TEXAS A&M AGRILIFE | INSTITUTE FOR ADVANCING HEALTH THROUGH AGRICULTURE

2024 IMPACT REPORT

CONTENTS

LEADING RESEARCH

A message from the Interim Director

DEAR IHA MEMBERS, COLLEAGUES AND SUPPORTERS,

In October of 2024, The Texas A&M AgriLife Institute for Advancing Health Through Agriculture participated in the grand opening of the Norman E. Borlaug Building on Texas A&M University's west campus. The 85,355-square-foot facility serves to advance research and teaching on nutrition, food insecurity and responsive agriculture.

Many of our efforts in late 2024 and early 2025 culminated in April with several events.

Leading experts, researchers and industry representatives joined thought-provoking conversations at our Responsive Agriculture Forum: The Solution to Creating a Healthier Future. The forum was a gathering to promote leading-edge discovery and innovation, sustainable production systems, economic strength and healthy living to benefit Texas, the U.S. and the world.

While I have been proud to serve as Director for the past year, AgriLife Research has announced a new Director of the IHA. Teresa Davis, Ph.D., will lead the institute in its vision of resilient and sustainable food systems, thriving producers and a healthier future.

Finally, during the last week in April, U.S. Secretary of Agriculture Brooke Rollins and Secretary of Health and Human Services Robert F. Kennedy Jr. visited Texas A&M AgriLife and the IHA to learn how agriculture is driving solutions for a healthier U.S. We were proud to showcase the research, innovation and outreach that position Texas A&M AgriLife at the forefront of advancing health through agriculture.

Thanks, and gig 'em!

G. Cliff Lamb, Ph.D.
Interim Director, Texas A&M AgriLife Institute for Advancing Health Through Agriculture
Director of Texas A&M AgriLife Research

THE WAY FORWARD

A message from the incoming Director

DEAR IHA MEMBERS, COLLEAGUES AND SUPPORTERS,

I am excited to join you as the new director of the Texas A&M AgriLife Institute for Advancing Health Through Agriculture, IHA.

I look forward to working alongside elite researchers and collaborators, addressing challenges at the nexus of agriculture and health in Texas and the world. It is a privilege to join this remarkable community that drives innovation and discovery.

Together, we will build on a strong foundation and forge new partnerships to advance precision nutrition, responsive agriculture and healthy living.

I look forward to hearing about your work and ideas about the future in our mission to improve health through agriculture.

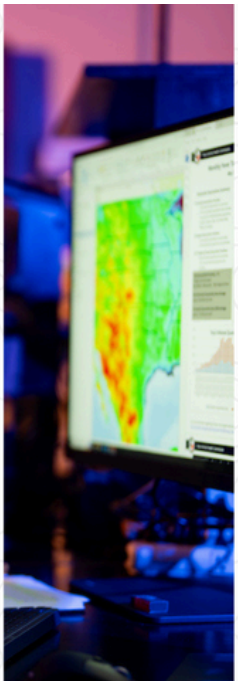
Gig 'em!

Teresa Davis, Ph.D.
Director, Texas A&M AgriLife Institute for Advancing Health Through Agriculture

ABOUT THE IHA





IHA Mission

The Texas A&M AgriLife Institute for Advancing Health Through Agriculture exists to improve human health for all by leading science-driven solutions in agriculture, nutrition and food systems in a way that supports economic prosperity, environmental sustainability and community well-being for current and future generations through innovative research-based guidance, policies, programs and practice.

The IHA achieves its mission through three synergistic focus areas:

Precision Nutrition

Research that identifies how dietary exposures differentially impact individuals and population subgroups in order to provide more specific nutrition guidance to promote health and reduce the risk of diet-related chronic diseases.

Healthy Living

Social and behavioral research that promotes health, reduces chronic disease and advances health equity through developing, evaluating and disseminating community-engaged intervention programs.

Responsive Agriculture

Research that promotes innovations in the agricultural system and food environment to optimize human health while ensuring the system is economically robust and environmentally sustainable.

