During the fall of 2011, I asked the Division of Agricultural Sciences and Natural Resources (DASNR) faculty to embark on a process to document our future directions. This process began with the development of External Drivers that influence our programs and the change that continually is being implemented in those programs. This early planning resulted in the identification of 11 Drivers of Change. Consensus discussions were held in the departments and units within DASNR to identify the most critical issues, relate them to the Drivers of Change and identify the impacts of the issues on agriculture and quality of life issues across the state.

A short discussion of each of these External Drivers provides some background of understanding of the emergence and identification of priority issues that will impact the state’s agricultural constituencies over the next five-10 years. Also included in this document are discipline-specific priority directions and goals for each of our departments, centers and institutes. All of this effort has been with a focus on the impacts that the External Drivers will have on the state that has guided the division’s process of priority goal setting. It is important to recognize that this planning effort is continually evolving and will require periodic review of priority issues that will emerge from external drivers to best meet the needs of our statewide constituencies.

This document represents the cumulative effort of many groups and individuals. I would like to express my appreciation to our faculty, department heads, and the Dean’s Advisory Council for their careful consideration and input toward the vision and future priority directions of DASNR.

Best regards,

Robert E. Whitson
DIVISION OF AGRICULTURAL SCIENCES AND NATURAL RESOURCES ISSUES

The following drivers have been identified as highly influential in shaping many of the issues expected to be important to Oklahoma citizens, agriculture, natural resources, families, businesses and communities, as well as scientific inquiry in the future.

DRIVERS OF CHANGE IMPACTING OKLAHOMA

- Climate Variability
- Energy
- Public Policy and Government Regulations
- Land Use and Natural Resources
- Market Volatility
- Pests and Invasive Species
- Population and Demographics
- Quality of Life
- Water
- Public Preferences and Expectations
- Technology

CLIMATE VARIABILITY

Oklahoma has always suffered from extremes in weather, resulting in increased risks to human safety, agricultural production, and shifts in natural communities of plants and animals. The recent increased number and severity of floods, droughts, extreme high and low temperatures, storms and wildfires in Oklahoma are similar to recent increased variability in climatic conditions worldwide. These changing conditions will pose a challenge to human health and to native populations of plants and animals, as well as create habitat conditions more conducive to invasive species (e.g., Eastern redcedar, sericea lespedeza, zebra mussels, feral hogs, fire ants, kudzu, etc.).

Current management strategies for agricultural production, natural resources and human shelter will have to be modified to meet the challenges of the increased variability and extremes in weather. Research, Extension and teaching efforts will likely impact plant and animal breeding, new crops, irrigation management and technology, cropping systems, animal and human housing design and technology, long and short-term weather forecasting, pest management, restoration practices and natural resource sustainability.

ENERGY

The increasing demands for energy sources to provide lighting, heating, cooling, power, transportation and food production systems will require development of new sources of energy, new and more efficient management systems, and improved distribution systems. The Energy Independence and Security Act of 2007 (EISA) calls for the Environmental Protection Agency (EPA) annual renewable fuel standard to rise steadily from 5.4 billion gallons (Bgal) in 2008, eventually reaching 36 Bgal annually by 2022. The 25x25 alliance has a self-established goal of producing 25 percent of our nation’s energy from renewable resources such as wind, solar and biofuels by the year 2025.

Recent initiatives by the Department of Defense (e.g., the Navy’s Great Green Fleet) and commercial aviation industry (e.g., “Farm to Fly” initiative) call for greater use of renewable biofuels in the production of jet fuels and marine diesel. Potential alternative energy sources in Oklahoma include biofuels developed from oilseed, lignocellulosic and sugar crops, animal waste and other feedstocks. Oklahoma (particularly western Oklahoma) also is well positioned to develop wind and solar power.

