various gameplay and design activities during Think Tank sessions in 2024.

and share ideas. Youth voices are also important in making educational media that works well for them. Through hands-on sessions, youth grow their skills and contribute to the design of educational media created by the team. At the same time, the Learning Games Lab team learns from the youth's ideas and suggestions, making their educational games better. Inclusive design is also an important focus, helping to create media that works for different kinds of people. These sessions support youth in STEM fields and help make better educational tools for everyone.

**Matheus Cezarotto,** ***Extension Specialist Educational Technology, Innovative Media Research and Extension***

**ACES Pillar: Family Development and Health of New Mexicans**

## 2024 4-H Family & Consumer Science School of Real-Life Skillz

The Family and Consumer Science School of Real-Life Skillz was developed to create an enriching, interactive learning environment for 4-H youth across New Mexico. The program targets youth aged 9 to 12, aligning with the 4-H slogan, "Learn by Doing."

The FCS School of Real-Life Skillz is a collaborative, two- and half--day program organized by the State 4-H Office, FCS Committee, Junior Instructors, and County Extension Agents. It offers 4-H youth hands-on workshops and interactive learning opportunities in areas such as outdoor cooking, baking, STEAM, New Mexico culture, arts and crafts, and sewing. The program emphasizes community involvement through a service-learning project, with this year's collaboration involving the Dress a Girl Foundation.


The Family and Consumer Science School of Real-Life Skillz provided an enriching, interactive learning environment for 4-H youth across New Mexico.

FCS School equipped 4-H participants with practical skills, fostered personal development, and encouraged knowledge-sharing. Participants applied what they learned during the workshops and were encouraged to present their experiences at local 4-H club meetings. This practice not only reinforced learning but also promoted leadership and communication skills.

One participant said, "I had a great experience and would like to come back." Another said, "4-H is the best."

Providing opportunities for youth to experience independence and broaden their horizons is a critical element of youth development. School-aged youth must cultivate social and practical life skills to support

their success in adulthood. By providing enriching experiences, fostering friendships, and empowering youth to give back to their communities, the program continues to be a vital component of 4-H's mission to prepare youth for success in life.

**Marissa Morgan,** ***State 4-H and Family & Consumer Science Agent***

**ACES Pillar: Family Development and Health of New Mexicans**

## Container Farm Prototype Initiative Offers Real-World Experience

The Container Farm Project, an on-going initiative that started in September 2023, provides applied research experiences for students while furthering ACES' mission to enhance food security and agricultural understanding across the state.

The project's goals are to design and benchmark a container farm that includes custom hydroponic and atmospheric control systems, evaluate the technological research opportunities in controlled environment agriculture, provide applied research experiences for NMSU and DACC students, analyze the economics of container farm operations and manufacturing, attract private industry partnerships for further prototyping initiatives, and educate the public about the potential of controlled environment agriculture for sustainable food production.

These goals are pursued through hands-on design, operational trials, research collaboration, and public outreach activities.

More than 50 NMSU students across College of Engineering and Dona Ana Community College programs have contributed to the design and fabrication components of the project. About 10 of these students have worked directly with industry partner, Reliable Controls Inc., to design a custom digital control system for the unit. This collaboration has led to the establishment of a long-term research partnership with Reliable Controls, as they explore expanding their product line into the agricultural sector.

Other food industry partners, such as Roadrunner Foodbank have expressed strong interest in project outcomes and ongoing partnership on similar initiatives. Once completed, the unit will serve as a research platform for faculty and students. It will be housed at the New Mexico Farm and Ranch Museum, where it will engage thousands of visitors each year. As an active technology platform, it will offer an interactive experience that supports education and outreach initiatives.

**Alexander Wilson,** ***Statewide Extension Agent, Extension Economics & Center of Excellence in Sustainable Food in Agricultural Systems***

**ACES Pillar: Food and Fiber Production and Marketing**

# Second Annual Land Management Symposium Hosted by Philmont Scout Ranch

The second annual Land Management Symposium at Philmont Scout Ranch in August 2024 is a catalyst event designed to gather servant leaders from across the country to collectively explore, instruct, and debate land stewardship.

To advance scientific understanding and encourage actionable solutions to ecological and environmental challenges, the Cooperative Extension Service served on the symposium planning committee and as editor for the "Report to the Nation."

The Southwest faces large landscape natural resource challenges including drought, wildfire risk, woody encroachment, invasive species, and continued recreational use. Wildfire risk has intensified with climate change, hazardous fuels, invasive species, and an ever-expanding wildland urban interface. Likewise, water is another critical issue as prolonged droughts, reduced snowpack, and continued use of resources pressure urban, agricultural, and ecological systems. Effective land management and sustainable practices are essential to meet these challenges, ensuring the long-term resilience of the region's landscapes, communities, and natural resources.

Fifty invited participants and presenters from across the country gathered at the ranch to focus on land-management challenges and opportunities facing today's land stewards. Featured topics included pinyon-juniper management, riparian restoration, carbon credits, woody encroachment, backcountry road infrastructure, and pro-active approaches to the Endangered Species Act.

A field tour of the Vermejo Park Ranch provided a unique venue to engage in dialogue inspired by the surrounding sights. While touring the ranch, the contingent got a refresher course in identifying plant-associations found within PJ woodlands, tips on riparian restoration complete with beaver reintroductions, and a primer on a paradigm shift afoot within the woody encroachment management community. An additional field tour on Philmont focused on backcountry roadway construction, where the theme hinged on getting water off the road as soon as possible.

Of the 39 participants who responded to the symposium survey, 100 percent said they would recommend the symposium to fellow servant leaders, and 87 percent said they learned practical, research-based knowledge they could apply as land managers.

One participant said, "The symposium provided opportunities for interdisciplinary collaboration among land managers and researchers that can lead to impactful ecological solutions."

**Douglas Cram,** ***Extension Forest & Fire Specialist, Extension Animal Sciences and Natural Resources***

**ACES Pillar: Environmental Stewardship**

# Extension Get Fit Empowers Older Adults

Through the Extension Innovation grant received from Cooperative Extension Service for 2024, Extension Family and Consumer Sciences associates were able to have the University of Arkansas train nine county agents, and two extension associates on Extension Get Fit, a program targeting adults 50 years of age or older providing strength training sessions using dumbbells.

Developed by University of Arkansas Division of Agriculture Research and Extension based on strength training research, with a focus on mid-life and older adults. The current need for structured physical activity programs is greater than Extension, public health, or other health-focused agencies' capacity to address without employing new strategies. As the older population increases, the gap between need and availability of programs will also increase. The Extension Get Fit model allows peer leaders to get trained and deliver the series. This allows for series to continue and new cohorts to begin with the assistance of peer leaders.

A study in the Journal of the American Geriatrics Society found that implementing strength training and balance exercises could reduce fall-related hospitalizations by nearly 50 percent.

According to the CDC, one in four adults aged 65 and older fall each year, which is the leading cause of injury-related deaths and hospitalizations within this age group. As we age, we lose muscle mass, along with a decrease in muscle strength, flexibility, and balance. According to National Institutes of Health, about 30 percent of adults aged 45-64 say they engage in regular leisure-time physical activity. However, this number decreases to 15 percent for adults between the ages of 65-75 and 5 percent for adults aged 85 and older.

Sessions are usually held for 12 weeks, meeting twice a week for one hour. A video series was also created to help when training new agents or peer leaders as well as serve as a resource guide for agents to use as a refresher when there are gaps in between their series. There will also be a 24-slide deck featuring workout routines for the classes, this will help agents when prepping for their series as prepared routine workouts will be available for them to use.

Since the training, two counties, Bernalillo and Los Alamos, have launched the series, reaching 34 participants. Evaluations collected from participants in Bernalillo, indicated that 100 percent were satisfied with the program and 99 percent stated they felt better health wise and felt stronger. Better sleep was also reported by 87 percent of participants.

One participant said, "My balance is improved, I'm not running into walls. The strength in my wrist is amazing! My flexibility is awesome! Have enjoyed this program and look forward to each morning to work out!"

Research has shown that fall prevention programs, including strength training, can be cost-effective. Estimates suggest that if fall-related injuries among older adults could be reduced by 20 percent, it could save the U.S. healthcare system about $12 billion annually.

