STRATEGIC PLAN

Texas A&M AgriLife
Blackland Research
and Extension
Center at Temple

**TEXAS A&M
AGRILIFE
RESEARCH**

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STRATEGIC PLAN

Mission

- Through innovative investigation, develop science-based solutions to meet our challenges in land, water, climate, and energy to enhance environmental quality and protect natural resources.
- Be forward-thinking and responsive to the needs of our stakeholders and cooperators.
- Work synergistically with other parts of The Texas A&M University System; local, state, and federal government agencies; international agencies; and private enterprise.
- Support the personal and professional development of our employees and promote understanding and opportunities in science for students and the community.

Goal

Maintain and increase The Texas A&M AgriLife Blackland Research and Extension Center at Temple, BREC's, leadership in the use of information and knowledge-based technologies to improve agricultural and environmental resources, optimize productivity, and enhance sustainability at local, state, national, and international scales.

STRATEGIC PRIORITIES AND BREC ACTIVITIES

BREC's research activities align with the [strategic priorities of Texas A&M AgriLife Research](#).

Synergistic Interactions Between Priorities

These four research priority areas interact synergistically to deliver healthy living to Texans (Figure 2). Innovative research is the foundation of this strategy, which empowers the nexus between agriculture and human health by cultivating science-based solutions to develop sustainable, profitable, and resilient agriculture that provides affordable, high-quality, nutritious food.
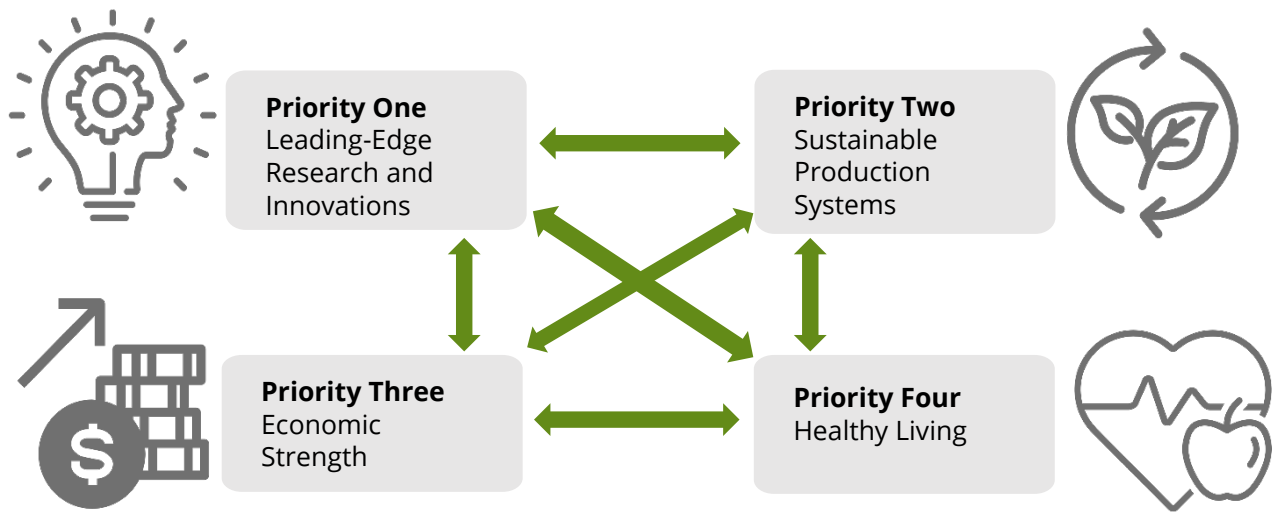

Figure 2. Synergistic interactions among our four research priority areas

STRATEGIC PRIORITY ONE – LEADING-EDGE RESEARCH AND INNOVATIONS

Discover new innovations, technologies, and science-based solutions to enhance agricultural and ecological systems and the life sciences.

