Texas A&M AgriLife Research

Strategic Priorities FY16-20

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Strategic Priorities FY16-20

Introduction

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 system's contribution to the Texas gross domestic product (GDP) was valued at $129 billion in 2013. This represented 8.3% of the state's total economic activity. Within the Texas agricultural economy, beef cattle and dairy accounted for 57% of total cash receipts, valued at $11.8 billion in 2013. Cotton was the second-largest commodity, with cash receipts of $2.3 billion. Broilers followed closely, with $1.8 billion in sales, and the greenhouse and nursery industry contributed $1.3 billion. Corn, grain sorghum, and wheat had combined farm-gate receipts of $2.2 billion and represented most of the remaining value for Texas's leading agricultural commodities.

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 ever-changing relationships across these sectors — make it imperative that Texas A&M AgriLife Research is positioned to anticipate and respond to critical needs and emerging challenges.

With its unique climatic and geographical diversity, the Texas landscape is a microcosm of the rest of the world. Dramatic increases in precipitation from west to east and substantial differences in average daily temperature from north to south make it possible to replicate most of the world's ecosystems in our statewide research. Therefore, even though the efforts of Texas A&M AgriLife Research are primarily focused on the needs of Texas, the influence and impacts of our discoveries extend far beyond our borders.

We are keenly aware that hunger, specifically undernutrition, is one of the most important global issues of our time. It is both a cause and a symptom of poverty, and ultimately it can 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 agriculture science, and in that way help prevent these outcomes and build a better world for present and future generations.

Although the roots of AgriLife are firmly planted in production agriculture and natural resources, we also look to apply the power of fundamental life sciences to real-world issues. Discoveries in biochemistry and genetics are accelerating our impacts on sustainable food and fiber production. Advances in drug development and nutrition target acute and chronic diseases for a healthier Texas. Our approach is to integrate basic and applied research and to use our tremendous strength in both to create solutions with lasting impacts.

Mission

Our mission is scientific discovery that benefits consumers and expands agricultural sustainability, profitability, and environmental stewardship.

Vision

We will maintain our position as the leader among peer organizations — both nationally and internationally — in the discovery and application of research in agricultural and life sciences. Our discoveries, development, and transfer of innovative technologies will produce economic, environmental, and health benefits that are key to Texas's success and vital to the lives of its citizens.

Developing Solutions

Texas A&M AgriLife Research is not deviating from its historical mission. However, to meet the emerging challenges of today and tomorrow, during the next five years we will place particular emphasis on a limited number of strategic priorities that will enhance the sustainability of targeted systems.

Sustainable systems have four important features:

1. Economic viability
2. Environmental and natural resource stewardship
3. Social acceptability
4. Resilience to shock

Sustainability is a complex concept that means different things to different people. Environmental and natural resource stewardship is an essential feature of sustainable systems, but no system is truly sustainable unless it is economically viable. Production practices may be supported for a time through subsidies, but in a free-market economy, long-term sustainability depends upon total benefits exceeding costs.

Even though agricultural production and marketing systems may meet criteria related to economic viability and environmental sustainability, if elements of the system are feared or rejected by society, the system will not continue to function. Sustainable solutions to the challenges facing agriculture must not only be based on sound science; they must also be acceptable to consumers and society at large.

Ultimately, resilience is required for sustainability. Factors outside the system or outside the control of its participants can undermine the way a system functions. Climate variability (whatever the cause), market disruption, and geopolitical instability create inevitable, and often unforeseeable, shocks to the food and fiber system. If these shocks cannot be absorbed, or if the system cannot adapt to accommodate them, it will fail — and thus it is not sustainable. Resilience may be extremely difficult to achieve, but it is an integral part of truly sustainable solutions. Therefore, the achievement of resilience in the food and fiber system is a major driver in the establishment of strategic priorities for Texas A&M AgriLife Research for the next five years.

Strategic Priorities

Texas A&M AgriLife Research is working to find innovative solutions that will create *adaptive agricultural systems* — systems that are capable of meeting the demands of a growing population, changing climate, fluctuating economic conditions, unpredictable geopolitical environments, and declining resources — for today and tomorrow. We must make fundamental scientific discoveries and apply them to create new technologies that will enhance the sustainability and resilience of adaptive agricultural systems. These agile systems can meet the needs not only for food and fiber, but also for clean water and air, functional landscapes, improved health and well-being, and the sustainability of resources for generations to come.