Development of a sustainable energy future for Oklahoma also is dependent on conservation of existing energy resources, both renewable and nonrenewable. Efforts within the Division of Agricultural Sciences and Natural Resources (DASNR) will be primarily focused through the Biobased Products and Energy Center with the mission of developing sustainable bioenergy and biorefinery industries in Oklahoma. DASNR faculty and staff will develop and provide teaching, research and Extension programs focused on sustainable energy sources; biomass production, harvest and transport, and biomass conversion; and energy conservation for agricultural and residential uses.

PUBLIC POLICY AND GOVERNMENT REGULATIONS

A major driver for production agriculture and DASNR research, Extension and teaching programs will be public policy and government regulations. Areas of impact include environmental regulations imposed by EPA, price support programs in future farm bills, changes in the tax code, trade agreements, regulatory affairs (e.g., food safety), banking and finance policy, biosecurity, etc.

It is incumbent upon DASNR to assist producers to remain economically viable in the face of ever-changing government regulations and policies. Input from all disciplines within DASNR will be required to develop best management practices necessary for production agriculture. Potential areas of research, Extension and teaching include development and evaluation of agricultural policy, economics, marketing, crop and animal production, pesticide use and application, food safety, postharvest processing and engineering technology strategies.
MARKET VOLATILITY

Many agricultural commodity and input prices have recently reached record levels in Oklahoma. Increased price volatility comes with these higher levels. The reasons for higher and more volatile prices are not totally clear, but may include: a) increased globalization of market changes anywhere in the world impacts Oklahoma prices; b) rising energy prices, which impact the cost of agricultural production and consumer goods, as well as the demand for agricultural products to produce energy – in turn, energy markets are volatile; c) continued population and economic growth causing increased demand for food and other agricultural-based consumer goods, hence higher prices; d) climatic conditions - which impact food, fiber and fuel production - and have become increasingly volatile, thus causing more production uncertainty; e) many countries with faltering economies that appear not to be responsive to past policies – this creates uncertainty for all industries including agriculture; and f) changing government policy and regulation with regard to trade regulations, price supports, crop insurance, environmental issues, etc. causing market/price uncertainty. With high and volatile prices comes greater risk and greater uncertainty about the type of long-term investments to make in agriculture. In response, producers may seek the following as well as other forms of assistance: a) marketing education and information, b) new production and management strategies to deal with higher risk, c) strategies for managing under new policies, and d) new government policies to deal with volatile prices and income.

LAND USE AND NATURAL RESOURCES

Over a 15-year period (1992-2007), Oklahoma experienced a 29 percent increase in the number of farms, a 10 percent increase in the number of those farms less than 180 acres in size, and an 8 percent decrease in farm owners who described their occupation as “farming.” Reasons for this growing number of small “nontraditional” farms are varied and not well documented.

Conversion of cropland for alternative uses (i.e., residential, recreational, agritourism, etc.) continues to grow statewide causing habitat fragmentation and increasing the urban/wildlife interface. This is just one example of the many changes in land use underway in Oklahoma. These shifting patterns of land use will require careful analysis to determine the potential impacts on agricultural production capacity and efficiency, along with possible implications on the conservation and judicious use of Oklahoma’s natural resources.

Changes in land ownership will impact the fire cycle, grazing management, forest investments and wildlife habitats. Comprehensive research, Extension and teaching packages are needed to inform and guide Oklahoma landowners and other stakeholders on the best management practices necessary to sustain agriculture, housing and community development, and conserve our natural resources for generations to come.

PESTS AND INVASIVE SPECIES

Organisms that negatively affect the health and safety of humans and animals - or production of food, fiber or other societal needs - are considered pests. Recent outbreaks of foodborne illnesses, development of Roundup® resistant weed species, the pine beetle epidemic in the Western U.S. forests, the spread of Asian soybean rust in the U.S., the mosquito-borne West Nile virus and economic losses due to tick-borne livestock diseases are prime examples of the impact of pests and the need for effective, sustainable control measures. Often, these organisms are endemic to the area within which they are found, but they negatively impact human needs. Increasingly, non-native plants and animals are being moved throughout the world and becoming established in areas in which they have not been previously found. Often, these exotic species negatively impact their new environment due to increases in numbers and/or displacement of native species.