**Lourdes Olivas,** ***Extension Associate, Extension Family and Consumer Sciences***

**ACES Pillar: Family Development and Health of New Mexicans**


## Executive Summary

In 2024, the Center of Excellence in Sustainable Food and Agricultural Systems (CESFAS) built on its successes in industry partnerships, student development, research, and outreach, strengthening New Mexico's agricultural economy and communities. The Healthy Food Financing Initiative (HFFI), developed with Vida Mejor Capital, is proving how NMSU is leader for multilateral initiatives to drive investment and rural growth, providing a model for scaling larger efforts. CESFAS affiliated faculty developed the Sustainable Solutions Lab, the first of its kind in the state, designed to accelerate the commercialization of value-added agricultural technologies. Faculty affiliated with the center supported the development of a Pecan Innovation Center effort in partnership with Tarleton State University, submitting early-stage congressional funding requests to position New Mexico as a leader in pecan research, processing, and commercialization.

A strong student pipeline is essential to achieving these ambitions, and CESFAS has expanded hands-on learning opportunities through capstone projects with the College of Engineering and Dona Ana Community College, internships, and direct faculty mentorship. The Container Farm Project alone provided 50 students with real-world experience in applied

agricultural innovation, while research competitions and digital learning initiatives expanded student exposure to emerging industry challenges. These efforts ensure that New Mexico's agricultural sector continues to benefit from a skilled, innovation-driven workforce.

CESFAS affiliated faculty have secured over $3.5 million in research funding, driving advances in sustainable food systems, food safety, and post-harvest innovation. Key research projects included cold plasma treatment as an alternative to methyl bromide, mycotoxin surveillance in New Mexico chile, sustainable forage production in arid biomes, and economic analysis of cold storage. Along with others, these efforts resulted in thirteen peer-reviewed publications, two industry publications, and two invention disclosures, reinforcing NMSU's leadership in applied agricultural research. Alongside these successes, CESFAS expanded outreach efforts, which include leading food safety training programs, collaborating with Roadrunner Food Bank to tackle food insecurity, and engaging over 80 industry stakeholders through initiatives like the Certified Butcher Program and Ag Day 2024. Through innovation, education, and industry collaboration, CESFAS continues to drive economic growth and resilience, positioning NMSU as the home of New Mexico's agricultural and food system.

***Note:*** *The highlights, accomplishments, and products listed reflect the contributions of faculty, staff, and students affiliated with CESFAS. While these individuals hold their primary appointments within departments in the College of Agricultural, Consumer, and Environmental Sciences (ACES), their work aligns with and advances the CESFAS mission, supporting sustainable food and agricultural systems through research, education, and outreach.*

# Academic Highlights

## Teaching Novelties and Results

### Container Farm Prototype and Exhibit

CESFAS partnered with the College of Engineering and Doña Ana Community College to integrate CESFAS research into student capstone projects. This collaboration includes the development of a 20-foot container farm, designed as both a research platform for NMSU and an interactive living exhibit at the New Mexico Farm and Ranch Museum, fostering public education and engagement in sustainable agriculture.

### NMSU Research and Creativity Week

CESFAS faculty assessed student presentations of research conducted at NMSU, particularly from the College of Agriculture.

- **Topics Covered:** Crop and soil health experiments with AES and bird health in the Tucumcari Valley due to nighttime light levels.
- **Engagement:** Interacted with over 30 participants, asking assessment questions, and evaluating their research presentations.
- **Collaboration:** Worked with fellow judges and event organizers to identify the winners of the presentation competition.

## Online Teaching Offerings

### Website Renewal

Led a team to develop a new vision and website for CESFAS, refining the mission and goals. This project involved:

- Articulating CESFAS's activities, faculty, and public representation across a broad internal and external audience.
- Identifying and engaging with key audiences and showcasing services like wine tasting, meat processing training, granting programs, and internship support.
- Aligning messaging under new leadership to ensure the website accurately reflects CESFAS's work and vision.
- Conducting investment analysis on key services and creating a new website structure, and personnel certification in Cascade Web Development.
- Collaborating with Emarkets and ACES IT to develop an enhanced wine processing service infrastructure.

# Research Highlights

## List of Grants Awarded

### Healthy Food Financing Initiative (HFFI) (USDA)

**$3M total, NMSU sub-award: $305K**

**Description:** The Healthy Food Financing Initiative (HFFI) is a public-private partnership designed to improve access to healthy food in underserved areas by providing financial and technical assistance to fresh food retailers and food supply chain enterprises. Established by the 2014 Farm Bill and reauthorized in 2018, HFFI helps these businesses overcome higher costs and entry barriers, aiming to expand food access and strengthen food systems, particularly in communities facing food insecurity. The initiative is administered by Reinvestment Fund on behalf of USDA Rural Development.

**Effective Start Date:** October 1, 2024
**Effective End Date:** October 1, 2029

## Assessment of Mycological Quality and Mycotoxin Contamination of New Mexico Red Chile and Paprika Production Chain

**NM Chile Association. $71K total**

**Description:** Red chile and paprika crops are used in the manufacture of a wide variety of food products that are popular among consumers. Mycotoxin surveillance studies around the world have reported the presence of fungal secondary metabolites in these products such as aflatoxins, ochratoxin A, and fumonisins. Although such surveillance studies have not been conducted in New Mexico, they will be of benefit to the chile industry by providing information on whether mycotoxin-producing fungi are present at different stages of New Mexico's red chile and paprika production chain. The present research proposal aimed to assess the presence of mycotoxigenic fungi in New Mexico's red chile and paprika production chain. Samples of red chile and paprika products were collected at various stages of the supply chain including storage, drying, and final dehydrated products. Selected mycotoxins were quantified using a monoclonal antibody-based affinity spectrofluorimetric method. This study enabled the New Mexico Chile Industry to understand the current status of the presence and extent of mycotoxin contamination and take countermeasures to mitigate potential food safety issues.

**Effective Start Date:** July 01, 2024
**Effective End Date:** June 30, 2025

## Cold Plasma Treatment – A Novel Approach as an Alternative to Methyl Bromide Treatment for Disinfestation and Microbial Safety in Pulses (USDA-MBT).

**$623K total, NMSU sub-award: $121K**

**Description:** The project aims to revolutionize post-harvest pulse treatment methods by establishing cold plasma as a sustainable and effective alternative to methyl bromide fumigation for disinfestation and microbial safety in pulses. The primary objective is to utilize innovative techniques, including hyperspectral imaging and cold plasma treatments, to detect insect infestation in pulses and achieve a disinfested and microbially safe product with an extended shelf-life.

**Effective Start Date:** September 01, 2024
**Effective End Date:** August 31, 2027

### Strategies for Upcycling Ice Cream Waste (Ravenwood Foods LLC)

**$69,000**

**Description:** Overall, the overarching concept is to use ice cream waste as a feedstock to produce value-added products. A guiding principle for the work proposed is upcycling that involves a combination of processes (e.g., physical and chemical) that convert materials (e.g., waste) into new ones of higher quality and increased functionality (e.g., jet fuel, additives, and ingredients). Overall, the entire project is broadly divided into four phases.

**Effective Start Date:** June 01, 2024
**Effective End Date:** May 30, 2025

### Innovation in Ice-Cream Manufacturing and Value Creation Opportunities (Wells Enterprises)

**$180,000**

**Description:** The main objective is to design frozen desserts that possess specific attributes—creaminess, mouthfeel, mouthcoating, and slow melting—by carefully controlling the molecular modifications of ice cream ingredients. The findings from this project not only will provide valuable insights into the field but have also will result in intellectual property with significant commercial potential.

**Effective Start Date:** January 01, 2023
**Effective End Date:** May 30, 2025

## List of Grants Awarded

Minor, M., Martínez-Monteagudo, S. I., & Sabillón, L. (2024). Photothermal pasteurization of paprika powder by ultra-high irradiance blue (405 nm) light: Impact on Salmonella inactivation and quality attributes. *Innovative Food Science &Emerging Technologies, 94,* 103672.

Alvi, M. A. U. R., & Martinez-Monteagudo, S. I. (2024). Mapping the meltdown behavior of frozen dairy desserts. *Journal of Dairy Science, 107*(8), 5473-5480.

Doddabematti Prakash, S., Rivera, J., Sabillón, L., & Siliveru, K. (2024). From wheat grain to flour: a review of potential sources of enteric pathogen contamination in wheat milled products. *Critical Reviews in Food Science and Nutrition*, 1-11.

Mendoza, J. R., Sabillón, L., Howard, R., Espinal, R., Leslie, J., Harvey, J., & Bianchini, A. (2024). Assessment of handling practices for maize by farmers and marketers in food-insecure regions of Western Honduras. *Journal of Agriculture and Food Research, 16,* 101140.