Strategic priorities are particular areas that AgriLife Research will emphasize over the next five years in order to make measurable progress toward enhancing the resilience of agricultural systems. After a review of our core competencies, and in the context of the obstacles to sustainable systems, we have identified four priority areas:

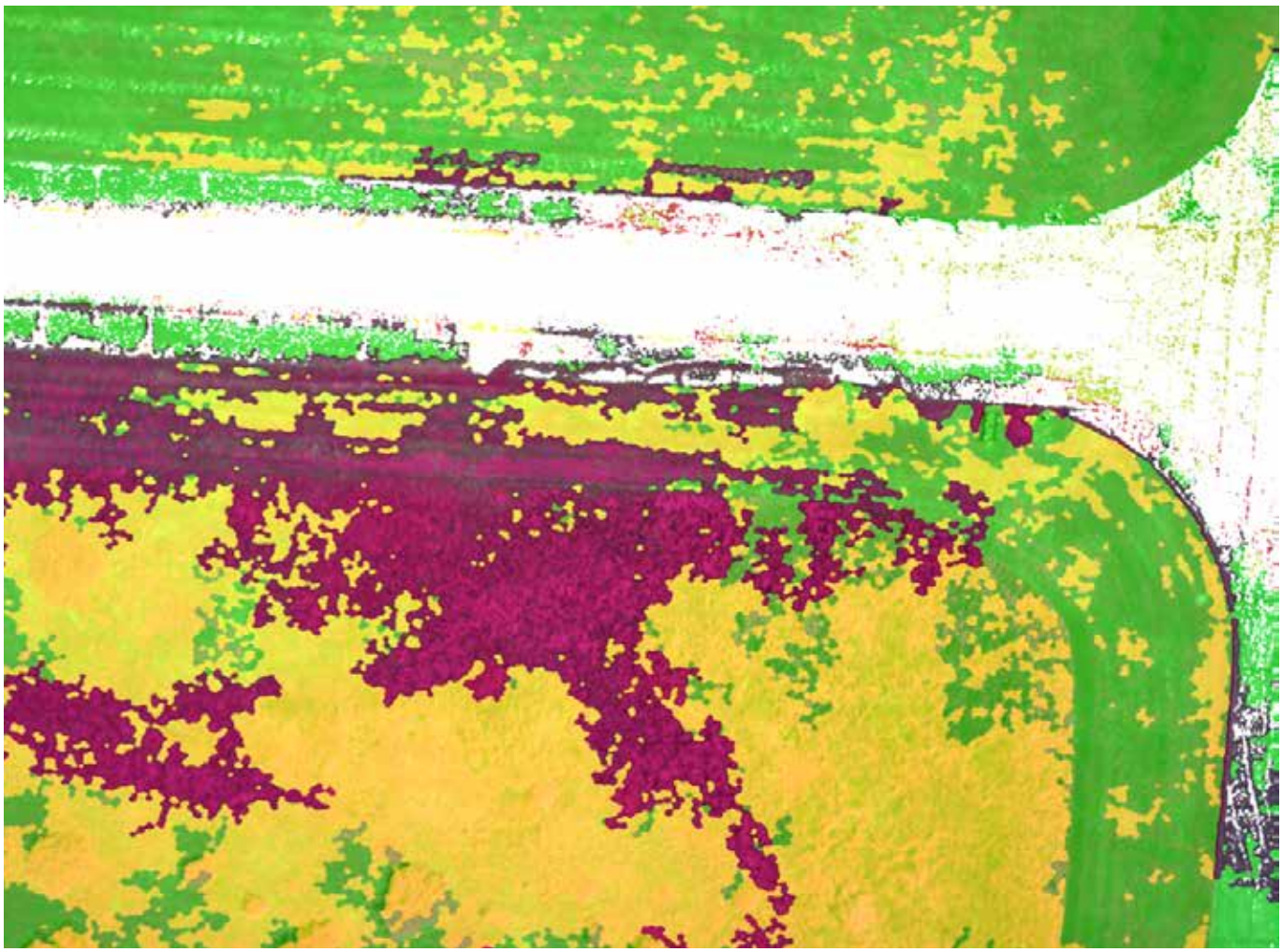
1. Achieve resilience in food, fiber, and ecological systems through adaptive strategies.

2. Detect, monitor, and mitigate insect vector–borne diseases and invasive species.

3. Enhance agricultural information systems and expand their use through innovative applications.

4. Integrate basic and applied research at the nexus of food and health.

Targeted goals within each objective — and preliminary actions to promote progress toward these goals — are outlined below. It is important to understand that this structure is expected to be dynamic. As progress is made or new discoveries are achieved, some actions may be removed and other actions that better facilitate progress may be added. We will describe the impact of programs as progress toward these goals, so that the direct and extended benefits of AgriLife Research programs can be readily defined.



Strategic Priority 1:

Achieve resilience in food, fiber, and ecological systems through adaptive strategies.

