

## **American Rescue Plan Funding Help Upgrade Research Equipment and Facilities**

UT AgResearch was fortunate to receive \$50 million from the state in funding from the American Rescue Plan. The funds are being applied at each of our ten AgResearch and Education Centers located throughout Tennessee. Infrastructure and equipment improvements are imperative to enable our scientists to provide accurate data reflecting modern practices that support our AgResearch stakeholders, strengthen communities, invigorate local economies and the American economy, and improve the quality of life for the citizens of Tennessee and beyond.

All research and educational programs performed at AgRECs are intended to improve sustainability, including profitability, increase efficiency and yield, improve food safety, and/or reduce environmental impacts. All these aspects improve food security, stimulate local economy, and promote climate-smart agriculture. Through our research and education centers, we seek to stay relevant, to tackle challenges, and supply unbiased research to stakeholders and consumers.

We are conscientiously, respectfully, and intentionally planning the use of the funds to facilitate research through infrastructure improvements and updated equipment to produce current, relevant, innovative research. We are driven to continually pursue research that brings Real. Life. Solutions. to current and anticipated future challenges. This includes improving food security for our growing population, food and fiber availability in a shrinking agriculture footprint, animal production, well-being and security, labor shortages in agriculture, and mitigating changing climatic conditions. We strive to contribute to a thriving economy and a better quality of life for the citizens in Tennessee and beyond through relevant research innovation and technological breakthroughs.

### **Facilities**

1. Robotic Milkers at the East Tennessee Research and Education Center – Little River Animal and Environmental Unit (ETREC-LRAEU) will house two modern robotic milking systems which will lead to more relevant dairy research and in turn generate information to support the Tennessee dairy industry. This state-of-the-art system will ultimately increase research capacity and information to better support Tennessee dairy producers in making better and more informed decisions for their operations.
2. The Next-Gen Broiler Research Facility at the Middle Tennessee Research and Education Center in Spring Hill (MTREC-SH) will enable researchers to conduct innovative research and technological demonstrations to support rapidly growing agricultural industry in our state, an industry that accounts for approximately \$7B in total economic impact.
3. Precision Livestock Farming (PLF) facilities for cutting-edge beef research at MTREC-SH will replace the out-of-commission dairy facilities, as well as the outdated beef facilities at our Plateau AgResearch and Education Center (PREC). Cutting-edge equipment will help quantify feed and water use of individual animals within a group. Research activities will support one of the top animal industries in Tennessee and render our research/operations more productive and relatable to stakeholders' needs.
4. Greenhouse facility at Northeast Tennessee Research and Education Center (NETREC). With the decline in burley tobacco production in East Tennessee (albeit still over \$100M industry and among the top five row crops in the state), a state-of-the-art greenhouse will support a growing area of agriculture, small fruits and vegetables and locally grown food crops. The new structure

and equipment will accommodate research that will produce information used to help East Tennessee farmers and allied industries solve short and long-term production problems and identify and evaluate alternative production techniques as well as maintain sustainability.

5. Climatology building and NOAA weather station at West Tennessee Research and Education Center (WTREC). Understanding how climate and microclimate impacts crop production is an especially critical component of stabilizing and increasing food and fiber production in a challenging and changing environment. A primary mission of UTIA is to develop sustainable, yet profitable crop production.
6. Revitalizing and strengthening research operations through updated facilities is desperately needed to compete for federal or industry funding and conduct relevant and innovative research. Modernization will advance impactful research, attract interns, students, faculty, and other researchers. The ability to temporarily house visiting scientists, postdocs, graduate students, and interns greatly enhances the AgREC ability to attract and perform cutting-edge research. Mentoring of students (including interns) and postdocs achieves an objective of developing the next generation of applied agricultural scientists and a well-trained agricultural workforce.
7. Smart AgResearch / Smart Farms require broadband internet. One of the NETREC projects involves equipping all relevant facilities, fields, and pastures with internet accessibility from all points on the AgREC and would allow for the development of innovative technology in plant, animal, and veterinary sciences in real time. This system will be the backbone to the Advanced Farming System (AFS) that will be the model for Southeastern land grant universities.
8. The Forestry Resources AgResearch and Education Center at Highland Rim Unit (FRREC-HRFU) project upgrade to 21<sup>st</sup> century internet broadband and will provide the ability for researchers to work on real-time data while on-site and/or staying in the unit field bunkhouse.

## **Equipment Upgrades**

1. Robotic milkers at ETREC-LRAEU. We are also investing in robotic equipment for the robotic milkers. We will have the unique ability to conduct conventional research and robotic milking research inside the same facility (under a common roof, resulting in a similar thermal environment). We will also gain further indirect returns on the investment in the form of invaluable research data and feedback to the robotic industry, which will in turn produce more accurate and efficient equipment for the industry.
2. C-Lock cattle feeders and waterers. The primary function of these units is to measure individual animal feed and water intake of livestock grazing on pastures and kept indoors. This is a cutting-edge research and precision ag tool. Each animal will be considered its own experimental unit, hence magnifying the statistical power of the setup versus feeding by the pen or pasture. There are multiple areas of research that can benefit ruminant nutrition as well as animal health and well-being. Results and recommendations from trials could help safeguard the health and well-being of animals as well as advance beef cattle nutrition, yielding greater producer profits.
3. The special infrared imaging camera systems requested by the Forestry Resources REC will provide 21<sup>st</sup> century ground-based reconnaissance, measurement, and digital infrared (and other light spectrum) data collection and analysis to support forestry and natural resources research.
4. Unmanned Aerial Systems (UAS), thermal camera & precision sensors, and related technology equipment. Remote-sensing technology is being marketed and used widely by producers to assess crop health and make prescription applications relative to seed, fertilizer, water, and plant protection products. The amount of data generated by remote sensing is massive, and unbiased

research is needed to better understand how to profitably use this technology to maintain and strengthen our food supply.