Rivera, J., Shivaprasad, D. P., Sabillón, L., & Siliveru, K. (2024). Enteric pathogen survival, food safety incidents, and potential mitigation strategies to address microbial contamination in wheat-based foods: A review. *Critical Reviews in Food Science and Nutrition*, 1-12.

Minor, M., Sabillón, L. (2024). Effectiveness of ultra-high irradiance blue-light-emitting diodes to control Salmonella contamination adhered to dry stainless-steel surfaces. *Microorganisms*, 12, 103.

Giotto, F. M., Gamage, N. H., Franco, A. M., Gerrard, D. E., Fonseca, M. A., & de Mello, A. S. (2024). Effects of liquid-based diets with breweries grains enriched with isolated starch and fish oil on veal quality. *Meat Science*, 216, 109592.

de Mello, A. S., Ferguson, B. S., Shebs-Maurine, E. L., & Giotto, F. M. (2024). MicroRNA Biogenesis, Gene Regulation Mechanisms, and Availability in Foods. *Non-coding RNA*, 10(5), 52.

Gamero-Barraza, J. I., Pámanes-Carrasco, G. A., Delgado, E., Cabrales-Arellano, C. P., Medrano-Roldán, H., Gallegos-Ibáñez, D., ... & Reyes-Jáquez, D. (2024). Computational modelling of extrusion process temperatures on the interactions between black soldier fly larvae protein and corn flour starch. *Food Chemistry: Molecular Sciences, 8,* 100202.

Quintero Quiroz, J., Velazquez, V., Torres, J. D., Ciro Gomez, G., Delgado, E., & Rojas, J. (2024). Effect of the Structural Modification of Plant Proteins as Microencapsulating Agents of Bioactive Compounds from Annatto Seeds (Bixa orellana L.). *Foods, 13*(15), 2345.

Ávalos, J. F. M., Barraza, J. I. G., Delgado, E., Rosas, M. I. G., Aldapa, C. A. G., Roldán, H. M., ... & Jáquez, D. R. (2024). Study of molecular dynamic interactions during the optimized extrusion processing of corn (Zea mays) and substandard bean (Phaseolus vulgaris). *Food Chemistry Advances, 4,* 100723.

Paśko, P., Galanty, A., Dymerski, T., Kim, Y. M., Park, Y. S., Cabrales-Arellano, P., Martinez VV, Delgado E., Gralak, M., Deutsch, J., & Barasch, D. (2024). Physicochemical and volatile compounds analysis of fruit wines fermented with saccharomyces cerevisiae: FTIR and microscopy study with focus on anti-inflammatory potential. *International Journal of Molecular Sciences, 25*(11), 5627.

Paśko, P., Galanty, A., Ramos-Zambrano, E., Ayala, A. L. M., Delgado, E., Argasińska, J. G., ... & Gorinstein, S. (2024). Pseudocereal oils, authenticated by fourier transform infrared spectroscopy, and their chemopreventive properties. *Plant Foods for Human Nutrition, 79*(1), 151-158.

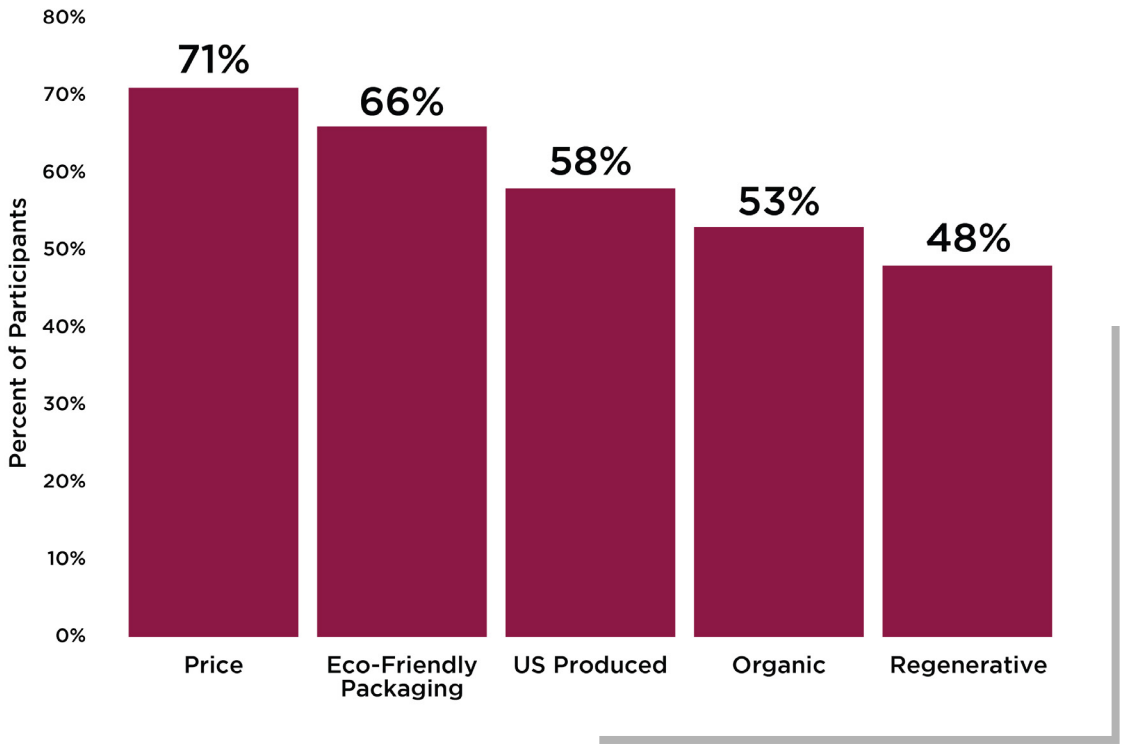
## Patents

1. Method for recovering fat and removing allergens from ice cream waste.
2. Method for increasing creaminess in non-fat Greek yogurt. INV-00129

## Industry Publications

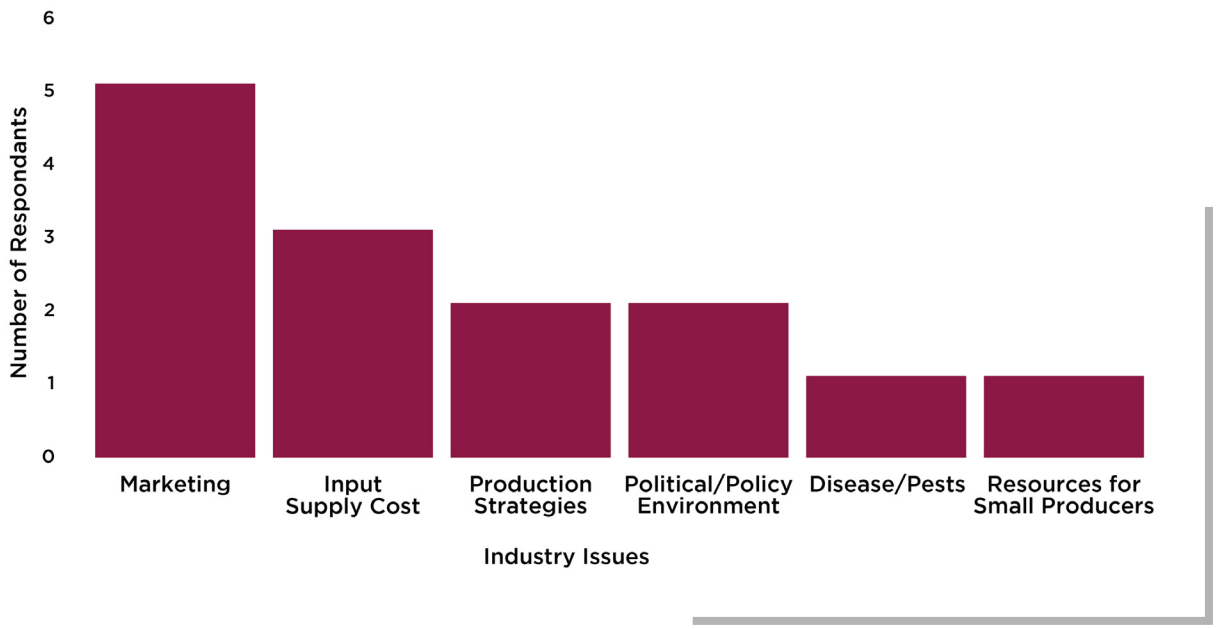
### Wilson, A. Lillywhite J. "Pecan Consumer Perspectives on Alternative Agricultural Production Systems" Pecan South Magazine, (July 2024)

**Synopsis:** This research examines consumer perceptions of regenerative agriculture in the pecan industry. Findings indicate that while awareness of regenerative agriculture is low, frequent pecan consumers value these practices. However, factors like price, production location, and packaging are more important in purchasing decisions.