GOALS	ACTIONS
1.1. Develop remote sensing tools to detect physiological indicators of biotic and abiotic stress in plants and animals.	1.1.1. Collaborate with Texas A&M Institute for Quantum Science and Engineering to develop raman spectroscopic sensors. 1.1.2. Expand existing collaboration with TAMU-Corpus Christi and Texas A&M Engineering Experiment Station to utilize unmanned aerial systems as a platform for remote sensing. 1.1.3. Interpret sensor data and develop visualization tools for precision management of crops and livestock. 1.1.4. Incorporate economic feasibility analyses into each action item above.
1.2. Accelerate genetic progress in crops and livestock through automated phenotyping and marker-assisted selection.	1.2.1. Integrate conventional and biotechnology approaches to livestock breeding and cropping systems. 1.2.2. Invest in personnel, infrastructure, and technology to facilitate automated phenotyping under greenhouse and field conditions. 1.2.3. Maintain and expand high-throughput sequencing capacity within our genomics core. 1.2.4. Develop methods to rapidly determine root architecture modifications, including altered ratios of root functional cell types. 1.2.5. Expand data collection and analytic capacity for *big data* and statistical approaches to extract biologically relevant information. 1.2.6. Strengthen and leverage collaborative research and development efforts with corporate partners.
1.3. Increase efficiency of production systems through precision agriculture.	1.3.1. Create decision support tools based on climate, weather forecasts, soil maps, aerial/satellite imagery, historic yield data, previous agronomic practices, and genetic potential of crops. 1.3.2. Determine the spatial and temporal yield and quality response to conventional and innovative cropping systems. 1.3.3. Develop economic analyses to assess profitability and cost/benefit of tools, technologies, and systems derived from our research.
1.4. Improve water-use efficiency in urban and agricultural applications.	1.4.1. Use innovative and traditional plant breeding techniques to develop water-efficient, drought- and salt-tolerant turf and ornamental landscape plant varieties. 1.4.2. Encourage microbial communities that complement and extend plant root functions. 1.4.3. Evaluate policy aspects and effectiveness of water conservation strategies in urban and rural areas. 1.4.4. Develop new irrigation methods and deficit irrigation strategies to reduce water use while maintaining crop yields. 1.4.5. Evaluate impact of insect herbivory under reduced water use.
1.5. Enhance sustainability of livestock and poultry production.	1.5.1. Engage with key stakeholders to effectively and defensibly define metrics for sustainability in beef, pork, lamb, and poultry production systems. 1.5.2. Create prescriptive management systems that drive positive change in systemic sustainability without compromising production efficiency. 1.5.3. Develop innovative intensification strategies that reduce the amount of land required for livestock production. 1.5.4. Reduce anti-microbial resistance through strategies that employ novel approaches to prevention, early detection, and treatment of disease. 1.5.5. Identify and exploit the genetic basis for resistance to disease and/or response to vaccination.

Milestones and Deliverables

1. Within one year, secure funding to support and propose to the Board of Regents the creation of a Center for Biophotonics.
2. Within three years, construct and test autophenotyping systems both in the greenhouse and under field conditions.
3. Within five years, develop and deploy UAV-mounted, novel sensors to monitor plant health and growth as well as the physiological indicators of biotic and abiotic stress.
4. Within five years, assess the profitability of alternative production systems employing precision agriculture; sustainable livestock and poultry systems; and improved approaches to water-use efficiency.

Strategic Priority 2:

Detect, monitor, and mitigate insect vector–borne diseases and invasive species.