GRANTS **AWARDED**

In 2024, the IHA leadership team secured **$13.3 MILLION** in grants to support the following projects:

- An Integrated Approach to Using Precision Nutrition, Responsive Agriculture and Behavioral Research to Reduce Diet-Related Chronic Disease
- USDA Grant: Texas MyPlate Food Ambassadors Changing Environment and Schools
- The USDA Nutrition Hub at Texas A&M: Healthy Communities and Nutrition Security for All
- Development of a Total Nutrient Index
- Estimation of Total Usual Dietary Intakes and the Contribution of Prenatal Supplements to Micronutrient Adequacy Among Pregnant Women in the United States

BY THE **NUMBERS**

Quantifying the IHA's impact from the previous year.

6 in 10

Estimated number of Americans living with major chronic health conditions such as heart disease, hypertension, obesity, cancer or diabetes, according to the U.S. Centers for Disease Control and Prevention, CDC.

$4.5 Trillion

CDC's estimate of annual health care costs in the U.S.

3

Major research initiatives at the IHA, specifically designed to combat these chronic diseases and their health care costs: Precision Nutrition, Healthy Living and Responsive Agriculture.

$13.3 MILLION

Grant support secured by IHA leadership.

11 IHA's number of full-time, Ph.D.-level scientists.

Associate Members **49**

Affiliate Members **119**

Visiting Members **9**

42 Number of research projects supported by the IHA in the coming year.

Source: U.S. Centers for Disease Control and Prevention

BROOKE ROLLINS, ROBERT F. KENNEDY JR.
TOUR TEXAS A&M AGRILIFE AND IHA

Secretary of Agriculture Brooke Rollins '94 and Health and Human Services Secretary Robert F. Kennedy Jr. toured Texas A&M AgriLife and the IHA on April 29, 2025, to gain a greater understanding of how Texas A&M is working to advance agriculture as a solution to health. Rollins' and Kennedy's introduction to multiple aspects of Texas A&M AgriLife showed how agriculture is uniquely positioned to meet many health challenges, and how new opportunities to work together are possible.

Read more about the Secretaries' visit on AgriLife Today.

EVENT **SPOTLIGHT**

In addition to Secretaries Kennedy and Rollins' visit, the IHA had an eventful year:

New Director Announcement

Teresa Davis, Ph.D., was named director of the Texas A&M AgriLife Institute for Advancing Health Through Agriculture, IHA, effective June 1, 2025. Read more at AgriLife Today.

Responsive Agriculture Forum

Leading experts, researchers and industry representatives joined thought-provoking conversations to collectively shape the future of responsive agriculture work at the IHA. Read more at AgriLife Today.

Norman E. Borlaug Building Grand Opening

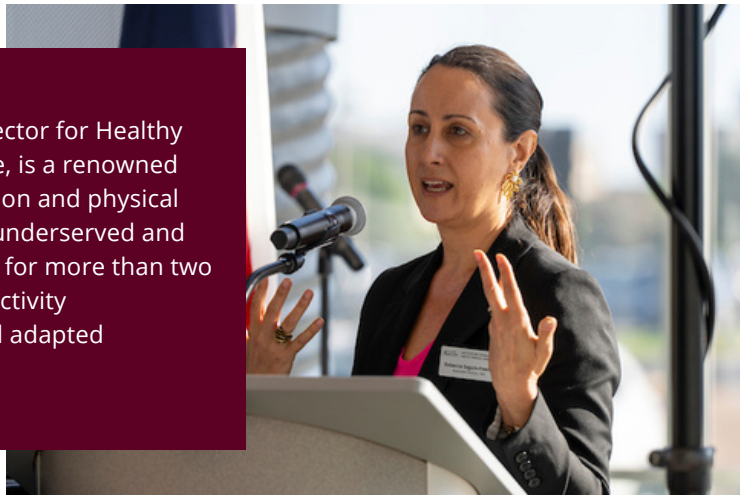
A ribbon-cutting ceremony on October 24, 2024, officially opened the 85,355-square-foot Norman E. Borlaug Building on the Texas A&M University campus to advance research and teaching in nutrition, food insecurity, precision nutrition and responsive agriculture. This building is the IHA's new home. Read more at AgriLife Today.

Reimagined Website

The redesigned and reconfigured website aligns with Texas A&M AgriLife's standards of excellence and elevates user experience with a more cohesive, intuitive and user-friendly interface. Explore the new website at iha.tamu.edu.