### Wilson, A. Lillywhite J. "Producer Perspectives of Alternative Agricultural Production Systems" Pecan South Magazine, (October 2024)

**Synopsis:** This study explores pecan producers' views on alternative agricultural practices, such as organic and regenerative agriculture. Findings highlight motivations and barriers to adoption, including economic returns, environmental benefits, financial challenges, and sociocultural factors.




## Contribution to the Six Goals of NMSU's Strategic Plan

Here are some highlights, significant achievements and impactful initiatives undertaken by CESFAS personnel. Our dedicated team has made remarkable strides in enhancing student success, elevating research and creativity, amplifying extension and outreach, and building a robust university system. Here are some key statistics for 2024:

### Goal 1: Enhance Student Success & Social Mobility

**Internship Opportunities:** CESFAS personnel successfully established collaborations with the NMDA and the Border Industrial Association, providing valuable internship opportunities for students.

**Undergraduate & Graduate Mentorship:** The Center's research initiatives are powered by a dedicated team of four graduate students and one undergraduate student from AEAB. Additionally, the Container Farm project has provided hands-on experience to 50 undergraduate students, directly involving them in innovative research and practical applications.

**Student Engagement:** Overall, 100 students were involved in CESFAS-affiliated projects.

## Goal 2: Elevate Research & Creativity

**Cross-Disciplinary Research:** CESFAS personnel engaged in cross-disciplinary research with LANL and industry partners, including the Container Farm initiative.

**Applied Research & Commercialization:** Collaborations with Reliable Controls Inc. have advanced applied research and commercialization efforts, ensuring that student learning is connected to real-world applications.

## Goal 3: Amplify Extension & Outreach

**Certified Butcher Program & Ag Day 2024:** CESFAS personnel organized key community outreach events, including the Certified Butcher Program and Ag Day 2024.

**Agricultural Research:** The Center's involvement in the Pecan Innovation Center project has significant potential to advance agricultural research and strengthen public-private partnerships.

**Culturally Responsive Outreach:** CESFAS personnel's commitment to culturally responsive outreach ensures that our work remains impactful and relevant to the communities we serve.

## Goal 4: Build a Robust University System


**Industry Partnerships:** CESFAS personnel focused on building key industry partnerships between NMSU and Vida Mejor Capital and the Sante Fe Famers Market Institute specifically for sustainable agriculture initiatives.

**University Service:** CESFAS personnel played a key role in university service through supporting initiatives like the Numex Alfalfa project, proactive budget analysis, and overseeing the redevelopment of our website to highlight NMSU with key audiences.

**Food System Development:** Through leadership in the Healthy Foods Funding Initiative, CESFAS personnel supported economic development within New Mexico's rural food systems, and enhanced NMSU's position as catalyst for sustainable food system transformation.

**Website Links for Your Unit:** https://aces-cesfas.nmsu.edu/

# Extension Highlights

In 2024, CESFAS personnel made significant strides in extension and outreach, engaging with the community and addressing critical local challenges. Here are some of the key highlights of our extension efforts:

## Sales Analysis: AES Numex Alfalfa

**Sales Price Analysis:** The team conducted a sales price analysis using a capital investment model to identify the likely breakeven costs for purchasing the license to grow these hybrids from the perspective of seed distributors, considering varying market conditions.

**Date:** October 1, 2024

## Policy Analysis: New Mexico Vine Fund

**Policy Submission:** Center personnel submitted a policy analysis for review to the New Mexico Winegrowers Association.

**Capital Investment Analysis:** The analysis presented key findings from a capital investment analysis that estimates the return on the New Mexico State Legislature's investment in the New Mexico Vine Fund.

**Economic Impact:** The analysis quantifies the benefits of this public investment by using IMPLAN's direct and indirect tax revenue models, which calculate impacts to state tax revenues generated by the new wine plantings at the state's wineries. This model provides valuable insights into the long-term financial benefits of supporting the wine industry and demonstrates the positive effects of public investment on the local economy.

## Hatch Valley Public Schools: Container Farm Tour

**Site Tour and Collaboration:** Organized and led a site tour and collaborative discussion between NMSU faculty and students and the Hatch Valley Public Schools faculty and students, focusing on the container farm they operate for educational purposes.

**Meetings Facilitated:** Facilitated two meetings between both teams, including our research administration and their administration.

**Hands-On Experience:** During the tour, participants explored the facilities, gained a deeper understanding of container farm operations, and observed a fully commercialized container farm in action. This experience was valuable for NMSU's ongoing efforts around container farms, especially for our College of Engineering students, who gained hands-on insights into real-world applications.

## Roadrunner Food Bank-CESFAS Meeting & Tour

**Addressing Food Insecurity:** New Mexico faces significant food insecurity, especially in rural areas and along the U.S.-Mexico border. Roadrunner Food Bank, the state's largest, is crucial in addressing this issue but struggles with key infrastructure challenges.

**Partnership Exploration:** Roadrunner Food Bank is working to expand their buying program along the border, sourcing more affordable, fresh food, and exploring partnerships with NMSU to investigate emerging technologies for improving food distribution.

**Collaborative Meeting:** To forward the collaborative relationship, CEO Dana Yost and key leadership visited NMSU in Las Cruces for a hosted lunch, working meeting with CESFAS personnel, and site tour of our new meat processing research facilities.

## Food Safety Outreach Program

**Preventive Control for Human Food (PCHF) Workshop.** The FSMA PCHF rule requires every processing facility to have a trained resource person or "Preventive Controls Qualified Individual." Therefore, it is of utmost importance to understand FSMA regulations not only to comply with the law, but also to produce safer foods.

**Better Process Control School (BPCS) Workshop.** The FDA and USDA require that local processors of low-acid or acidified foods always operate with a certified supervisor on hand during processing. The BPCS workshop fulfills this FDA and USDA requirement by providing training in acidification, thermal processing, and container closure evaluation.

**Hazard Analysis Critical Control Point (HACCP) Workshop.** The HACCP system is the universal language of food safety management. This course provided participants with foundational knowledge and tools to develop and implement HACCP plans applicable to a variety of industries and commodities.

**Certified Butcher Program:** Showcased at NMSU Outreach Conference, training a total of 131 trainers (76 out-of-state, 55 in-state).

### ASC Los Lunas Field Day

Participated in the exploration of novel crops.

### AG Day 2024

Served over 300 portions of mango ice cream featuring guar gum research.

### New Mexico Food Protection Alliance

Participated in strengthening food safety collaborations.

### Water Townhall

Hosted an event to address statewide water challenges.

### One-on-One Stakeholder Consultations

Engaged with over 80 members of the New Mexico food and fiber supply chain to identify areas of partnership and collaboration, and to better understand the capacity of NMSU ACES as a partner for development.

## Faculty Innovations

Container Farm Project has made significant strides this year, showcasing our commitment to innovation and sustainable agriculture. Below are the key developments:

**Final Fabrication at DACC:** Underway with the incorporation of advanced HVAC and automation systems.

**Collaboration with Reliable Controls Inc.:** Partnering to develop state-of-the-art hydroponic control systems.

**Future Hosting at NM Farm & Ranch Museum:** The farm is anticipated to be hosted as a living exhibit, offering an educational and interactive experience for visitors.

## Economic Development Impacts

Our economic development initiatives have made substantial progress this year, contributing to the growth and sustainability of the agricultural sector. Key impacts include:

**Healthy Food Financing Initiative:** Providing technical assistance to support underserved food enterprises.

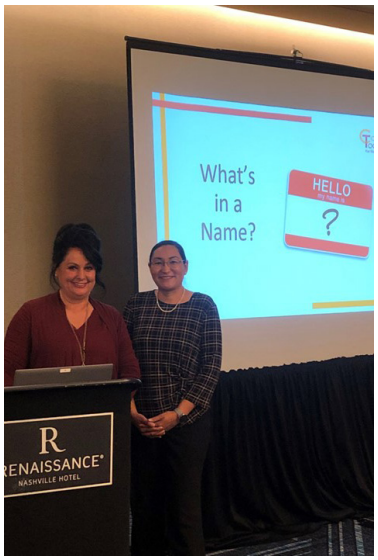
**Pecan Industry Research:** Conducting feasibility studies for on-farm pecan cold storage and developing value-added pecan products.