GOALS	ACTIONS
2.1. Improve detection methods for pathogens and vectors to predict and manage epidemics.	2.1.1. Identify host markers to serve as signatures for pathogens. 2.1.2. Characterize and utilize volatile organic compounds and other novel chemicals that interfere with host finding, settling behavior, or other behaviors in blood-feeding arthropods. 2.1.3. Create a startup company and engage corporate partners to commercialize the AgConnect™ suite of software tools. 2.1.4. Form rapid-response teams when new pests or diseases are detected in neighboring states or countries to limit the area affected and minimize economic damage. 2.1.5. Investigate potential to work with government and private sector collaborators to establish early warning systems in Panama for insect vectors of plant, animal, or zoonotic diseases. 2.1.6. Improve detection of exotic pathogens such as new serovars of Dengue virus or novel arboviruses like Chikungunya.
2.2. Define the insect- and tick-transmitted disease cycles and find ways to eliminate or reduce source populations.	2.2.1. Recruit pathogen-vector experts in College Station and Weslaco to identify targets that block replication and transmission of pathogens. 2.2.2. Enhance plant endophyte expertise in College Station to develop methods to block successful pathogen infection in plants. 2.2.3. Recruit additional entomologists with expertise in mosquito-vectored diseases to work in College Station and in Weslaco. 2.2.4. Improve exotic plant pathogen laboratory acquired from USDA-ARS in Weslaco. 2.2.5. Explore the use of RNAi and CRISPR as means of disrupting reproduction of pathogens in blood-feeding arthropods, or interfere with other physiological processes in the vector, the pathogen, or in the host. 2.2.6. Explore the host microbes that may help attract or repel the arthropod vector.
2.3. Develop better control tactics and management strategies.	2.3.1. Use innovative and traditional plant breeding techniques, marker-assisted selection, genomics, and phenotyping to develop disease-tolerant citrus and vegetable plant varieties. 2.3.2. Develop remote sensing tools to detect and monitor insect or disease infestation in plants. 2.3.3. Develop methods to rapidly detect insecticide resistance in a holistic approach to insecticide-resistance management. 2.3.4. Design and test new trapping and surveillance systems to estimate vector density while testing vectors for the presence of pathogens, which could lead to area-wide management recommendations.
2.4. Develop and manufacture vaccines to protect people, animals, and plants.	2.4.1. Develop bacteriophage and other novel strategies to lyse bacterial pathogens in the vasculature of living plants. 2.4.2. Identify endophytic communities to block pathogen signaling required for the expression of pathogenic genes. 2.4.3. Utilize electron-beam technology to create safe, effective vaccines, and collaborate with the National Center for Therapeutic Medicine to cost-effectively produce small batches of customized vaccines as part of a rapid response to specific vector-borne diseases.

Milestones and Deliverables

1. Within one year, create a startup company to commercialize and expand utilization of the AgConnect™ suite of tools and dashboards to facilitate and enhance biosurveillance of pathogens.
2. Within one year, recruit additional expertise in mosquito-vectored diseases and construct infrastructure to support their work.
3. Within three years, develop and deploy remote sensing technology to monitor and mitigate infestation by plant, animal, and zoonotic pests.
4. Within five years, expand the use of electron-beam technology to enhance food safety and phytosanitary requirements of fruits and vegetables entering the United States from Mexico and other foreign sources.

Strategic Priority 3:

Enhance agricultural information systems and expand their use through innovative applications.

GOALS	ACTIONS
3.1. Limit uncertainty in agricultural and natural resource decision making.	3.1.1. Improve our capacity in modeling complex systems. 3.1.2. Enhance our capacity in biogeochemical ecosystem process modeling in terms of the water cycle, greenhouse gases, nitrogen cycle, etc. 3.1.3. Develop process-level models for the inherent complexity of genetics-environment-management interactions. 3.1.4. Identify strategic partners within TAMUS and without with capabilities in providing and managing soils and weather databases, bioinformatics, and *big data* analysis.
3.2. Improve identification of feedbacks, thresholds, and transitions that can lead to change in social and ecological systems.	3.2.1. Improve early-warning capacity and information dissemination. 3.2.2. Enhance modeling capacity to detect when biological and economic thresholds are being approached and to model changing states and associated transitions. 3.2.3. Develop appropriate modules and linkages to improve capacity for modeling coupled human and natural systems.
3.3. Develop knowledge systems to support adaptation, transformation, resilience, and sustainability of plant and animal systems in natural, agricultural, and urban settings.	3.3.1. Improve capabilities for storing, analyzing, and delivering/translating information to assist in decision support for adaptive management, including dashboards that facilitate multilayer data and the addition of new layers as sensor technology increases and expands. 3.3.2. Develop capabilities for capturing local knowledge to reduce duplication of effort, optimize management strategies, and engage stakeholders. 3.3.3. Develop a knowledge system node for Texas to support modeling efforts and data acquisition, storage, and dissemination to Texas stakeholders. 3.3.4. To help improve policy planning, integrate economic decision-support mechanisms to assess the impact of changes in land management.
3.4. Develop mechanisms, frameworks, and tools to leverage *big data* into actionable management decisions.	3.4.1. Identify mechanisms to encourage basic science researchers in the fields of computer science, statistics, and mathematics to apply best practices and methods to agricultural datasets and projects. 3.4.2. Develop and improve visualization and data-management tools for *big data* in agriculture. 3.4.3. Develop server capacity for *big data* storage and remote access of "slices" by less powerful Internet-connected devices.

Milestones and Deliverables

1. Within one year, formalize a collaborative relationship with GEOSAT and other individuals and groups within The Texas A&M University System to gain access to high-performance computing and *big data* management systems.
2. Within three years, establish collaborative relationships with government, academic, and private sector partners in Mexico and Panama to develop and implement early warning systems to protect against the accidental or intentional introduction of biosecurity threats to Texas and the United States.
3. Within five years, develop and license decision-support models and data-mining capacity to the private sector.