Humans have dealt with pests using a myriad of management practices for centuries, and as pest species have evolved and/or moved into new areas, we have had to develop new and more effective management strategies. Pests often adapt to control strategies such as genetically resistant varieties or chemical treatment (e.g., herbicides, fungicides, insecticides, nematicides, etc.), thus, making the development of new control measures an on-going challenge.

Integrated pest management (IPM), which simultaneously utilizes multiple control strategies (e.g., chemicals, genetic resistance, natural predators, cropping practices, etc.), offers the possibility of economical, longer-lasting control. Based on the history of the development of pest species and populations and our management strategies, we can assume that the recognition, identification of pests and development of evolving management strategies will be necessary for the foreseeable future. DASNR faculty and staff will discover and extend knowledge of the biology, populations, ecology and management strategies of pests including arthropods, pathogens, plants and vertebrate animals.
The population of Oklahoma is growing and changing in a number of ways. The nation’s population is becoming relatively more urban. Future political representation will reflect this. There are many urban issues that DASNR has existing expertise to address including lawn and garden care, household pests, energy and water conservation, nutrition, green space, family relations and youth development, to name a few.

Minority populations, particularly the Hispanic population, are growing in number. In addition, Oklahoma has a large Native American population. Both populations have cultures that tie closely to natural resources, agriculture and consumer demand. Individuals with full-time occupations in agriculture are declining. However, the total number of farms is slowly rising. One of the most rapid rates of increase is in small farm numbers. Some of these farms are small specialty crop farms, but many of them can be classified as “lifestyle” farms populated by people seeking a rural-life environment but with limited backgrounds in agriculture.

A growing number of citizens have no experience with agriculture and, thus, a low level of knowledge and appreciation of food and fiber. Independent of whether these individuals choose to be small farmers or just citizens who vote or buy our products, we need to orient portions of academic and Extension education programs to their background. The age of farm operators/owners is expected to continue to rise with an increasing number of land owners being absentee landlords. The implications of these two trends are that there will be larger changes in farm ownership and management methods over the next decade than have occurred in the past decade.

What ownership and management patterns will evolve? How will these impact rural communities? What will happen to family farm numbers and/or farm size? How will native plant communities be affected by lack of management? Students enrolling in the college of agriculture with little or no background in agriculture continue to increase in number. Likewise, in the last decade, the number of female students has risen dramatically. Female students now outnumber male students. In a broader, worldwide context, agriculture and other professions continue to increase in number. Likewise, in the last decade, the number of female students has risen dramatically. Female students now outnumber male students. In a broader, worldwide context, agriculture and other professions continue to increase in number. Likewise, in the last decade, the number of female students has risen dramatically. Female students now outnumber male students. In a broader, worldwide context, agriculture and other professions continue to increase in number. Likewise, in the last decade, the number of female students has risen dramatically. Female students now outnumber male students. In a broader, worldwide context, many of the issues created by the population and demographic trends are important to OSU researchers and educators.

QUALITY OF LIFE

As economic development continues to progress and generate greater productivity and stronger financial security, quality of life will become increasingly important. Many DASNR programs strive to improve quality of life.

Major DASNR programs contributing to quality of life include: a) undergraduate and graduate programs that train students to succeed in personally rewarding and financially secure professions; b) Extension adult education programs that focus on teaching quality of life topics including nutrition, child care, financial management, housing, consumer economics, family relations, healthy lifestyles, etc.; and c) 4-H youth development programs that teach general life skills and occupational skills related to agriculture and other professions.