Goals and Milestones

- BREC will work with other Texas A&M AgriLife units and its federal, state, and international collaborators to strengthen its research capabilities in the following areas:
    - Economic, biophysical, and climate change modeling
    - Artificial intelligence and "big data" analytics
    - Field research and on-farm experimentation
    - Global application of agricultural and environmental decision tools

- BREC will strengthen its research infrastructure as follows:

    - Build a strong support staff, including farm crews and laboratory technicians
    - Construct new a office and lab space to meet growing research needs
    - Upgrade the internet and intranet structures for the growing need of "big data" analysis
    - Upgrade computer and information technology capabilities to meet the growing needs for remote sensing, artificial intelligence, and "big data" research
    - Construct a solar array to reduce utility costs and demonstrate improved reliability of electric power supply
    - Construct an onsite water reuse facility to reduce utility costs and demonstrate improved reliability of water supply
    - Enhance field research capabilities with drones and remote sensing equipment and increase cooperation with field research programs elsewhere to support soil and crop simulation algorithm development for evapotranspiration, soil moisture and carbon content, greenhouse gas emissions and carbon intensity, and crop growth and development

- Acquire advanced agricultural machinery to support precision agriculture research

- BREC will strengthen the capabilities of its faculty and support staff by encouraging the following:
  - Participation in collaborative research project proposal writing workshops and courses
  - Familiarity with The Texas A&M University System Sponsored Research Services procedures
  - Participation in project implementation, management, and reporting workshops

STRATEGIC PRIORITY TWO – SUSTAINABLE PRODUCTION SYSTEMS

Provide the translational research necessary to develop and produce high-quality, safe, and sustainable food and fiber systems with local, national, and global impacts.

Goals and Milestones

- BREC will continue development and dissemination of internationally recognized and tested agro-economic and environmental decision support tools by maintaining and expanding collaborative linkages with:
  - Federal government agency partners (ARS, NRCS, ERS, BOR, USAID, USACE-ERDC, DOD, etc.)
  - Texas state agencies and water authorities (TSSWCB, TCEQ, TRWD, TRA, TGLO, NTMWS, LCRA, NRI, etc.)
  - United States and foreign universities and environmental research agencies (in Europe, Canada, Australasia, Africa, South and Central America, and South, East, and Southeast Asia)
  - International agricultural and environmental organizations (CGIAR Centers, TNC, WB, FAO, Mekong River Authority, etc.)

STRATEGIC PRIORITY THREE – ECONOMIC STRENGTH

Enhance the efficiency, profitability, and resiliency of agriculture, natural resources, and food systems in the state of Texas and the world.

Goals and Milestones

BREC will work with the Texas A&M Agriculture and Food Policy Center to model farm- and regional-scale economic effects of changes in agricultural technologies, farming systems, climate change, input output prices, and other economic and policy variables.

STRETEGIC PRIORITY FOUR – HEALTHY LIVING

Discover, disseminate, and facilitate the adoption of scientific evidence at the intersection of nutrition, human health, and agriculture.

Goals and Milestones

BREC will seek collaboration with the Texas A&M University College of Medicine to predict the impacts of water pollution, pesticide practices, and climate change on disease vectors and their effects on human health.

APPENDIX: TEXAS AGRICULTURE, NATURAL RESOURCES, THE FUTURE

Agriculture

By 2050, the U.S. and world population are expected to increase by 30%, and global real incomes per capita are expected to double. Population and income growth translate into higher demand for both staple products and high-valued foods, such as more animal and plant proteins, fruits, and vegetables. Higher real incomes also

mean a growing demand for livestock and feed for livestock. As a result, agricultural productivity has increased dramatically over the years. Today's farmers produce 262% more food with 2% fewer inputs than in 1950. A major component of this increase in agricultural productivity is due to investments in public agricultural research with a benefit-cost ratio of 32, which means that every dollar spent on public agricultural research and extension returns 32 dollars to society. Therefore, large benefits exist for investments in U.S. public agricultural research.