REBECCA SEGUIN-FOWLER, **PH.D., R.D.N., L.D., C.S.C.S.**

Associate director for Healthy Living



Rebecca Seguin-Fowler, Ph.D., R.D.N, L.D., C.S.C.S., associate director for Healthy Living and elected member of the National Academy of Medicine, is a renowned public health scientist with expertise in community-based nutrition and physical activity intervention research. Improving community health for underserved and underrepresented populations has been at the core of her work for more than two decades. She has led widely disseminated dietary and physical activity interventions, innovative food systems intervention projects and adapted evidence-based programs for at-risk populations.

In 2024, Seguin-Fowler and the Healthy Living team led 18 unique projects. These projects included partnerships with over 61 Texas A&M AgriLife Extension, academic and civic/community organizations, and they have recruited over 4,800 study participants.

Additional 2024 highlights from Seguin-Fowler and the Healthy Living team:

- A total of $13+ million in funding across the Healthy Living faculty members.
- 47 new national and international scientific presentations and 24 peer-reviewed manuscripts published.
- 24 trainees, including five postdoctoral fellows, eight graduate students (master's and doctorate), five medical students and six undergraduate students.

REBECCA SEGUIN-FOWLER PH.D., R.D.N., L.D., C.S.C.S.

Associate director for Healthy Living

2024 PUBLICATIONS

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REBECCA SEGUIN-FOWLER PH.D., R.D.N., L.D., C.S.C.S.

Associate director for Healthy Living

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REBECCA SEGUIN-FOWLER PH.D., R.D.N., L.D., C.S.C.S.

Associate director for Healthy Living

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MARCO PALMA, **PH.D.**

Interim associate director for Responsive Agriculture

Marco Palma, Ph.D., has established himself as a global leader in behavioral and experimental economics and is now leading the IHA's Responsive Agriculture research. He is the founder and director of the Human Behavioral Laboratory, one of the largest facilities of its kind in the world. With over $107 million in funding to conduct applied research and outreach efforts, Palma's activities touch the lives of many people in the state of Texas, the United States and worldwide. According to Google Scholar, Palma's papers have been cited 2012 times, most of which (1399) have been within the last five years (since 2019).

In 2024, Palma and the Responsive Agriculture team led research projects, secured grants, supported conferences and other events, including:

- Led the coordination and execution of the first-ever Responsive Agriculture Forum, with participation from at least 30 speakers across research and industry.
- Participated in the UVM Food Systems Research Summit on September 16 and 17, 2024.
- Reviewed 38 annual reports from grants awarded to associate and affiliated IHA members during the 2022–23 and 2023–24 grant cycles.
- Created a new spotlight series based on the research findings from the annual reports submitted by the associated and affiliated IHA members.
- Updated the Responsive Agriculture definition.
- Designed the new Responsive Agriculture hub structure to incorporate consumer-driven behavior, industry, researchers and farmers designed to create a healthier food system – including prosperous farmers.
- Released outreach materials for the Responsive Agriculture hub, which contributed to building the ongoing Responsive Agriculture portfolio.

Projects which are currently active include:

- Discovering the antioxidant properties and benefits of grains (sorghum) and other novel uses to enhance human health.
- Creating the Kindly Human Inc. app, behavioral experiments on mental health in collaboration with the Human Behavior Laboratory.
- Developing the Plants, Nature and Health Initiative, led by Charlie Hall, Ph.D. and Jay Maddock, Ph.D.

MARCO PALMA, PH.D.

Interim associate director for Responsive Agriculture

2024 PUBLICATIONS

Hosni H., Palma M.A., Segovia M.S. Behavioral and Economic Interventions: A Path to Improved Dietary Behaviors. *Annual Review of Nutrition*. (Forthcoming).

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MARCO PALMA, PH.D.

Interim associate director for Responsive Agriculture

2024 PUBLICATIONS, ctd.

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Suess C., Maddock J.E., Palma M.A., Youssef O., Kyle G. 2024. An application of Protection Motivation Theory to understand the influence of fear-appeal media on stated donations for coral reef restoration. *Tourism Management*. Vol. 100: 104797. https://doi.org/10.1016/j.tourman.2023.104797

NEW TEAM MEMBERS

Leading-edge researchers and operations specialists who joined the IHA in 2024.