Development of human capital is central to improving the quality of life. To produce the next generation of leaders, undergraduate and graduate students need access to leadership training through coursework that develops critical thinking skills and creative problem solving, along with developing their communication skills through individual presentations and group debates and presentations. Extracurricular activities - such as judging teams, Oklahoma Agricultural Leadership Encounter, Animal Science Leadership Alliance, internships, the Undergraduate Research Scholars Program, and many other clubs and activities - give students unique opportunities to develop their leadership skills to become tomorrow’s leaders and advocates for agriculture. Oklahoma is faced with severe quality of life issues such as teenage pregnancy, high school dropouts, high incarceration, bankruptcy and hunger incidence. Chronic disease is prevalent with obesity creating higher rates of cardiovascular disease and diabetes.

Quality of life is directly related to educational outcomes. Working toward increasing the number of college graduates is critical to the state socioeconomic well-being.

Safe food, water and a clean environment are essential to quality of life. Likewise, rural- and urban-based recreational activities that are biobased are increasing in demand as recreational experiences for enhancing the quality of life. Examples include utilization of land, lakes, rivers, wildlife, forests or rangeland used for gardening, fishing, hunting, hiking, camping, horseback riding, bird watching, golfing, public parks and more.

More specific to rural Oklahoma is the challenge of enhancing rural community vitality and sustainability. Job creation (both agricultural and nonagricultural) is vital. Rural communities are challenged to provide quality education, health care, a wide variety of retail stores, recreational opportunities, communications and governmental services (fire, police, roads, sewage, water, etc.). Without these community attributes, the quality of life for rural Oklahomans will be reduced.
An ever-widening imbalance in the supply and demand of water will dramatically impact the future of agricultural production and community development in Oklahoma. While water demands rise statewide, water supply will increasingly come under pressure, particularly in areas of high demand such as the Oklahoma Panhandle and urban residential areas. Surface and groundwater level declines, resulting from withdrawals for irrigation that cannot be recharged through precipitation, are a growing concern.

Innovative approaches are needed to develop and deploy efficient and sustainable livestock and crop production systems under the projected limited-water environments of the future. A shift to more reliance on rain-fed systems, coupled with new and improved technologies to maximize production per inch of precipitation, will shape research, Extension and teaching efforts of the future.

Capturing, conserving and recycling water from a variety of sources for use in livestock and crop production will supplement rainfall, where appropriate. The quality of water moving through Oklahoma agricultural systems and urban developments will be impacted. Creative technologies developed to enhance water quality in agriculture and natural resource settings will be adaptable for many industrial and municipal water system uses.

Public Preferences and Expectations

The individual consumer has a set of preferences and values that are dependent upon culture, education, advertising, income and individual tastes, among a plethora of other factors. Consumer and public preferences affect issues important to DASNR clientele in three major ways: 1) they affect consumer demand for the consumption of food and fiber commodities and products; 2) they affect government policies; and 3) they directly affect how food industry firms operate, such as using greener practices or more environmentally friendly methods.

Markets are a major mechanism for transmitting consumer preferences to producers and, thus, guiding the resource use of a nation. However, society has found that not all of their preferences are adequately addressed by markets. Government policy (that is driven by voters and citizen political action groups) often attempts to regulate or influence markets where markets fail or public goods exist. Likewise, citizens seek conditions and products for which markets do not exist, such as clean air, protection of endangered species, development of biobased fuels, etc. Preferences and opinions have directly caused substantial changes in major companies’ purchasing patterns and retail offerings. For example, Walmart and McDonalds now require their suppliers to be more green and sustainable, while at the same time they are providing products perceived to be healthier and more environmentally friendly. Public opinion will matter in issues relating to animal welfare, organic foods, local foods, support for small farms, sustainability of production, environmental integrity and energy conservation. Production of a safe and wholesome food supply for human consumption is important to good human health and well-being. America’s population expects their food supplies to be safe.

Markets, government agencies and firm managers work best when a nation’s citizenry are well educated and have access to unbiased, scientifically based information. Publicly supported land-grant universities - via their integrated teaching, research and Extension function - are a major source of both education and unbiased, scientifically based information. Our forefathers recognized this when they created land-grant universities to educate the working class.