**Food Waste Utilization:** Developing sustainable methods to upcycle ice cream and agricultural byproducts.

**Value-Added Research Facility:** Secured $385K in seed funding and college laboratory space for the development of a value-added research facility.


## Executive Summary

The College of Agricultural, Consumer and Environmental Sciences (ACES) serves as the engine for economic and community development in New Mexico, improving the lives of New Mexicans through research, teaching and Extension. To best serve the needs of all New Mexicans, ACES is committed to creating an environment that enables all students, faculty, and staff to fully engage in the educational, outreach and scholarly pursuits. Dr. Laura Bittner, Extension Health and Well-being Specialist, and Dr. Karim Martinez, Extension Family Life and Child Development Specialist, currently serve as co-directors of this initiative. Their duties include coordinating and managing strategic activities on behalf of ACES while serving as a liaison to related campus-wide initiatives.



# 2024 Highlights

## Projects

Since February 2024, Dr. Bittner and Dr. Martinez have served as co-chairs for a Cooperative Extension Service (CES) ad hoc committee to revise the Extension Demographic Contact Reporting system to better align with United States Department of Agriculture-National Institute of Food and Agriculture (USDA-NIFA) Civil Rights Demographic Reporting guidelines. Collecting demographic information from Extension participants is a requirement of federal funding and ensures that Extension programs are available to everyone in New Mexico.

As co-chairs, Dr. Bittner and Dr. Martinez facilitated meetings, researched reporting systems from other Extension organizations and consulted with national experts. Through this committee, new forms, data collection processes, and an online database were created. In addition, live training sessions were provided for 156 Extension faculty and staff. A session was also recorded and posted on the Contacting Reporting website for reference. The new system was launched in January 2025 and will be assessed in July 2025.

Another project of this initiative was establishing a College of ACES Advisory Committee to expand current efforts and identify new strategies to improve student, staff, and faculty recruitment and retention.  Twelve ACES faculty and staff representing eight departments volunteered to serve on this committee.

## Presentations

As part of Dr. Bittner's and Dr. Martinez's co-director roles, they were invited to present "Let's Talk! Creating Inclusive Organizations Through Conversation" at the National Extension and Research Administrative Officers Conference in Delaware on April 9, 2024.  As a result of the positive audience reception in Delaware, they were invited to present "Together We Thrive: Building Strong Workplace Connection" at the Extension Western Region Administrative Officers meeting in Cody, WY. A third presentation was provided for the United States Department of Agriculture-Foreign Agricultural Service (USDA-FAS) Cochran Fellowship Program, titled "Reaching New and Underrepresented Audiences," on July 31, 2024. The Cochran Fellowship Program provides 2-3 weeks of U.S. agriculture training in which Fellows receive hands-on training to enhance their technical knowledge and skills in areas related to agricultural trade, agribusiness development, management, policy, and marketing.

Dr. Bittner and Dr. Martinez also coordinated two trainings for ACES administrators, faculty and staff. The focus of these trainings was to educate and train students, faculty, and staff on how to increase understanding and sense of belonging for individuals and community members.

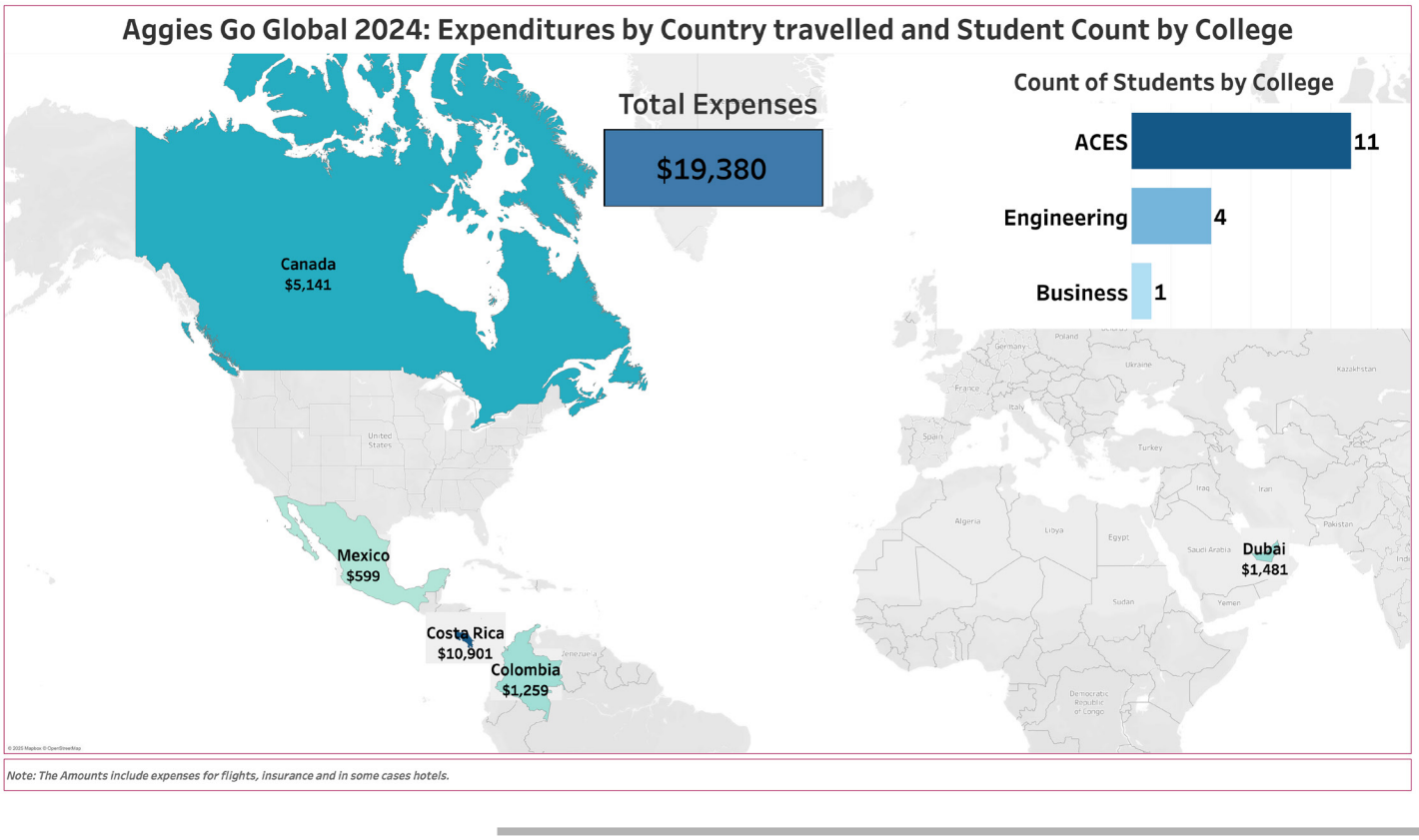

## Executive Summary

The mission of the Aggies Go Global (AGG) program is twofold: Firstly, it aims to afford every student within the College of Agricultural, Consumer, and Environmental Sciences an enriching international experience before they graduate. Secondly, AGG is committed to advancing the LEADS 2025 goals, particularly in terms of social mobility (Goal 1) and leveraging research to address local needs aligned with global challenges (Goals 2.3 and 2.4). This program is aligned with ACES' Strategic Objectives 4.1 and 4.5, focusing on global student recruitment and sustained engagement in international initiatives.

Through forging new Memorandums of Understanding (MOUs) with international universities and institutions, AGG is actively bolstering NMSU's global standing. Additionally, the College of ACES endeavors to facilitate faculty engagement in global pursuits, emphasizing activities such as teaching short courses abroad, organizing or participating in international workshops, and cultivating opportunities for NMSU students' global exposure through collaboration with AGG.

Participation in grant proposals, including those from large to small, serves to amplify the societal and economic impact of research, while fostering international collaboration and technology transfer (LEADS objective 2.4).

Incentivizing global engagement, AGG administers an annual Outstanding Global Work Award and travel grants for faculty and students. Moreover, in its quest to extend outreach to ACES alumni, the program confers an International Distinguished Alumni award, thus broadening its impact and fostering a global network of ACES partners.