Listed alphabetically by last name.

- Gabrielli De Mello, Postdoctoral Research Associate
- Emily Holbrook, Research Assistant
- Emma Lewis, Postdoctoral Research Associate
- Byunggul Lim, Postdoctoral Research Associate
- Kendra Marstall, Research Associate
- Patrick Schilling, Norman E. Borlaug Building Manager

RESEARCH IMPACT

Member Innovation and Key Findings

Over the past year, the Texas A&M AgriLife Institute for Advancing Health Through Agriculture has made significant strides in advancing scientific discovery. Our associate members have pushed the boundaries of precision nutrition, responsive agriculture and healthy living, publishing groundbreaking studies and forging new collaborations. From innovations using Raman spectroscopy technology to papers placed in the renowned *Journal of Nutrition*, our work has strengthened our impact and set the stage for even greater advancements. We celebrate the dedication and curiosity that drive our mission forward.

Listed alphabetically by last name.

Produce Prescription to Address Food Insecurity Among PVAMU Students

Janet Antwi, B.Pharm., M.S., Ph.D., R.D., Associate Professor, Prairie View A&M University

Prairie View A&M University, PVAMU, is located in rural Waller County, where food accessibility remains a challenge. Nineteen percent of residents were food insecure in 2016. Antwi sought to evaluate the effectiveness of prescriptions of fresh fruits and vegetables, among other factors such as education and counseling, to improve diet quality and reduce food insecurity. As of May 2025, collected data from this intervention is under analysis.

Protection of Edible Fruit and Vegetable Microbiological Safety Within Production Systems by Preventing Human Pathogen Entry and Exit on Harvested Food Crops

Javad Barouei, Ph.D., Associate Professor, Prairie View A&M University

Study hypothesized that food-borne pathogens originating from livestock manure can persist at harmful levels beyond the three- to four-month interval between the application of manure-based biological soil amendments and produce harvest, recommended by USDA National Organic Program, NOP. Early findings indicate that food-borne pathogens can persist at harmful levels beyond the NOP-recommended three- to four-month interval between raw manure application and produce harvest.

Impact of Human Milk Oligosaccharides on Infant Gut Health

Robert Chapkin, Ph.D., University Distinguished Professor, Regents Professor, University Faculty Fellow Professor

This project hypothesized that human milk oligosaccharides, HMOs, would have both direct and indirect effects on gut epithelial and immune cell gene expression and function via the microbiota. The use of germ-free and gnotobiotic mice allowed researchers to define the direct impact of HMOs on the gut as well as effects mediated through microbial communities. In addition, the use of single cell transcriptomics enabled determination of the mechanistic pathways whereby specific HMOs and microbiota influence intestinal epithelial and immune cell function. All mouse gnotobiotic experiments have concluded and all tissues have been processed. Data analyses remain in progress and manuscript writing is underway.

RESEARCH IMPACT

Member Innovation and Key Findings

Enhancing the Understanding of U.S. Meat Goat Markets

Sunil P. Dhoubhadel, Ph.D., Associate Professor, Prairie View A&M University

Goat meat is a healthy, sustainable alternative with lower calories, fat and environmental impact than other meats. However, it remains a niche market due to high production costs, underdeveloped marketing channels and limited industry research. A lack of data on consumer preferences and market demand prevents informed decision-making by producers and discourages investment. Insufficient research also hinders policy development, extension work and broader adoption of goat meat as a sustainable food option. This study finds that lowering goat meat prices and highlighting its health benefits could significantly boost its market share to 21% of the total U.S. meat market, translating to a $70 billion industry in the U.S.

Plants, Nature and Health Initiative, PNHI

Charlie Hall, Ph.D., Professor and Ellison Chair and Jay Maddock, Ph.D., Regents Professor, Director for the Center for Health and Nature

The Plants, Nature and Health Initiative, PNHI, at Texas A&M University cultivates interdisciplinary research, education and outreach to explore and promote the vital connections between human well-being and the natural world. Newly funded in October 2024, PNHI formed a steering committee to assess resources and guide strategic planning. A January 2025 session brought together leaders from horticulture, health, economics and design to set a three-year vision and annual action plan. Key themes include nature's health benefits, walking interventions, economic impacts and educational outreach.