Technology

Advances in communication technology have helped revolutionize the way people work and make decisions. Social media platforms provide multiple ways for personal interaction. The expanded use of smartphones, tablet computers and mobile apps has brought about important changes in the way people access information. Increasingly, traditional media channels couple with social media avenues to give individuals unprecedented control over the information they seek. As a result, reaching clients with programs and information is becoming more complicated. For DASNR’s faculty and staff, the constantly evolving media environment will continue to influence program delivery methods and interaction with our students and stakeholders.

Advanced technologies in the laboratory, greenhouses and field have resulted in tremendous advances in agriculture. Biomolecular technologies provide us the ability to develop transgenic plants and animals incorporating disease resistance and increased growth potentials. Advances in microtechnologies have resulted in advances in sensory devices and robotics that have provided increased efficiencies of inputs and operations. DASNR faculty and staff will continue to use the developing and new technologies to provide improved animal breeds, plant varieties and to gain a better understanding of life mechanisms.
DIVISION OF AGRICULTURAL SCIENCES AND NATURAL RESOURCES GOALS

To best address critical issues in the 21st century, it is important to identify critical issues that will arise from the influence of the external drivers affecting Oklahoma agriculture and quality of life issues across the state. To address the most pressing issues, specific goals have been identified in DASNR’s teaching, research and Extension programs that will help meet the needs of key constituencies across the state.

Develop and promote international educational experiences for faculty and students.

Programs and course offerings will be tailored to prepare all students (from traditional, rural students to nontraditional, urban students) for successful, fulfilling careers in agricultural sciences and natural resources. CASNR course offerings will elevate and highlight the importance and impact of topics such as water, energy, and efficient and sustainable production systems on the future of Oklahoma agriculture and natural resources.

Build exceptional faculty teaching expertise through continued education and development opportunities.

Outstanding faculty advisers, combined with the coordinators and staff of the Student Success Center, will build on highly successful programs and continue to explore new opportunities for student leadership training and development.

Expand distance education programs and course offerings to complement and enhance on-campus programming and to reach new student populations.

Increase the CASNR portfolio of distance education programs and course offerings to enhance the undergraduate and graduate curriculum and to reach nontraditional students worldwide.

Develop and promote international educational experiences for faculty and students.

Build on the very successful travel and study abroad programs currently offered, with the goal of making an international learning experience obtainable for all undergraduate students. Develop interactive and reciprocal educational programs with leading international universities to foster faculty and student cross-cultural learning experiences.
Provide educational opportunities to help improve the quality of life for all Oklahomans. Achieving this goal will require expanding the diversity of the audiences we serve and the delivery of educational and service programs that improve the vitality and sustainability of Oklahoma’s families, businesses, and rural and urban communities. Through these programs, OCES will address identified issues and needs such as those related to health, family resiliency, understanding of food and fiber production, personal finances, nutrition, food safety and security, housing, economic development, recreation, land and resource use, human capital, and youth competencies in science, life skills and critical thinking.

Educate and inform crop and livestock producers and landowners of appropriate new technologies, changing production methods and economic conditions that impact their businesses.

Examples include changes resulting from higher energy costs and the potential use of forages for energy production. Both will lead to changes in cropping systems and livestock feed sources. The drivers identified indicate there will be increased competition for water that will call for less irrigation and/or more efficiency in plant water use (drought-resistant plants, etc.). Other factors include climate variability, rising input costs, evolving markets, food safety issues, and changing government policies and regulations.

Increase natural resource conservation and environmental educational programming.

Chief among these educational programs will be programs on best management practices for the conservation of energy and water resources. Other conservation education efforts include (but are not limited to) soil and wildlife conservation, management of pests and invasive species, and environmental protection. These efforts will include programming for many audiences in the general population, as well as agricultural producers.

Develop and conduct enhanced risk management educational programs.