5. Harvesters, forage/hay processing equipment, research and commercial combines, cotton picker, small plot sprayers, research planters:
  - a. Research forage harvester is a cutting-edge research, precision ag tool, which has the capability to harvest not only small forages but also more challenging forages and biomass like switchgrass and corn silage. The accuracy and reliable reporting of the plot harvester and research samples elevates our ability to conduct this type of research and supports an increasing number of researchers. Forage research is vital to meeting the needs of our beef and forage producers. Improved forages in Tennessee directly impact producer success and directly benefits public health by stabilizing our food supply. The new state-of-the-art harvesters are automated, accurate, efficient, and require only two people to operate and collect samples.
  - b. Hay tedder (processing): This addition allows the stored winter forage to be cut and processed at a more ideal time and condition producing a higher quality feed for livestock. Much of this feed is processed throughout the year and fed utilizing PLF-GrowSafe research facility. It is essential for continuing pertinent cattle research that our farmers and agricultural industry rely on, and research and innovation are imperative to feed a rapidly growing population.
  - c. Milan Combine: researchers rely on the REC-Milan combines for harvesting large research plots with yield monitors and providing plot weights and grain moisture percentages. Yield is the primary factor considered for grain production and these machines allow us to accurately harvest and measure differences in crop yield between treatments. A production combine is required for nutrient management and soil fertility, irrigation, precision farming, utilization of drone technology, conservation tillage, soil health, cover crops, harvesting efficiency, and other important field research trials.
  - d. Backhoe, forklift, and disc mowers are all essential equipment used on the AgREC farms to support research operations and improve our research plot access roads and specialized plot establishment. Backhoes will be used to maintain drainage systems, build roads, install culverts, and clear areas for existing research projects and future crop, forestry and natural resources research focused on food and fiber production, soil conservation, and other road engineering, watershed management and water management/erosion initiatives. Forklifts are needed to safely set up pens, move heavy tools and supplies. Disc mowers are also essential to AgRECs for forage harvests in support of winter livestock feeding.
  - e. Vehicles, including ATV, to access facilities and research areas. Vehicles are also needed to transport staff throughout the AgREC, to and from field research areas, to haul equipment and supplies, transport commodities, and are essential for AgREC operations including performing research operations. ATVs are essential units used for beef cattle production research and field crop activities.

## **Field and Fencing**

1. Securing/safeguarding animals, animal welfare, and research biosecurity: Fencing at ETREC is needed to create new space to house dairy livestock to be used in precision milking and modern dairy research. Land will also be used to help dairy producers understand how to integrate beef

cattle into their dairy operations. Fencing at NETREC is necessary to improve pasture management for new grazing trial techniques which support research endeavors for both plant and animal sciences. Additionally, fencing and roads are integral parts of the new food animal (cattle and poultry) research initiatives, required for setting up the research plots/high tech grazing paddocks, caring, managing, and accessing the research animals or facilities.

2. PLF beef paddocks and the concomitant fencing will replace former, inadequate dairy facilities with cutting-edge research facilities like PLF research at the Hickman Precision AgCenter at MTREC-SH. The new fencing will support an increase in the number of beef cattle at this facility to support the largest livestock industry in Tennessee. In addition, the PLF beef paddocks will make it more effective to study soil health, water consumption and forage utilization in a controlled beef cattle production setting with enhanced Precision Livestock Technologies collecting real-time data.
3. Drainage tiles and dike pump at ETREC. The drain tiles will be used to move water from low-lying areas that are currently prone to flooding research plot areas near lake Loudon. The dike pump will be used to drain water collected by field tile systems and move it into the Tennessee river which prevents riverbank and ecological damage during unseasonable rain events and rising lake levels.

### **New or Improved Roads**

1. New or improved roads for access to research plots are necessary. Without proper roads to research areas, we cannot safely access new and legacy research projects in the field. FRREC research is related to fiber production, maintaining endangered wildlife species, and retaining species of concern, including white oak and short leaf pine, both of which have current regional research initiatives. NETREC requests include gravel that will be utilized for barn entrances, gate entrances, around cattle waterers, and driveway repairs. Fencing and roads are integral parts of the new food animal (cattle and poultry) research initiatives, required for setting up the research plots and paddocks, caring, managing, and accessing the research animals, forestry, crops, and facilities.
2. Road improvements are also a great need to reduce wear and tear on valuable research equipment and vehicles. Researchers must access research plots, and gravel is needed to reduce potholes to alleviate some of the wear and tear on vehicles.

### **Land Surveys**

1. Land surveys, FRREC: address the FRREC Cumberland Unit property lines in perpetuity to protect and secure research projects and associated long-term access/map location of ongoing and legacy field research plots.