## Executive Summary

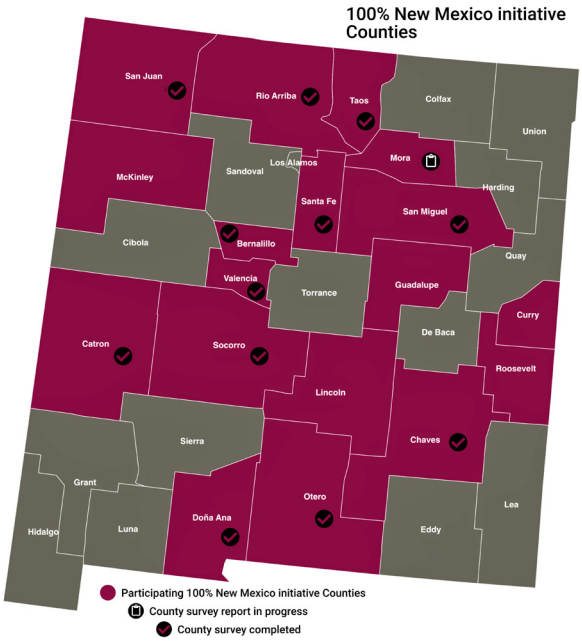
**Anna, Age Eight Institute – Transforming the Lives of New Mexico's Families**

The Anna, Age Eight Institute's mission is to transform New Mexico into a state where all children, students, and families can thrive. Through the 100% New Mexico initiative, we are addressing two critical challenges: adverse childhood experiences (ACEs) and negative social determinants of health (SDOH) by providing frameworks, research, and technical assistance at the county level to ensure access to the ten vital services essential for families to thrive. In 2024 we continued to support 18 counties currently participating in the initiative. The frameworks guiding the initiative are the social determinants of health framework, the transformational pedagogy framework, and the social-ecological framework that guide social change on four levels: individual, family, community and societal/policy. Our goal is to ensure ten vital services for 100% of families, including:

- **Medical/Dental Care**
- **Behavioral Healthcare**
- **Food Security Programs**
- **Housing Security Programs**
- **Transportation**
- **Parent Support, including home visitation programs**
- **Early Childhood Learning Programs**
- **Community Schools with health and family services**
- **Youth Mentor Programs**
- **Job Training**

At our five-year mark, service disparities continue to diminish the lives of New Mexico's children, students, and families, reinforcing the need for our data-driven approach to positive change. We completed six new county surveys of the barriers that prevent families from accessing vital services, bringing the total number of counties completing surveys to thirteen. Our mini-grants this year to local initiatives continued to support counties in building qualified teams to turn survey results into action. Our strategy is focused on operationalizing the social determinants of health across the entire state.

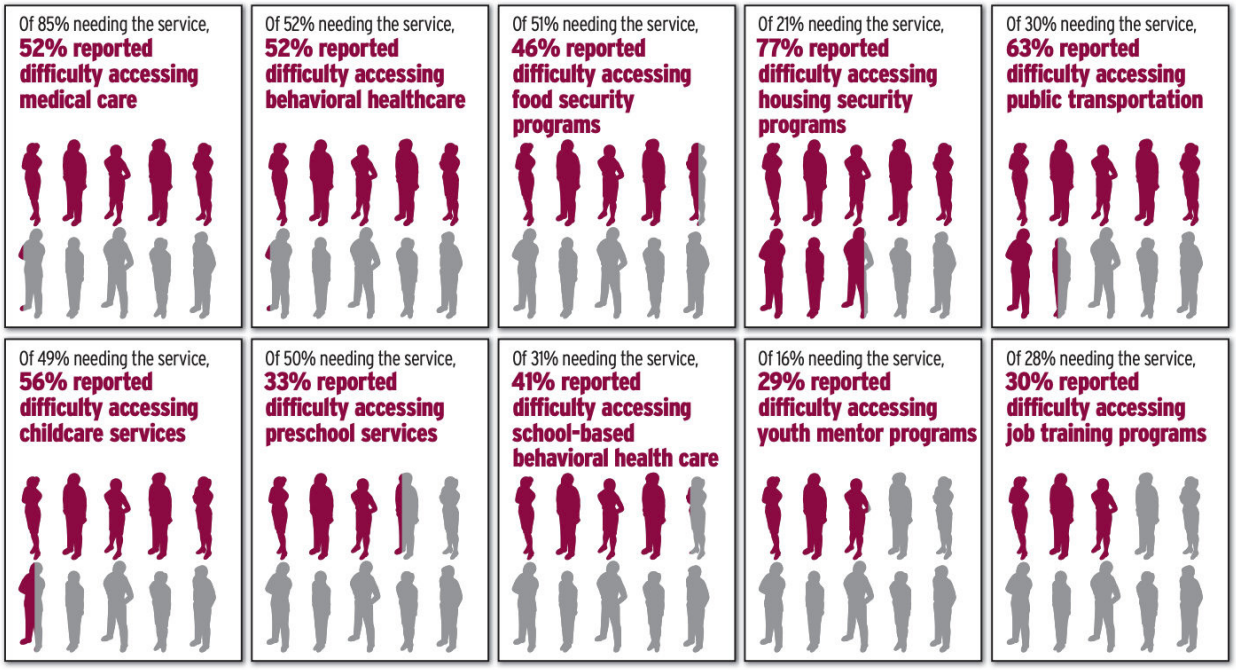
Our most significant advancements took place in the area of our 100% Family Center: One-stop Service Hubs. The centers act as hubs for multiple activities. Most importantly, staff help families connect to vital services onsite, online, or through staff navigators that are much needed in the community, with service barriers identified through our local 100% New Mexico survey. The centers have a dual purpose, linking families to services and growing services using continuous quality improvement. These centers, once funded, will also be staffed to address workforce shortages in healthcare providers, teachers, and social workers. Our 100% San Juan County initiative was instrumental in supporting the development of a family center, partnering with Presbyterian Medical Services, and is on target to open its doors in early 2025, with two additional counties closing in on this significant milestone soon after. Our 100% Chaves County initiative is partnering with the non-governmental organization, CASAKids, to support their expansion into a full-service hub. Proposals for Hub are being developed in most initiatives, guided by the online course, "Developing a One Stop Service Hub."




NM counties participating in the 100% New Mexico initiative with survey completion status

## Surveys: A Vital First Step

The initiative leaders in every county know that families have difficulty reaching what we collectively call the ten vital services for surviving and thriving: medical and dental care, behavioral healthcare, food security programs, housing security programs, transportation, parent supports, early childhood learning, community schools, youth mentor programs, and job training. In some cases the services exist, but they are inaccessible for a multitude of reasons. In other cases, the services are entirely absent or are so far away they might as well not exist. The initial county survey uncovers these barriers and serves to guide capacity-building work in ten sectors.




Example survey results at-a-glance from the Taos County survey

In 2024 we had six counties complete their initial survey with the goal of achieving the largest-possible relevant dataset. Mora County will soon join the ranks.

- Chaves
- San Juan
- Doña Ana (2nd round)
- Socorro (2nd round)
- Taos
- Valencia (2nd round)

They join the group of nine counties where the data collected from completed surveys are being analyzed and acted on, some on their second survey completion.

- Bernalillo
- Catron
- Doña Ana
- Otero
- Rio Arriba
- San Miguel
- Santa Fe
- Socorro
- Valencia

## Maintained Directories to Verified Services

Another data collection step in the initial phases of the initiative is to complete a directory of verified services within the county. Many directories containing resources in New Mexico exist, but their data is not typically vetted. Initiative team members identify local resources, then contact each one to verify hours, services, costs, transportation, and more. It is not unusual for this step to reveal that many service providers no longer exist or their service details are inaccurate, out of date, or misleading. As of 2024, Catron County, Curry County and Roosevelt County, Otero, Rio Arriba, San Juan, San Miguel, Socorro, and Taos have all completed this step and now have published publicly accessible, vetted directories. Notably, the Anna, Age Eight Institute has continued to assemble AI-based tools including conversation-based interfaces to help county teams reduce the labor intensity of this important step and the necessary reevaluation steps in the future.

## Summits Build Momentum

Our local 100% New Mexico initiative summits bring together community leaders and community members to discuss how to coordinate resources to make sure that 100% of the residents in the county have access to the vital services needed to survive and thrive. The summits are open to the public and bring lawmakers, service providers and community members to the table to discuss topics such as fully resourcing local schools, establishing the 100% Family Center: One Stop Hub model, and building partnerships so that 100% means everyone's in and no one is out. Summit activity again soared in 2024. Our local initiatives held summits in no fewer than ten counties, along with special focus summits on topics such as housing.