Agricultural and natural resource managers have always faced substantial risks from weather and changing markets. But recent events (drought, record-level commodity and input prices) and a number of leading drivers identified as influencing Oklahoma’s agriculture (climate variability, energy, market variability, water, pests and invasive species, and government policies and regulations), indicate higher levels of risk in the future. These programs should help managers design organization, production, marketing and management systems that improve sustainability in the face of increased risk levels.

Make a positive difference in the lives of more Oklahoma 4-H members with emphasis on 4-H programs to attract more minority and urban youth.

The goal of 4-H is to provide youth with life skills that contribute to them being better citizens and more resilient individuals. National research has shown the advantages of 4-H participation include higher educational accomplishments and higher motivation for future education. In addition, youth in 4-H are more civically active and make more community and civic contributions than youth in other out-of-school activities. These accomplishments and impacts are because of the positive youth development provided by state Extension specialists and the supportive families, caring volunteers and dedicated county educators who work with youth.
• Strengthen the economic and environmental sustainability of livestock production systems.
• Enhance the teaching and research capacity of the department in the area of animal protein production, quality and safety.
• Initiate a new Extension educational program relative to use of current/new genomic selection techniques/tools in the beef cattle industry.
• Initiate a new priority program (animal behavior and well-being).

ANIMAL SCIENCE
 ANSI.okstate.edu
 405.744.6062

Goals for biochemistry and molecular biology will be developed upon the arrival of the newly appointed department head.

BIOCHEMISTRY AND MOLECULAR BIOLOGY
 biochemistry.okstate.edu
 405.744.6189

- Sustainability and quality management of limited available water resources under more variable climate conditions.
- Develop and use bioproducts from invasive and other logical species for energy and other beneficial uses for rural economic development.
- Improve traceability of all biobased materials for a more secure food production and processing industry.
- Develop and implement new biobased and nano-scale sensor systems for more targeted and efficient treatments.

BIOSYSTEMS AND AGRICULTURAL ENGINEERING
 biosystems.okstate.edu
 405.744.5431

- Identify biologically based solutions in IPM to address societal problems in health, energy, food and the environment. Strengthen our capabilities concerning pesticide use, government regulation, pest management, crop protection/rotation and pest resistance.
- Develop new or strengthen existing teams to enhance human animal health and food and water quality (STEM, biorefronics, attribution, detection/diagnosis). Reduce inputs and ensure a safe food and water supply.
- Serve as regional leader in identifying, surveying and diagnosing invasive, endangered and existing species. Examine impact of climate change on pest/beneficial distribution and forecasting to refine existing thresholds.
- Identify, evaluate and address issues brought by small farm proliferation (grapes, pecan, garden farming, etc.), and the influence of urbanization and a global economy on overall market decisions (e.g., China/India with pecan, peanut - NAFTA, etc.) and youth education.

ENTSOMOLOGY AND PLANT PATHOLOGY
 ento.okstate.edu
 405.744.5643

- Develop new/superior crops tailored to Oklahoma growers through traditional breeding and new molecular methods with value-added characteristics.
- Develop new extraction technology and state industry for deprivation of value-added products from production of existing and new crops, new product markets, shelf-life extension, nutraceuticals, etc.
- Develop food safety systems and evaluate protocols and curriculum for edible horticulture crops that address producer compliance with new federal- and state-mandated food safety programs.
- Develop mechanism for improvement of Oklahoma communities using sound design and horticultural principles for environmental/economic enhancement via creation of OSU Community Design Outreach Center for teaching, research and Extension.
- Develop the integrated environmental research and education site for environmental research, programming and curriculum that addresses emerging environmental needs such as low-impact development, storm water management, water capture, recycling, reuse, etc.
• Develop new crop cultivars that increase production potential; improve drought, heat and acid tolerance, and nutrient use efficiency of food, feed, fiber, fuel and turf production systems through genetic improvement and plant breeding.