Strategic Priority 4:

Integrate basic and applied research at the nexus of food and health.

GOALS	ACTIONS
4.1. Contribute to public health and well-being by encouraging increased daily intake of fruits and vegetables.	4.1.1. Increase voluntary consumption of nutritious fruits and vegetables by improving appearance, taste, and other quality attributes through marker-assisted selection and other advanced plant-breeding strategies. 4.1.2. Improve the health-promoting properties of fruits and vegetables through manipulation of pre- and post-harvest factors. 4.1.3. Perform rigorous research to support Texas A&M AgriLife Extension's Healthy South Texas initiative.
4.2. Identify how specific food commodities, animals, and pathogens in certain locations convey risks to public health, such as the risks arising from the spread of antibiotic-resistant bacteria.	4.2.1. Assemble a modeling team to expand our capacity in data mining and risk assessment. 4.2.2. Promote collaborative, multi-disciplinary research involving scientists from the College of Veterinary Medicine & Biomedical Sciences, the Health Science Center, and the private sector. 4.2.3. Engage and play an active role with governmental, industry, and consumer consortia to provide science-based solutions to emerging issues such as microbial resistance to antibiotics. 4.2.4. Estimate the economic impacts of food-borne illness in terms of lost jobs and income and diminished productivity.
4.3. Understand the mechanisms of contamination and transmission of specific pathogens via food.	4.3.1. Construct Biosafety Level 3 laboratories to enable multi-disciplinary teams to conduct challenge studies. 4.3.2. Employ synthetic biology technology to design and build organisms and study mechanisms of attachment, etc.
4.4. Develop strategies to reduce the risk of foodborne illness, phytosanitary issues, and biosecurity threats.	4.4.1. Collaborate with private industry to design, construct, and deploy mobile electron-beam sterilization systems at the Texas A&M AgriLife Research and Extension Center at Weslaco or other locations on the Texas-Mexico border. 4.4.2. Identify genomic markers for resistance to pathogen attachment in fruits and vegetables and introduce them into adapted cultivars through hybridization. 4.4.3. Develop innovative biological or chemical approaches to eliminate or reduce pathogens in the food supply chain and assess the economic feasibility of adoption on a commercial scale.

Milestones and Deliverables

1. Within one year, expand and enhance vegetable-breeding capacity in Weslaco, the Winter Garden, and the Panhandle of Texas.
2. Within three years, establish a collaborative research and development program with a major food retailer, grower, or processor to license and market improved varieties of fruits and vegetables.
3. Within five years, release two new vegetable varieties with superior resistance to abiotic and/or biotic stress.

Summary and Conclusion

Texas A&M AgriLife Research currently leads all of its peer organizations in total research expenditures. Our greatest strengths are (1) our capacity to address an extraordinary span of challenges and (2) the depth of research expertise within our agency. Applying these strengths toward measurable and achievable goals will hasten the development of meaningful and valuable solutions for Texas and the world. We are placing emphasis on four strategic priority areas:

1. Achieve resilience in food, fiber, and ecological systems through adaptive strategies.

2. Detect, monitor, and mitigate insect vector–borne diseases and invasive species.

3. Enhance and exploit agricultural information systems.

4. Integrate basic and translational research at the nexus of food and health.

Achieving our goals in each of these areas over the next five years will provide increased resilience to agricultural and natural resource systems and will help to sustain the diverse, dynamic, and interconnected economy of our state.

Risks

An assessment of risks that may compromise AgriLife Research's progress toward achieving our goals and prevent us from attaining our milestones and deliverables is shown in Table 1. Risks were separately considered for each strategic priority. The Enterprise Risk Matrix (Table 2) that follows the risk assessment outlines our strategy to monitor and mitigate those risks. Milestones and deliverables will be reported each year in the Texas A&M AgriLife Research *Research Goals and Impacts Annual Report*. This report will serve our internal audience to ensure that appropriate goals and management controls are in place, and it will guide our strategic communications efforts with external audiences in Texas and beyond.

Table 1.

