The Vernon Center serves the people and communities of Texas's Rolling Plains. The center was founded in 1905 with the location of a jointly operated USDA–Texas Agricultural Experiment Station facility in Chillicothe. The center at Vernon opened in 1971, and the Chillicothe station became a substation, for a total of 1,690 acres for rangeland studies and an additional 875 acres in research and demonstration farms.

The Rolling Plains region has a cotton- and wheat-centered economy supplemented by livestock, poultry, peanuts, and grain sorghum. Its weather and environment are less predictable than those of other Texas regions, and it is susceptible to drought, flooding, extreme heat and cold, dust storms, thunderstorms, and tornadoes. The Vernon Center assists producers and communities through research and education in land stewardship and the best use of available resources.

Center researchers focus on rangeland restoration, improving livestock and forage production, efficient crop and tillage systems, and integrated crop management technologies. They are investigating canola as a viable and profitable crop for the region, as well as triticale, a man-made cereal crop with a high livestock-feed value. Triticale is sustained by a massive root system to better withstand both drought and winter cold. The center has developed hybrid grain sorghum that is well adapted to the Rolling Plains environment.

Research scientists at Vernon have developed nationally and internationally recognized, science-based knowledge documenting natural resource management as a requirement for

- healthy, functional ecosystems;
- integrated crop and livestock production systems; and
- sustainable use of natural resources in semiarid environments.

All of these form a lasting foundation for successful agricultural production and viable communities.

**Current Research**

**Evaluating range brush as biofuel feedstock, compared with coal and lignite**

Center researchers have pioneered research on the potential of invasive rangeland woody plants such as mesquite and juniper for bioenergy uses. They published some of the first data that documents shrub regrowth rates following harvest and landscape-scale biomass distribution, using remote sensing. They also developed a woody-plant harvesting machine. They have determined that the heating value of mesquite and juniper can exceed 7,000 and 8,000 BTU/lb, respectively, compared with less than 5,000 BTU/lb for forage or bioenergy sorghum and less than 4,000 BTU/lb for cattle feedlot or dairy manure. On a dry, ash-free basis, all four biofuel types range from 8,500 to 9,000 BTU/lb, compared with greater than 10,000 BTU/lb for coal or lignite. This brush-to-bioenergy research has generated a great deal of interest, especially in the private sector.

**Researching rotational grazing for beef production and carbon sequestration**

Vernon researchers determined the ecological and economic consequences of managing grazing on semi-arid savanna stocked with livestock to (1) maintain current ecosystem health, (2) maximize profit, or (3) improve ecosystem health over a 30-
year time frame. Their research showed that managing grazing for highest ecosystem health results in earning capacity four times higher than on rangelands with poor ecosystem health. Managing for high ecosystem health is imperative for maintaining ranch livelihoods and the ecosystem services that Texans depend on.

**Conducting watershed management and water quality research**

In the 2000s, more than 30% of observation wells in 25 Texas counties exceeded the Environmental Protection Agency’s maximum contaminant level for nitrate in drinking water, compared to eight counties in the 1960s. A spatial clustering of counties with high groundwater nitrate levels was apparent in the Texas Rolling Plains and the southern High Plains. Research at the Vernon Center has shown that the median nitrate-nitrogen concentration in the Seymour Aquifer exceeds the EPA maximum contaminant level. Agricultural producers could realize substantial savings if nitrate-nitrogen in irrigation water was credited toward crop nitrogen requirements when developing nutrient management plans. Data indicate that nitrogen fertilizer applications were reduced by 43%–72% when accounting for well water nitrates and crediting toward crop nitrogen requirements. Crop yields were maintained with reductions in nitrogen inputs, showing well water nitrate is used by irrigated crops.

More than half (274 of 516) of the streams listed as impaired in the 2008 Texas Water Quality Inventory are stated to have elevated bacteria levels that make them unsafe for contact recreational use. The potential loss of recreational income associated with water quality degradation alone has been estimated to approach $630 million annually in Texas. Vernon Center research was critical in removing Buck Creek from the 2010 draft list of streams with unsafe bacteria levels. This saved farmers and ranchers substantial costs in fencing cattle, which were originally thought to be a main source of bacterial impairment of the creek. A protection plan was developed for the Buck Creek Watershed, with recommended implementation strategies through 2011.

**Research Impacts**

- Implementation of conservation tillage using no-till practices in wheat production has saved wheat producers about $5.6 million annually.
- Evaluating the Seymour Aquifer for nitrate-nitrogen concentration could save cotton producers in the Rolling Plains about $2 million annually in nitrogen fertilization.
- Reduction of bloat in stocker cattle grazing wheat pastures could save producers $18.9 million in annual income.

**Vernon Center Facilities**

The Vernon and Chillicothe facilities include 16,000 square feet of office and laboratory space; 20,000 square feet of shop, storage, and work areas; 7,500 square feet of greenhouses; 875 acres of cropland; and 1,690 acres of rangeland.

**About Texas A&M AgriLife Research**

*A member of The Texas A&M University System*

Established in 1888, Texas A&M AgriLife Research is the state’s premier research and technology development agency in agriculture, natural resources, and the life sciences. Headquartered in College Station, AgriLife Research has a statewide presence, with scientists and research staff on other Texas A&M University System campuses and at the 13 regional Texas A&M AgriLife Research and Extension Centers. The agency conducts basic and applied research to improve the productivity, efficiency, and profitability of agriculture, with a parallel focus on conserving natural resources and protecting the environment. AgriLife Research has 550 doctoral-level scientists, many of whom are internationally recognized for their work. They conduct hundreds of projects spanning many scientific disciplines, from genetics and genomics to air and water quality. The annual economic gains from investments in Texas’s public agricultural research are estimated at more than $1 billion. Through collaborations with other institutions and agencies, commodity groups, and private industry, AgriLife Research is helping to strengthen the state’s position in the global marketplace by meeting modern challenges through innovative solutions.