• Enhance capacities in weed and invasive species control and management in croplands and rangelands.

• Optimize management practices for realizing yield potential through advanced crop production, while simultaneously maintaining soil quality and minimizing environmental impact.

• Increase the efficiency of agricultural water use by providing information and methodology about improved efficiency irrigation, dryland water management, and drought avoidance and amelioration strategies.

• Global change and climate uncertainty requires innovative management and teaching solutions.

• Energy development and land use changes will cause habitat fragmentation in critical wildlife and fish habitats.

• Invasive species will continue to present problems in the reservoirs and rivers, and on lands of Oklahoma.

• Water quantity and quality from forests and rangelands will be vitally important for ecological flows, growth and recreation.

• Initiate and maintain research efforts to increase understanding of plant responses to extreme temperatures and drought.

• Promote conservation of water resources through development and use of drought-tolerant plants.

• Development of genetic and management strategies toward efficient use of plants for energy production.

• Provide research and education opportunities in southern Oklahoma.

• Develop the IAB facility to be a fully functioning research, education and outreach resource for OSU in southern Oklahoma.

• Provide expertise and research support to federal and state agencies and other entities in agricultural biosecurity, forensic plant pathology and produce safety.

• Develop and optimize sampling, detection and characterization methods for plant pathogens of high consequence. These technologies will enhance our nation’s capabilities in protecting and defending our agricultural resources.

• Provide educational programs that prepare young scientists to meet national staffing needs in emerging areas of homeland security and create opportunities for “pipelining” them into these fields through interactive experiences such as internships, visits, community events and seminars.

• Target diverse communities and stakeholders including law enforcement, regulatory officials, security agencies, crop producers, plant disease diagnosticians, Cooperative Extension agents and researchers.
CENTER PRIORITIES AND GOALS

BIOBASED PRODUCTS AND ENERGY CENTER
bioenergycenter.okstate.edu
405.744.5618

- Maintain an active feedstock development program providing improved perennial grass varieties.
- Develop suitable feedstock production systems using and/or enhancing existing biomass resources, dedicated crops and processing waste streams.
- Develop energy efficient and cost effective biomass logistics and supply systems.
- Enhance existing, while exploring and developing new, bioconversion technologies addressing biofuels, bioenergy and bioproducts.
- Determine sustainability of establishing biorefineries through systems and economic analyses, energy balances and integrated models to quantify the environmental, economic and social impacts.

OKLAHOMA WATER RESOURCES CENTER
water.okstate.edu
405.744.5615

- Strengthen the resilience and preparedness of agriculture and water resources for extreme climate variability including intense and extended drought.
- Construct complete water budgets for regional basins to optimize water for agriculture, other uses and values - to minimize inefficiencies - and to inform citizens on how to reduce inefficiencies.
- Generate research that establishes best management practices for agricultural and urban landscape irrigation.
- Develop Extension programs that create and deliver online decision support tools and training programs that enable managers to use those tools.

ROBERT M. KERR FOOD AND AGRICULTURAL PRODUCTS CENTER
fapc.okstate.edu
405.744.6071

- Educate and train the Oklahoma food and agribusiness industries in food safety, best practice, new product and processing technologies, and contemporary and emerging economic development business and marketing strategies.
- Develop and conduct applied research for healthy food options, new food processing technologies, safe food practices, enhanced quality products, and economical and sustainable food processing for the Oklahoma food industry.
- Pursue programs that will train and educate undergraduate and graduate students in contemporary food industry practices, food code regulatory policies and procedures, and new food processing technologies for entry into the food industry.
- Pursue efforts toward the safe food network alliance with state agencies, commissions, trade groups, tribal groups, commodity organizations, food delivery organizations, agricultural producers and food processors through the Oklahoma Food Safety Task Force, and support the blending of this network with federal and other state agencies to produce, process, package, inventory, ship and market safe quality food.
Agriculture
Division of Agricultural sciences and Natural resources

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