Assessment of Risks — AgriLife Research Strategic Priorities FY16–20

STRATEGIC PRIORITY	GOALS	MILESTONES AND DELIVERABLES	RISKS
1. Achieve resilience in food, fiber, and ecological systems through adaptive strategies.	1.1. Develop remote sensing tools to detect physiological indicators of biotic and abiotic stress in plants and animals. 1.2. Accelerate genetic progress in crops and livestock through automated phenotyping and marker-assisted selection. 1.3. Increase efficiency of production systems through precision agriculture. 1.4. Improve water-use efficiency in urban and agricultural applications. 1.5. Enhance sustainability of livestock and poultry production.	1. Within one year, secure funding to support and propose to the Board of Regents the creation of a Center for Biophotonics. 2. Within three years, construct and test autophenotyping systems both in the greenhouse and under field conditions. 3. Within five years, develop and deploy UAV-mounted, novel sensors to monitor plant health and growth as well as the physiological indicators of biotic and abiotic stress. 4. Within five years, assess the profitability of alternative production systems employing precision agriculture; sustainable livestock and poultry systems; and improved approaches to water-use efficiency.	1. Theft of intellectual property or technology 2. Faculty/staff/student travel to high-risk countries and regions 3. Failure to adhere to guidelines in biosafety, human-subject research, or animal research 4. Failure to appropriately manage export controls 5. Inadequate IT support 6. Reduction of external funding 7. Reduction in appropriated resources 8. Failure to replace/upgrade aging infrastructure 9. Lack of adherence to policies, rules, federal and state regulations and laws, or grant/contract requirements 10. Disasters such as hurricanes, droughts, or acts of terrorism 11. Failure to address health and safety issues in a timely manner

STRATEGIC PRIORITY	GOALS	MILESTONES AND DELIVERABLES	RISKS
2. Detect, monitor, and mitigate insect vector–borne diseases and invasive species.	2.1 Improve detection methods for pathogens and vectors to predict and manage epidemics. 2.2 Define the insect- and tick-transmitted disease cycles and find ways to eliminate or reduce source populations. 2.3 Develop better control tactics and management strategies. 2.4 Develop and manufacture vaccines to protect people, animals, and plants.	1. Within one year, create a startup company to commercialize and expand utilization of the AgConnect™ suite of tools and dashboards to facilitate and enhance biosurveillance of pathogens. 2. Within one year, recruit additional expertise in mosquito-vectored diseases and construct infrastructure to support their work. 3. Within three years, develop and deploy remote sensing technology to monitor and mitigate infestation by plant, animal, and zoonotic pests. 4. Within five years, expand the use of electron-beam technology to enhance food safety and phytosanitary requirements of fruits and vegetables entering the U.S. from Mexico and other foreign sources.	1. Theft of intellectual property or technology 2. Faculty/staff/student travel to high-risk countries and regions 3. Failure to adhere to guidelines in biosafety, human-subject research, or animal research 4. Failure to appropriately manage export controls 5. Inadequate IT support 6. Reduction of external funding 7. Reduction in appropriated resources 8. Failure to replace/upgrade aging infrastructure 9. Lack of adherence to policies, rules, federal and state regulations and laws, or grant/contract requirements 10. Disasters such as hurricanes, droughts, or acts of terrorism 11. Failure to address health and safety issues in a timely manner

STRATEGIC PRIORITY	GOALS	MILESTONES AND DELIVERABLES	RISKS
3. Enhance agricultural information systems and expand their use through innovative applications.	3.1. Limit uncertainty in agricultural and natural resource decision making. 3.2. Improve identification of feedbacks, thresholds, and transitions that can lead to change in social and ecological systems. 3.3. Develop knowledge systems to support adaptation, transformation, resilience, and sustainability of plant and animal systems in natural, agricultural, and urban settings. 3.4. Develop mechanisms, frameworks, and tools to leverage *big data* into actionable management decisions.	1. Within one year, formalize a collaborative relationship with GEOSAT and other individuals and groups within The Texas A&M University System to gain access to high-performance computing and *big data* management systems. 2. Within three years, establish collaborative relationships with government, academic, and private sector partners in Mexico and Panama to develop and implement early warning systems to protect against the accidental or intentional introduction of biosecurity threats to Texas and the United States. 3. Within five years, develop and license decision-support models and data-mining capacity to the private sector.	1. Theft of intellectual property or technology 2. Inadequate IT support 3. Data breach resulting in large exposure of confidential information 4. Reduction of external funding 5. Reduction in appropriated resources 6. Failure to replace/upgrade aging infrastructure 7. Lack of adherence to policies, rules, federal and state regulations and laws, or grant/contract requirements 8. Disasters such as hurricanes, droughts, or acts of terrorism