NOTE: This research is funded entirely by the IHA. Learn more about this initiative on the IHA's website.

Using Metabolomics to Improve Dietary Medicine and Chronic Disease Intervention

Waylon J. Hastings, Ph.D., Assistant Professor

Dietary interventions cannot be implemented using "one-size-fits-all" approaches. To prevent diet-related chronic disease, we must improve our understanding of how different individuals respond to dietary interventions. This study uses metabolomics, the comprehensive profiling of metabolites, their precursors, and their derivatives, to identify biological pathways underlying aging and disease across a comprehensive population. Using these pathways, we then explore i) which metabolic features are most amenable to modification by established dietary interventions and ii) identify a set(s) of pathways that, when modified, are most likely to lead to sustained improvement in cardiometabolic parameters frequently targeted by dietary interventions.

RESEARCH IMPACT

Member Innovation and Key Findings

Emerging Adult Nutrition; National Survey of Young Adult Nutrition, NAYAN

Julie Hess, Ph.D., Research Nutritionist, USDA-ARS

The work of our team focuses on providing insight into the diet quality of the emerging adult (ages 18-23 years) population in the U.S. and identifying correlates and predictors of young adults' eating habits, with particular emphasis on sociodemographics, reproductive health and food upbringing. Initial results from our second NHANES analysis were presented at the International Society of Behavioral Nutrition and Physical Activity ISBNPA meeting in Omaha, NE in May 2024; Data collection was completed on the NAYAN survey in November 2024.

Improving Obesity Associated Poor Bone and Joint Health

Srividhya "Sri" Iyer, Ph.D., Assistant Professor

Skeletal fragility, poor bone repair and increased incidence of osteoarthritis are underappreciated comorbidities that are associated with obesity. However, the underlying mechanisms are unclear. Funding for this project was secured from NIAMS in 2024.

Development of optical sensing for monitoring health status of plants and animals

Dmitry Kurouski, Ph.D., Associate Professor

Digital agriculture is an emerging farming philosophy that aims to increase crop yields with minimal environmental impact. Digital farming requires the development of sensing technologies that can work directly in the field to provide information about plant health. Our group develops an innovative sensing approach for confirmatory diagnostics of biotic and abiotic stresses in plants based on Raman spectroscopy, RS, a modern analytical technique that provides information about molecular vibrations and, consequently, the structure of samples. Findings show that RS can detect and identify viral, fungal and bacterial diseases in plants, and highlight the promise of RS as a valuable tool for real-time, nondestructive monitoring of heavy metal, HM, contamination in rice crops. Importantly, the dose-response experimental design demonstrated RS's ability to detect HM stress levels that aligned with typical environmental contamination. We found that RS is highly accurate to determine body composition as a result of habitual dietary patterns, specifically vegan, typical American and Ketogenic diets, all very common in the US. RS is based on major differences in the intensities of vibrational bands that originate from collagen. Moreover, RS could be used to predict folate deficiency and identify the sex of the animals. Finally, we found that RS could be used to track the chronological age of the mice. Considering the hand-held nature of the utilized spectrometer, one can expect that RS could be used to monitor and, consequently, personalize effects of diet on the body composition.

RESEARCH IMPACT

Member Innovation and Key Findings

A Community-Based Participatory Research on Diet Quality, Dietary Intake, and Quality of Life Among Food Pantry Clients in Texas

Hyunjung "Grace" Lee, Ph.D., Assistant Professor

The impact of food pantry usage on diet quality, intake and overall well-being among clients in Texas, and the lack of culturally tailored, accessible nutrition education for food pantry clients. We are examining the relationship between food pantry usage and overall well-being, including diet quality and intake, among food pantry clients in Texas. This community-based participatory research will also explore the need for culturally tailored nutrition education for food-insecure populations. Current efforts are focused on refining the research framework, conducting a systematic review and building partnerships to support data collection.