Peg Crim of the 100% Otero County initiative discusses local challenges and solutions at the 100% Otero Summit

# Training Leaders for Success

The institute continued our successful and productive in-person training series for 100% New Mexico initiative leaders. The 2024 "Road to the 100% New Mexico Initiative" training event was an opportunity for initiative leaders from the participating counties to join together for a shared learning experience and covered the topics vital to the success of the initiative in each county.

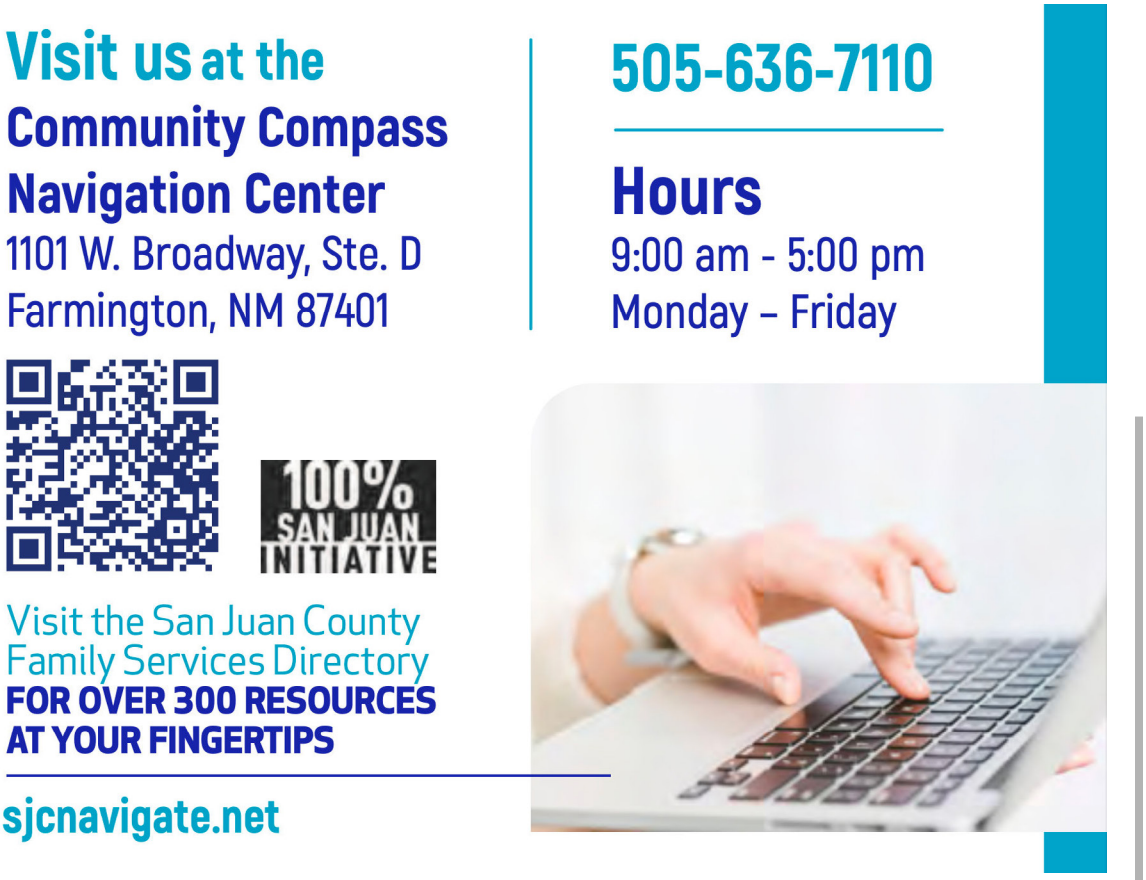
- Strengthen local support for the 100% Community model to ensure ten vital services to prevent adversity inside and outside the home.
- Build local capacity to facilitate the 100% New Mexico initiative's seven steps including surveys, directories, summits, mural projects, and buy-in from local government and stakeholders.
- Create and pitch proposals for the 100% Family Center: One-Stop Service Hubs and meet the urgent need of families by ensuring ten vital services for surviving and thriving.
- Identify potential funders and partners within the public and private sectors and on every level of government to support the development of the 100% Family Center as a transformative community and school-based model.

The training sessions offered the initiative leaders a chance to develop the skills, resources, and insights to do transformative work in local problem-solving, capacity-building, and community engagement as we ensure ten vital services for surviving and thriving for 100% of New Mexico's children, students, and families. Sessions are also introducing local leaders to the power of AI, sharing insights on the effectiveness and ethics of AI use in community-building and communications work.


Dominic Cappello addresses attendees at 100% training in Santa Fe

## Meeting the Need: 100% Family Centers

The 100% Family Center concept, a one-stop service hub, is a cornerstone of the initiative. These centers provide centralized access to ten vital services, offered both onsite and online. Dedicated staff are available to guide individuals and connect them with local service providers, eliminating the complexities of navigating fragmented systems. San Juan County will open a first-of-its-kind center in early 2025 under the branding of the "Community Compass Navigation Center." Two additional counties will reach the milestone by mid-year. To make this happen, detailed plans were reviewed with local stakeholders, locations were identified, and grant applications submitted. The process clearly demonstrates that we know the challenges and how to fix them. All that's lacking is the buy-in to make the health, safety, and education of 100% of New Mexico's children and students the number one priority.




By developing a 100% Family Center: One-Stop Service Hub in every county, we are connecting families with real solutions to real problems.

*The 100% New Mexico initiative has the potential to transform the adverse social determinants of health into positive ones, giving every family in New Mexico access to the services they need to thrive.*

**– Dominic Cappello, Co-Director of the Anna, Age Eight Institute**

## Evaluating Progress

All components of the initiative are evaluated by our outside evaluation team, housed at Chapin Hall. They oversee the assessment of each county's seven-step process, designed to move from assessing service needs and barriers to supporting community-based capacity-building and public awareness strategies to supporting policy change to increase access to vital services. Their latest report/research brief, published in 2024, was "Results from the 100% New Mexico Initiative." The team is also assisting the institute team in developing and publishing articles in peer-reviewed journals, focusing on how New Mexico is operationalizing the social determinants of health in counties and assessing the initiative's impact on households, communities, and localities across the state.

## Conclusion

The 100% New Mexico initiative thrives on the power of partnerships. We greatly appreciate the steadfast commitment of NMSU, alongside our partners, community leaders, and dedicated team members. United in purpose, we are creating meaningful change for countless individuals, families, communities, schools, family-serving organizations, local governments, and workforces across the state. Through a shared dedication to collaboration and a focus on proven strategies, we are paving the way for resilient communities and a thriving New Mexico.


## Executive Summary

In 2024, IRD continued its journey of growth and learning, with a focus on inspiring the next generation of tribal leaders. The efforts were aimed at strengthening relationships with tribal communities, expanding educational resources, and fostering economic development. IRD remained committed to addressing the unique needs of Native American students and tribal nations across New Mexico. This report outlines the key areas of focus and the actions that were taken to achieve the mission in 2024.

# 1. Agriculture: Promoting Food Sovereignty and Sustainable Practices

## Objectives

- Supported tribal farmers and ranchers in sustainable agriculture and food sovereignty.
- Increased internship opportunities for Native American students in agriculture-related fields.

## Key Actions

- Collaborated with NMSU ACES to organize workshops, webinars, and field days on regenerative agriculture and food sovereignty.
- Launched internship programs in agricultural sciences (plant/soil science, agricultural engineering) for high school and college students in tribal communities.
- Supported climate resiliency initiatives by helping tribes adapt agricultural practices to meet environmental challenges.

## Expected Outcomes

- An increased number of Native American students pursued agricultural careers.
- Enhanced capacity for tribal communities to implement sustainable farming practices.

# 2. Natural Resources: Supporting Cultural and Environmental Stewardship

## Objectives

- Strengthened tribal capacity to manage natural resources sustainably.
- Fostered youth engagement in environmental and water resource management.

## Key Actions

- Promoted training sessions on wildlife management, water rights, and conservation for tribal natural resource departments.
- Participated in the N4WPP Tribal Water Symposium to share knowledge and collaborate on water resource issues.
- Collaborated with Tribal schools and colleges for internship opportunities for students in terested in environmental sciences, game and fish management, and water resource conservation.

## Expected Outcomes

- Increased engagement of tribal youth in natural resource management.
- Strengthened partnerships with tribal governments to address environmental challenges.

## 3. Engineering & STEM: Empowering Native Youth through Technology and Innovation

### Objectives

- Promoted STEM education and career opportunities for Native American students, especially in engineering.
- Expanded partnerships with educational institutions to provide hands-on STEM experiences.