STRATEGIC PRIORITY	GOALS	MILESTONES AND DELIVERABLES	RISKS
4. Integrate basic and applied research at the nexus of food and health.	4.1. Contribute to public health and well-being by encouraging increased daily intake of fruits and vegetables. 4.2. Identify how specific food commodities, animals, and pathogens in certain locations convey risks to public health, such as the risks arising from the spread of antibiotic-resistant bacteria. 4.3. Understand the mechanisms of contamination and transmission of specific pathogens via food. 4.4. Develop strategies to reduce the risk of foodborne illness, phytosanitary issues, and biosecurity threats.	1. Within one year, expand and enhance vegetable-breeding capacity in Weslaco, the Winter Garden, and the Panhandle of Texas. 2. Within three years, establish a collaborative research and development program with a major food retailer, grower, or processor to license and market improved varieties of fruits and vegetables. 3. Within five years, release two new vegetable varieties with superior resistance to abiotic and/or biotic stress.	1. Theft of intellectual property or technology 2. Faculty/staff/student travel to high-risk countries and regions 3. Failure to adhere to guidelines in biosafety, human-subject research, or animal research 4. Lack of oversight of laboratory chemicals and inventory 5. Failure to appropriately manage export controls 6. Inadequate IT support 7. Reduction of external funding 8. Reduction in appropriated resources 9. Failure to replace/upgrade aging infrastructure 10. Lack of adherence to policies, rules, federal and state regulations and laws, or grant/contract requirements 11. Disasters such as hurricanes, droughts, or acts of terrorism 12. Failure to address health and safety issues in a timely manner

Table 2.

Enterprise Risk Matrix FY16-20

Risk (Reference to Strategic Plan)	Impact (High, Medium, Low)	Likelihood (High, Medium, Low)	Mitigation Activities	Monitoring Activities	Executive Management Reporting Process
Loss of intellectual property and related technology due to foreign efforts to obtain information illegally Strategic Priorities 1,2,3,4	High	High	• Educate PIs on the methods used to obtain intellectual property through illegal means. • Coordinate with TAMUS Facility Security Officer, DSS, FBI, and A&M System peers on common concerns. • Develop technology control plans for identified intellectual property interests.	• Continuously monitor safeguarding mechanisms outlined in technology control plans.	• Quarterly reports to Management by Compliance Officer • Real-time situational discussions with executive management as needed
Faculty/staff/student travel to high-risk countries and regions increases risk of violence or disease for travelers Strategic Priorities 1,2,4	High	Medium	• Establish and continually monitor procedures to assess high-risk travel. • Maintain close contact with System Risk Management regarding travel risks and alerts. • Ensure that travelers follow established procedures for traveling to high-risk areas. • Review weekly Concur report as well as ad-hoc reports sent via departmental offices to identify high-risk travelers. • Develop and follow a travel incident response protocol.	• Risk and Compliance monitors available resources for international travelers. • Route international travel requests to Risk and Compliance Office.	• Quarterly reports to management by compliance officer • International travel not approved by System Risk Management is routed to Executive Management for approval/disapproval.

Risk (Reference to Strategic Plan)	Impact (High, Medium, Low)	Likelihood (High, Medium, Low)	Mitigation Activities	Monitoring Activities	Executive Management Reporting Process
Failure to adhere to guidelines in biosafety, human-subject research, or animal research increases risk of incident harming employees and/or the agency's research program. Strategic Priorities 1,2,4	Medium	Medium	• Monitor Maestro notices for research that needs the approval of an oversight committee, and communicate with PIs to help ensure that approval is obtained. • Use TAMU research compliance committees to provide peer-level review of research compliance issues in these areas.	• Compliance staff attends IBC, IACUC, and AACUC meetings to keep current on processes, issues, or concerns in this area. • Monitoring of required CITI training for researchers • Monitoring current approvals for expiration dates to avoid non-compliance	• Quarterly reports to management by compliance officer • Compliance Office alerts Executive Management in real time about any incidents impacting the agency.
Lack of oversight of laboratory chemicals and inventory creates a hazard that impacts worker safety and the agency's research program. Strategic Priority 4	Medium	Medium	• Perform site inspections to monitor lab safety and follow up on corrective actions (outside of Brazos County). • Utilize TAMU EHS to monitor lab safety on campus. • Establish process for the decommissioning of laboratories.	• Risk and Compliance Office reviews • TAMU EHS reviews	• Quarterly reports to management by compliance officer • Real-time discussion of issues by Compliance Office with Executive Management as needed