Menu to Meal, M2M: Leveraging Augmented Reality and Artificial Intelligence for Hispanic Restaurant Nutritional Labeling

Hyunjung "Grace" Lee, Ph.D., Assistant Professor – Co-PI

The feasibility, acceptability and preliminary effectiveness of AR/AI-enhanced menu labeling in improving nutrition literacy and dietary choices among Hispanic restaurant consumers. This interdisciplinary project explores the use of AR and AI to enhance nutrition labeling in Hispanic restaurant menus. Our goal is to support informed dietary choices through a bilingual, interactive mobile app. We are collaborating across departments including hospitality, architecture and computer science to develop the intervention. Current efforts focus on developing the focus group protocol, refining the research design, preparing the IRB application and building local partnerships for implementation.

Prediction of microbiota-dependent effects of fine-scale food composition on human health using Big Data and AI/ML approaches

Danielle Lemay, Ph.D., Research Scientist, USDA-ARS

We seek to predict microbiome-aware health effects of foods with different fine-scale polyphenol composition. Analysis revealed that individuals with high polyphenol consumption had distinct microbial community profiles compared to low polyphenol consumers. Building on our previous findings that prenol lipids and phenylpropanoic acids are associated with lipopolysaccharide (LPS) binding protein—an indicator of gastrointestinal permeability—we further examined their relationship with LPS-producing bacteria. We found that consumption of these polyphenol classes was positively associated with immunoinhibitory LPS producers and showed no correlation with inflammatory LPS, suggesting a potential role in modulating gut immune interactions. Regarding polyphenol functional profiling, we have estimated polyphenol-associated microbial genes in the fecal shotgun metagenomes of healthy human adults. We have found that microbial genes which encode for enzymatic removal of glycosides, which release the aglycone form of polyphenols, are among the most common and prevalent. Our preliminary results further suggest that dietary polyphenol intake is linked to bacteria involved in isoflavonoid metabolism.

RESEARCH IMPACT

Member Innovation and Key Findings

Enhancing human health on the Texas High Plains with sustainable and resilient cropping systems that mitigate wind erosion and control dust

Katie Lewis, Ph.D., Associate Professor

This project aimed to monitor one of the largest environmental concerns in the Texas High Plains, THP, wind erosion. During the Dust Bowl, cultural and environmental factors led to 5 Tg of topsoil loss by wind erosion from the THP. While cultural practices have reduced wind erosion by 80% in the region, significant dust storms still wreak havoc for the people of the THP. In addition to the loss of agricultural productivity, these dust storms have been shown to harm human health (i.e., Valley Fever) leading to a significant rise in hospitalizations. Over 200 soil samples have been collected across the state of Texas for DNA analysis and testing for the pathogenic fungi, Coccidioides. These samples have expanded upon the genetic diversity of the endemic species of Coccidioides in Texas, now hypothesized to be a genetic variant. Sampling is still continuing across the state to identify positive locations of Coccidioides to improve the epidemiology of its associated disease, Coccidioidomycosis. Efforts have been established to create a working collaborative group across the state of Texas that includes health care physicians, soil scientists, geneticists and researchers.

Integrative approaches to develop stress-resilient and nutrient-enhanced food crops

Kranthi K. Mandadi, Ph.D., Professor

The overarching focus of our research is to develop strategies to improve stress resilience and nutrient densities of our food crops and production systems, which are critical for Texas and U.S. food and nutritional security. Our findings provided novel targets for genetic improvement, precision disease management and vector control, contributing to more resilient crop production and enhanced food quality. The integration of genome editing, antimicrobial discovery and remote sensing advances sustainable agricultural practices, helping mitigate the impact of bacterial diseases on global food security.

RESEARCH IMPACT

Member Innovation and Key Findings

Climate Change, Agriculture and Nutrition

Bruce A. McCarl, Ph.D., University Distinguished Professor

Climate change has been found to affect major crop yields, such as corn, soybeans, cotton and wheat. However, few studies have analyzed the impact of climate change on lesser planted crops, hay, pesticide cost and livestock productivity. Climate change alters yields and the relative profitability of crops. In turn, farmers have adapted by changing the crops planted, switching cropland to pastureland, and changing livestock species/breeds. In the south we find corn and soybeans moving out with cotton and pasture/other hay taking their place. Farmers are also reducing livestock stoking rate. In the north we find less grassland and increased corn soybean and wheat production. In turn the amount of nutrients produced is smaller in the south and growing in the north and west. We have also examined the effects of genetic engineering finding it is helping improve yields, lower crop yield variability and slowing down crop mix movements. Beyond that we examined the market implications and resource needs to support the expanded grass-fed beef production in the U.S. operation. We found a price premium for grass-fed beef exists but that it falls with production levels and contributing factors such as land availability.