### Key Actions

- Partnered with UNM and NMSU's STEM programs to deliver engineering-related workshops and internships for Native students.
- Facilitated STEM mentorship programs to connect Native American students with professionals in engineering fields.
- Promoted STEM camps to inspire tribal youth to pursue careers in technology, engineering, and math.

### Expected Outcomes

- Increased number of Native American students pursued STEM degrees and careers.
- Expanded access to high-quality STEM education and mentorship.

## 4. Energy: Advancing Tribal Energy Knowledge and Career Opportunities

### Objectives

- Provided educational opportunities for Native American students in energy sectors, including renewable energy and oil/gas industries.
- Created internship and career pathways for students interested in energy production and sustainability.

### Key Actions

- Partnered with San Juan College to provide internships for tribal students in the energy sector.
- Participated in career fairs and networking events with energy companies to connect students with job opportunities.

### Expected Outcomes

- An increased number of Native American students entered the energy sector.
- Enhanced access to career opportunities in renewable energy and oil/gas industries.

## 5. Business Development: Fostering Economic Growth in Tribal Communities

### Objectives

- Supported the development of tribal businesses and entrepreneurship.
- Increased access to resources for tribal economic development.

### Key Actions

- Participated in entrepreneurship workshops and business development training for Native American entrepreneurs.
- Provided mentorship and guidance to tribal businesses seeking to expand and grow.
- Collaborated with financial institutions to secure funding for tribal business initiatives.

### Expected Outcomes

- Strengthened tribal businesses and increased economic opportunities in tribal communities.
- Enhanced skills and resources for Native entrepreneurs to succeed in the marketplace.

## 6. Workforce Development: Preparing Native American Students for Success in the Job Market

### Objectives

- Expanded access to workforce development and certification programs.
- Supported tribal veterans and adults seeking to advance their careers through training.

### Key Actions

- Offered workforce readiness programs and certifications for Native American students and adults seeking to enter or advance in the workforce.
- Increased partnerships with veteran organizations to provide tailored workforce services for Native American veterans.
- Created career development programs that focused on industries like agriculture, energy, and business.

### Expected Outcomes

- Enhanced employability for Native American adults and youth.
- Increased participation in workforce development programs and certifications.

# 7. Education: Expanding Educational Opportunities for Native American Students

## Objectives

- Increased access to higher education and career development resources for Native American students.
- Fostered collaboration with schools, colleges, and universities to provide diverse learning opportunities.

## Key Actions

- Collaborated with over 50 educational institutions to provide pathways for Native American students into higher education.
- Developed and distributed educational resources for tribal schools, focusing on career pathways in agriculture, energy, business, and other fields.
- Provided assistance in tribal summer enrichment programs and internships for tribal students in partnership with the New Mexico Public Education Department.

## Expected Outcomes

- Expanded access to higher education for Native American students.
- Increased graduation rates and career success among Native American students.

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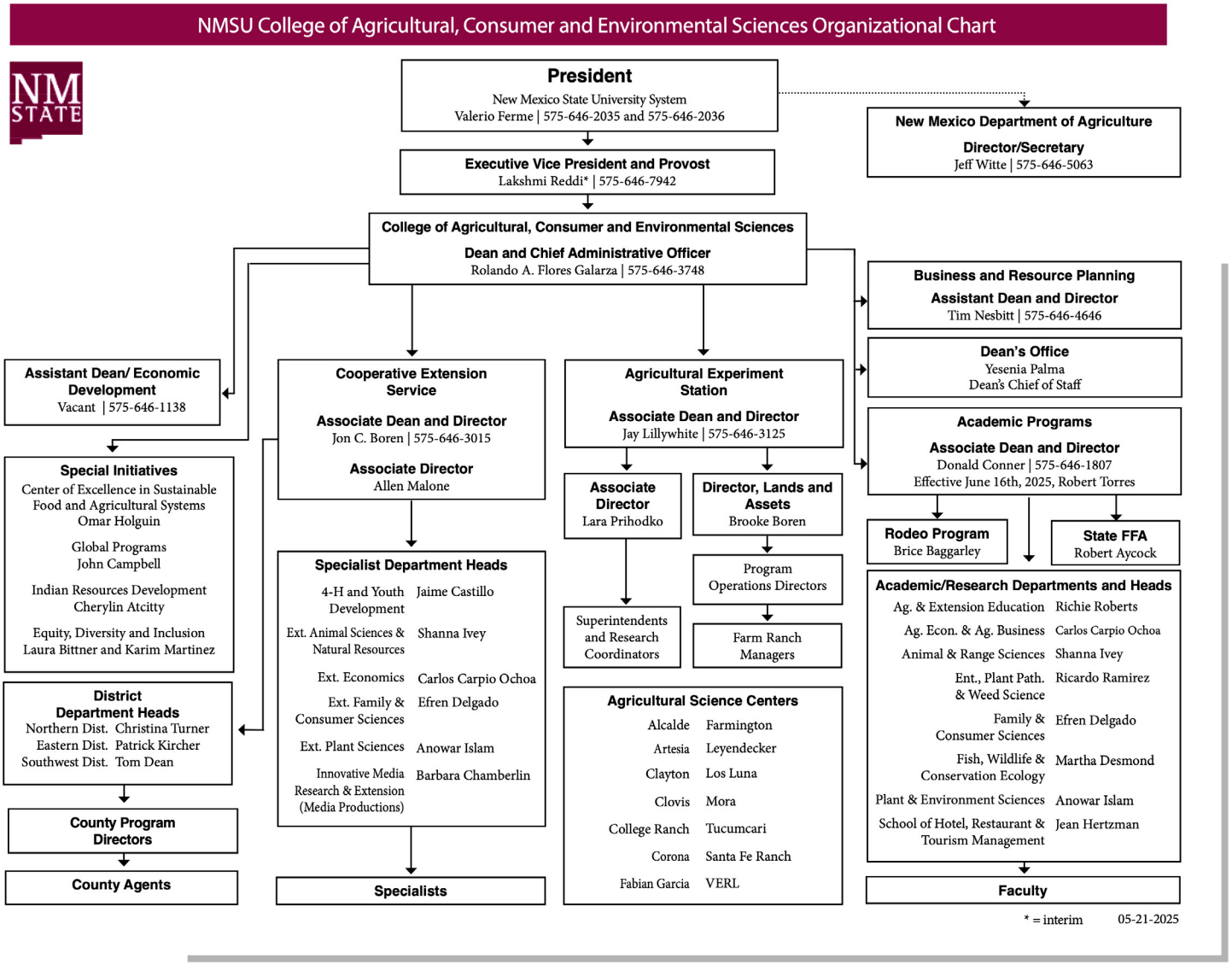
The 2024 summary of activities served as a roadmap for IRD as it continues to build on its successes and deepen its commitment to tribal communities. By focusing on key areas such as agriculture, natural resources, energy, business development, and workforce readiness, IRD empowered Native American students and tribal communities to thrive. Together, IRD and its partners created pathways to success, fostered sustainability, and continued to elevate the voices and talents of Native peoples across New Mexico.

# College of ACES Organizational Chart



# Celebrating Dr. Matthew Gompper's Legacy

Dr. Matt Gompper, Department Head of Fish, Wildlife, and Conservation Ecology (FWCE) passed away in March 2024 after serving the department for almost 5 years. As a conservation scientist and department head, he left an indelible mark on the field of wildlife ecology and the college of ACES. His research spanned diverse ecosystems—from the Brazilian Pantanal to the deserts of New Mexico—focusing on carnivore ecology, wildlife diseases, and the dynamics of predator populations, advancing science and conservation worldwide. At NMSU, he fostered a collaborative environment that led to increases in FWCE faculty and FWCE graduate student enrollment and produced a legacy of influential research and mentorship.

Beyond his research, Dr. Gompper was a dedicated mentor, guiding numerous graduate students, postdoctoral researchers and faculty, many who are now leaders in academia, government agencies, and conservation organizations worldwide. His commitment to education and his ability to inspire the next generation of ecologists were integral to his legacy. Through his interdisciplinary approach and dedication to both science and mentorship, Dr. Gompper significantly influenced the field of wildlife conservation, leaving a lasting impact on both his students and the broader ecological community. Many have honored this legacy through the establishment of an endowed scholarship in his name, the Dr. Matt Gompper Legacy Scholarship. This scholarship will be awarded to deserving students for the first time this year.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