Rapid agricultural productivity increases, relative to gains in other food sectors of the U.S. economy, have translated into falling real prices of food consumed at home. For example, in 1948-2018, the share of U.S. household income spent on food at home declined from 22.3% to 6.4%, while total food consumption increased. With Americans spending 6.4% of their income on food, the other 93.6% is available for spending on a wide range of other goods and services, including recreation, housing, transportation, education, and health care. Therefore, the long-term rise of civilization and living standards worldwide largely tells a story about increasing agricultural productivity. The U.S. is the largest exporter of agricultural products. Since 95% of the world's population lives outside the U.S., the possibilities and opportunities to continue feeding the world are endless.
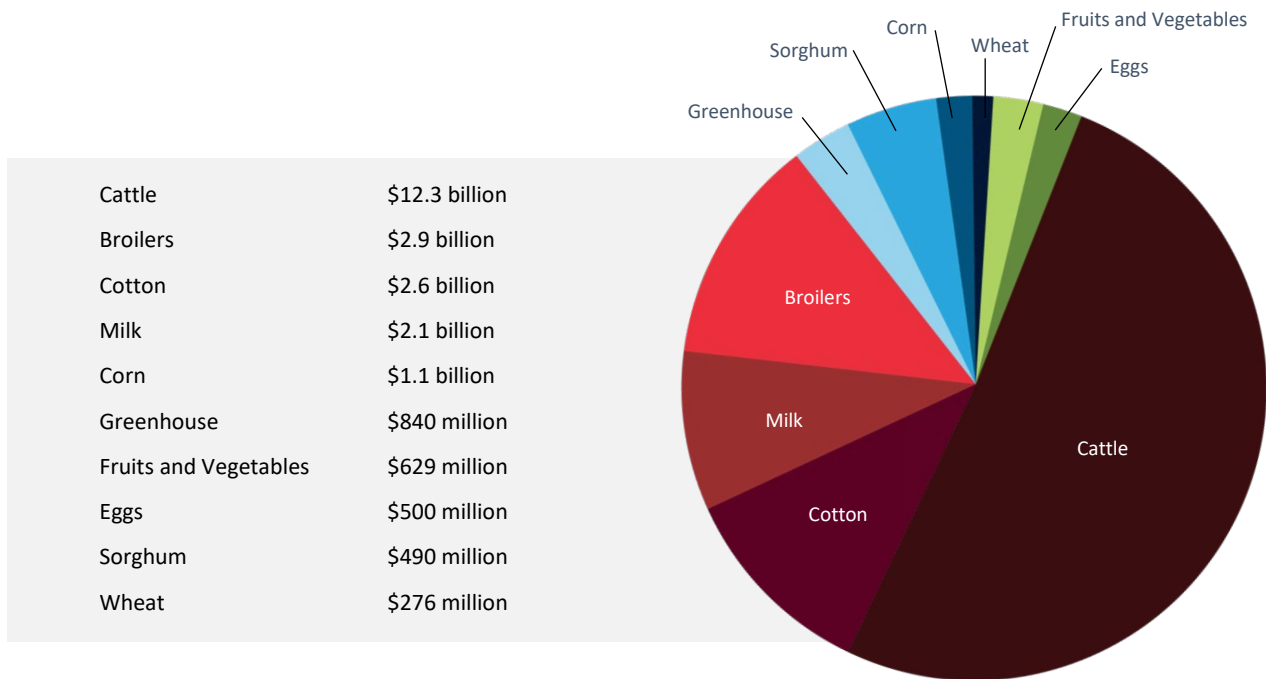

Cattle	$12.3 billion
Broilers	$2.9 billion
Cotton	$2.6 billion
Milk	$2.1 billion
Corn	$1.1 billion
Greenhouse	$840 million
Fruits and Vegetables	$629 million
Eggs	$500 million
Sorghum	$490 million
Wheat	$276 million

Figure 3. Texas top 10 commodities in terms of market value

Agriculture has long been a mainstay of the Texas economy, and the success of Texas agriculture has paved the way for the development of new industries and sustained the diversification of our economy.

The food and fiber systems' contribution to the Texas gross domestic product (GDP) was valued at $145.8 billion in 2017. This represented 9.1% of the state's total economic activity. The top ten commodities in market value are cattle, cotton, milk, broilers, greenhouse, sorghum, wheat, fruits, vegetables, and eggs (Figure 3). Additionally, agriculture-related activities such as hunting, fishing, and recreation, among others, are worth over $2 billion.