Green N-Carbon Dots to Develop Climate Resilient Tomatoes with Enhanced Health Promoting Bioactive Compounds

Bhimanagouda Patil, Ph.D., Regents Professor, Leonard Pike Inaugural University Professor, and Director, Vegetable and Fruit Improvement Center and Love Tito Endowed Professor in Responsive Agriculture

Seed nano-priming with nitrogen-doped CDs (N-CDs) may improve tomato drought tolerance and increase the levels of health promoting bioactive compounds, including vitamin C, β-carotene, lycopene and GABA (gamma-Aminobutyric acid), which may have potential to improve heart health and reduce the risk of certain types of cancer. Findings indicate the higher concentrations of ascorbate/dehydroascorbate, amino acids and carotenoids not only enhance nutritional benefits and consumer appeal but also improve resilience to environmental changes.

The Nutritional Health of Young Adults

Beth Racine, Ph.D., Professor, Associate Department Head for Extension, Texas A&M AgriLife Research Center at El Paso Director

The public health and nutrition disciplines rarely consider the nutritional status of young adults. Young adults are living through a unique life stage. Most are living without daily family support for the first time. Overall dietary quality, as assessed via the HEI-2015, was significantly lower among emerging adults (18–23 y; HEI-2015: 50.3 +/- 1.3) than that among the general adult population (24 y; 56.3 +/- 0.5; $P < 0.0001$) in the United States, but not among children. We have analyzed NHANES to examine the prevalence of metabolic syndrome among emerging adults and the relationship between diet quality and metobolic syndrome. That analysis will be presented at the ASN conference and will be submitted for peer-review in the next month. Data analyses remains underway from our administered NAYAN study of over 1,100 young adults.

RESEARCH IMPACT

Member Innovation and Key Findings

USDS-ARS Postdoctoral Fellowship in Diabetes/Nutrition

Chad Rethorst, Ph.D., Associate Professor

This work aimed to evaluate the feasibility and acceptability of just-in-time intervention messages aimed at reducing the frequency of glucose excursions, as well as to evaluate the preliminary effectiveness of intervention messages to reduce glucose excursions and health outcomes. These interventions would be developed with the aim of improving health-related outcomes (diet quality, weight, HbA1c) in high-risk populations (individuals with obesity and/or pre-diabetes) in underserved populations. Our study enrolled 51 participants with overweight/obesity and analysis is currently underway. Results support the feasibility and acceptability of the intervention approach. A manuscript reporting study findings is currently in preparation.

Applied Specialty Sorghum Breeding and Genetics

William L. Rooney, Ph.D., Regents Professor, Borlaug-Monsanto Chair in International Crop Improvement, AgriLife Faculty Fellow, Sorghum Breeding and Genetics

The AgriLife Research sorghum breeding program has been at the forefront of breeding specialty grain sorghums for several years. Our efforts in this program are to develop new applications for these hybrids, document their value in food/nutrition systems and commercialize these hybrids for applied use. This work provides a framework for future genetic and cellular studies to validate the proposed cascade of events and the critical regulatory and structural genes involved in the sorghum black pericarp trait.

Ghrelin: a unique biomarker for nutritional state and inflamm-aging

Yuxiang Sun, Ph.D., Professor, Associate Department Head for Graduate Programs, AgriLife Research Faculty Fellow

We hypothesize that ghrelin signaling is a key sensor/regulator of aging immunity; and ghrelin signal is an attractive biomarker for aging lifespan and healthspan. Our findings indicate that innate immune cells in various tissues exhibit differential characteristics in aging and inflammaging exacerbates inflammatory responses under endotoxin exposure, this vicious cycle in aging increases the vulnerability of aging organs toward insults/injury; that intermittent fasting, through modulating autophagy, reduces systemic and tissue inflammation; and that GHSR deficiency protects against experimental liver fibrosis and colitis through inflammasome signaling. Manuscripts are in production.

