



Research drives long-term ag productivity gains

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As part of our annual Agricultural Symposium, we dove into the real-world application of the research to be presented through stories like this. [Learn more about the Symposium.](#)

By Su Bacon

Twenty years ago, when Jason Warren made the drive on U.S. 412 from Enid to Stillwater, Oklahoma, he was surrounded by seemingly endless fields of wheat on both sides of the highway.

Today, “on the same stretch of road, I see as much soybean, sorghum and corn as wheat,” Warren said.

Warren is an extension specialist in plant and soil sciences at Oklahoma State University. While many motorists may simply enjoy the changing scenery, Warren knows why the view has changed.

Farmers are rotating their crops. They’re planting varieties that thrive in that area and they’re using farm management strategies, such as no-till planting, that improve productivity and profitability.

And it all started with research.

“U.S. agriculture is dependent on robust investments in research and development to raise productivity,” said Keith Fuglie of the U.S. Department of Agriculture.

Fuglie is an economist with the Structure, Technology and Productivity Branch in the Resource and Rural Economics Division.

Research Warren is conducting may someday mean crops of cotton will be added to the roadside panorama. He is investigating the growing of cotton in the Oklahoma panhandle as an alternative to corn.

“It’s an opportunity to generate revenue equivalent to corn with one-third the water,” Warren said.

Extension specialists like Warren work with scientists at agricultural experiment stations at land-grant universities throughout the country. The stations are funded by federal and state dollars allocated for agricultural research.

Partnerships key to growth

The federal-state partnership has been a key factor in driving agricultural productivity growth, Fuglie said.

From World War II through the early 1980s, public research and development expenditures grew much more rapidly than they have at any time since, Fuglie said.

During this time, mechanical, biological, chemical and digital advances allowed farmers to become much more efficient and productive -- farming more acres with less labor, planting hardier varieties, watering selectively and applying fertilizer and other chemicals with precision.

But has the golden age of U.S. agricultural productivity growth ended?

Philip G. Pardey investigated public and private funding for agricultural research over the years and notes a marked decline since the late 1980s.

“Public agricultural R&D resources allocated to productivity-enhancing purposes have shrunk,” he said.

Pardey is a professor in the Department of Applied Economics at the University of Minnesota. He and Julian M. Alston co-wrote “The Drivers of U.S. Agricultural Productivity Growth,” which is being presented at the Federal Reserve Bank of Kansas City’s annual Agricultural Symposium.

In 1960, the United States was responsible for 20% of global investments in public agricultural research and development, Pardey said. Most of the research was carried out at agricultural experiment stations and USDA research agencies.

In 2015, the U.S. share had dropped to 8.9% and China, India and Brazil together spent some \$3.16 for every dollar the U.S. invested in public agricultural research and development, Pardey found.

Stagnant funding

“Over the last 15 years, private and public spending in agricultural research and development by China, India and Brazil has increased dramatically,” said Thomas Coon, vice president of the Division of Agricultural Sciences and Natural Resources at Oklahoma State University.

Yet, at Oklahoma State funding for the agricultural experiment station has been cut by \$8 million.

“We have fewer faculty today than six years ago,” Coon said. “Where we once had eight or nine plant breeders, we have two now.”

Federal funding has been stagnant, Coon said: “The dollars appropriated have remained the same for the last 25 years.”

Coon compared the federal dollars allocated for agriculture research and food -- \$2 billion a year -- with \$46 billion allocated for the National Institutes of Health.

Consider the consequences, he suggested, if a virus comparable to COVID-19 hit livestock or crops in the United States: with the current level of funding, could the U.S. respond quickly enough?

Pardey suggests lag time and pressure to study other areas account for some of the decline in dollars directed to agricultural productivity research.

“While investments in agricultural research often have a high payoff, long time periods often elapse between the investment and the economic impact,” Fuglie said.

The time period tends to be measured in decades from the first study to real-world results.

Real-world results include breeding plants that have are more resistant to heat and drought and managing or eliminating pests and diseases that threaten crops.

Yet, attention has gradually turned away from studies in such areas. Research at agricultural experiment stations has increasingly focused on food safety, food security and environmental concerns, which have little effect on productivity, Pardey said.

The U.S., however, is still very advanced, Pardey said.

But maintaining that leadership requires an investment in research and development to support the gains that have been made and to move forward with new ones.

“Great potential exists for innovation in crop and livestock genetics and digital farming technologies to generate new products and production processes,” Pardey said.

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