Texas is the top state in the nation for producing crude oil, natural gas, and wind-based energy, which provide significant competitive advantages. In 2020, Texas accounted for 43% of the nation's crude oil production and 26% of its marketed natural gas production. Texas also has abundant renewable energy resources. It is first in the nation in wind-generated electricity and a leader in biomass-based renewable energy. With many sunny days across vast distances, Texas is also a leader in solar energy potential. Ranking second in the nation in both population and economy, Texas consumes a large share of the nation's energy. Therefore, as U.S. and world economies grow, two main variables sustain such growth — energy and food — and Texas is a key player in both. Integrating and taking advantage of the synergies of both industries will contribute greatly to the continued growth of the Texas and U.S. economies.

Natural Resources

Texas's natural resources are expansive, with nearly 172 million acres of landmass. The state is home to more than 142 mammal species as well as 615 bird species, of which half are migratory.

Freshwater lakes, ponds, and reservoirs cover about 1.2 million Texas acres. This includes nearly 185,000 miles of river, more than 350 miles of coast along the Gulf of Mexico, and 1,254 miles along the Rio Grande bordering Mexico. Texas waters house more than 250 freshwater fish species and 1,500 saltwater species.

Within this natural ecosystem, 141 million acres — more than 80% of the state's total acreage — consist of privately owned working lands and more than 60,000 working landowners. Texas working lands are privately owned farms, ranches, and forests producing agricultural products. This includes 25.8 million acres of cropland, 105.8

million acres of grazingland, 8 million acres of timber, 5.3 million acres of wildlife management, and more than 780,000 acres of other working lands.

At the same time, from 1997 to 2017, Texas lost approximately 2.2 million acres of working lands converted for nonagricultural uses. Of those acres, 1.2 million were converted in the last five years.

The Future

Texas is becoming an urban state and is home to four of the top 10 most populous cities in the country (Houston, San Antonio, Dallas, and Austin) and 69 of the top 780 cities. The Census Bureau estimates that Texas has three of the ten fastest-growing counties in the country (Hays, Comal and Kendall) and almost a quarter of the top 100 fastest-growing counties. Although Texas has a large rural population, almost 4.5 million, it only accounts for about 15% of the total, which means that around 25 million people live in urban areas.

The COVID-19 global pandemic pushed the world several years prematurely into cyberspace and wreaked havoc on the global food supply chain, causing tremendous decreases in food security. Texas was no exception. COVID-19 exposed Texans' poor health status regarding obesity, hypertension, diabetes, heart diseases, and other chronic diseases related to diet and nutrition. COVID-19 also revealed the need to examine food production and distribution systems, uncovering the need for a more agile food supply system that provides nutritious, affordable, and accessible food to consumers while financially supporting our farmers, ranchers, and agricultural workers, even when there are multifactored disruptions at one time throughout the supply chain.

We are keenly aware that hunger, specifically undernutrition, is one of our most important global issues. Both a cause and a symptom of poverty, it can ultimately lead to conflict, mass migrations, and the rise of terrorism, all of which can impact Texans. We believe that we can help alleviate human suffering associated with hunger and poverty through agricultural science and, in that way, help prevent these outcomes while building a better world for present and future generations. With proper investment today, AgriLife Research will set the foundations of the infrastructure necessary to ensure food security for future generations.

Over-nourishment presents a double-burden paradox that affects nutrition and increases the risk of chronic diseases. Texas agriculture and AgriLife Research are

uniquely positioned to partner to improve public nutrition and health by providing a healthier, more nutritious, and abundant food supply.

As Texas agriculture grows, it has a positive multiplier effect throughout the economy. For every dollar of agricultural production in Texas, another $2.19 is generated by other industries in the state to support this additional output. The interconnected nature of Texas agriculture to other sectors of the economy — and the everchanging relationships across these sectors — make it imperative that AgriLife Research is positioned to anticipate and respond to critical needs and emerging challenges.

AgriLife Research's roots are firmly embedded in production agriculture and natural resources. We seek to expand the agency's focus to apply the power of fundamental life sciences to solve real-world issues. Discoveries in genetics, crop and animal management systems, and links between poor human nutrition and chronic diseases are accelerating our impacts on sustainable food and fiber supply chains. Our approach integrates basic and applied research to create, as stated in our vision, "healthy lives and livelihoods improved through abundant, affordable, and high-quality food and agricultural products in Texas and the world."