RESEARCH IMPACT

Member Innovation and Key Findings

Long-Term Memory of Adverse Prenatal Environment of Offspring and its Genetic Interactions

Masako Suzuki, Ph.D., Assistant Professor

We hypothesize that prenatal malnutrition alters the repertoires of cell subtypes in the mature organs of offspring by modifying stem cell fates in a manner dependent on genetic background, thereby significantly contributing to the risks of disease later in life. This hypothesis is supported by five current projects, several of which remain underway.

Enhancing fresh produce safety and nutritional value through encapsulated plant-derived antimicrobial and anti-inflammatory delivery

Matt Taylor, Ph.D., Professor

Amid growing global efforts to reduce food loss and food waste, research is needed to cut food loss and waste in order to protect food security for Texans, the U.S. and global populations. Our multidisciplinary team has developed novel encapsulation techniques using plant-derived natural antimicrobials to significantly boost the shelf-life and microbiological safety of post-harvest fruits and vegetables.

Employing novel co-encapsulation systems for bioactive compounds, our work enhances the stability and durability of fresh produce and also opens new avenues for delivering anti-inflammatory agents to treat gastrointestinal inflammatory diseases.

Key outcomes of our study include:

1. Innovative encapsulation system: We successfully developed and characterized stable co-encapsulation structures for plant-derived bioactive compounds that exhibit high efficiency, robust biophysical stability and favorable electrophoretic properties. These characteristics are essential for ensuring that the encapsulated compounds remain effective during the typical shelf-life of produce.
2. Antimicrobial validation: Our systems demonstrated potent antimicrobial activity. The minimum inhibitory concentrations achieved against select fungal plant pathogens were comparable to those observed in systems targeting human pathogens. This suggests that our encapsulated antimicrobials could effectively counteract the growth of plant and human foodborne pathogens, offering broad application pathways that target shelf-life extension with co-benefits for gastrointestinal health

Our research lays the groundwork for innovative strategies that tackle food loss and waste with co-benefits to improved food safety and public health.

RESEARCH IMPACT

Member Innovation and Key Findings

Edible Insects and Health: From a Pest to an Asset

Jeffery K. Tomberlin, Ph.D., Professor, AgriLife Research Fellow, Presidential Impact Fellow, Director, National Science Foundation Center for Environmental Sustainability Through Insect Farming – with Joel Mason, Ph.D. and José Ordovás, Ph.D.

Mass production of insects (currently practiced and approved globally) is a multibillion-dollar industry. This project aimed to 1) develop a strategy for optimal production of high-quality insect biomass, and 2) facilitate the expansion of the insects-as-food industry by exploring potential human health benefits. Findings are still unfolding; key grant applications, manuscript publications, partnerships and study analyses remain underway.

Impact of Diet and the Food Environment on Polycystic Ovary Syndrome (PCOS) Risk in Texan Adolescents

Heidi Vanden Brink, Ph.D., M.Sc., Assistant Professor

PCOS is a highly prevalent, lifelong endocrine disease with no cure that develops in adolescence, exacerbated by obesity, and an independent risk factor for youth- and adult-onset Type 2 diabetes. As such, early diagnosis and intervention for PCOS is imperative to promote healthy living, yet strategies for diverse populations are lacking. We hypothesize, and our early preliminary data support, i) that the chronic disease burden of PCOS is even more substantial among youth living in Texas; ii) these youth with symptoms of PCOS are also more likely to exhibit evidence of early metabolic disease. Our research and analyses are ongoing to identify aspects of diet and food availability such as food security that may increase the likelihood of meeting criteria for PCOS.

Hi-A Corn for healthy human food and animal feed

Wenwei Xu, Ph.D., Professor, Texas A&M AgriLife Research and Extension Center at Lubbock

Developed two Hi-A corn hybrids; a commercialization agreement is in the negotiation phase; a local tortillas company has shown the grain of our Hi-A corn hybrid TAMZ102 makes high quality chips and tortillas.

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