Risk (Reference to Strategic Plan)	Impact (High, Medium, Low)	Likelihood (High, Medium, Low)	Mitigation Activities	Monitoring Activities	Executive Management Reporting Process
Failure to appropriately manage export controls could result in penalties due to violation of law/ regulations. Strategic Priorities 1,2,4	High	Medium	• Maintain a process for managing and monitoring potential violations of export control regulations for all business functions, including research, fiscal, human resources, purchasing, travel, and contracting. • Provide face-to-face training for employees on export control issues and the agency process to manage them.	• Monitoring of export controls compliance for all business processes is centralized within Risk and Compliance.	• Quarterly reports to management by compliance officer • Real-time discussion of issues by Compliance Office with Executive Management as needed
Inadequate Information Technology (IT) support affects agency ability to conduct business and research. Strategic Priorities 1,2,3,4	High	Medium	• Adequately staff AgriLife Information Technology (AIT). • Implement centralized IT support model (program and financial).	• USER committee to evaluate adequacy of support	• Quarterly meetings with director of AIT, with reports to Director's Office
Data breach results in large exposure of confidential information. Strategic Priority 3	High	Medium	• Adhere to various security regulations. • Conduct internal and external IT audits.	• AgriLife Information Technology system architecture and testing • ISO monitoring of security-related data • Management Review Team IT reviews • External reviews	• Management Review Team reports • External reports to Director's Office

Risk (Reference to Strategic Plan)	Impact (High, Medium, Low)	Likelihood (High, Medium, Low)	Mitigation Activities	Monitoring Activities	Executive Management Reporting Process
Reduction of external funding affects ability to fulfill objectives. Strategic Priorities 1,2,3,4	High	Medium	• Maintain close cooperation with the state and federal GR teams. • Maintain corporate agreements. • Maintain adequate staffing of OSRS, optimizing management. • Hire and retain the best scientists. • Additional investment in Corporate Relations Team and Borlaug Institute has resulted in significant increase in funding.	• Contracts and grants reports • Federal updates • Interactions with GR teams	• Monthly contracts and grants reports • Assessments from sources in Washington, D.C., and Austin to Directors Office, and maintenance of corporate relationships
Damage from reduction in appropriated sources due to prolonged recession reduces ability to accomplish agency objectives. Strategic Priorities 1,2,3,4	High	Medium	• Reallocate resources. • Downsize operations. • Increase external funding by hiring grant writers.	• System Treasury Office • Meetings with GR teams	• Monthly fiscal updates • Cash concentration pool reports from TAMUS Treasury • GR team reports

Risk (Reference to Strategic Plan)	Impact (High, Medium, Low)	Likelihood (High, Medium, Low)	Mitigation Activities	Monitoring Activities	Executive Management Reporting Process
Failure to replace/ upgrade aging infrastructure creates a financial drain on individual faculty because dollars dedicated to research must be spent on infrastructure. Strategic Priorities 1,2,3,4	Medium	Medium	• Reallocate resources. • Downsize operations. • Increase external funding. • Invest in core facilities for genomic sequencing and bioinformatics.	• Review of annual deferred maintenance plan	• Annual deferred maintenance plan • Monthly fiscal updates detailing infrastructure allocations and reserves
Lack of adherence to agency and TAMUS policies and federal or state rules, or lack of knowledge of appropriate rules and regulations, causes penalties or reduces ability to conduct research. Strategic Priorities 1,2,3,4	Medium	Medium	• Inform employees of internal policies via website. • Conduct employee training in appropriate areas, with continuing training as required. • Risk Compliance Office provides training assistance and monitoring of key compliance areas.	• Management reviews • Internal audits • Disbursements reviews • Review of training records	• TAMU System internal audit reports • Internal Management Review Team reports • Quarterly meetings between Compliance Officer and Executive Management
Natural or other disasters such as hurricanes, droughts, or acts of terrorism cause agency operations to be seriously impaired. Strategic Priorities 1,2,3,4	Medium	Medium	• Follow emergency management plan. • Reallocate resources. • Use contingency funds (PUF), insurance through TAMUS, or crop/pasture insurance.	• Engineering Office • AIT • Health and Safety Office	• Reports from Engineering, AIT, State Emergency Office, and Health and Safety Office as needed

Risk (Reference to Strategic Plan)	Impact (High, Medium, Low)	Likelihood (High, Medium, Low)	Mitigation Activities	Monitoring Activities	Executive Management Reporting Process
Failure to recognize and address health and safety issues in a timely manner results in harm to staff or public. Strategic Priorities 1,2,4	Medium	Medium	• Inform employees of internal policies via website. • Conduct employee training in appropriate areas, with continuing training as required. • TAMU and TAMUS coordinate efforts.	• Management reviews • Reviews by compliance offices	• Internal Management Review Team reports • Reports from TAMU and AgriLife compliance offices

Strategic Priorities

1. Achieve resilience in food, fiber, and ecological systems through adaptive strategies.
2. Detect, monitor, and mitigate insect vector–borne diseases and invasive species.
3. Enhance agricultural information systems and expand their use through innovative applications.
4. Integrate basic and applied research at the nexus of food and health.