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U.S. Rice Production in the New Millennium: Changes in Structure, Practices, and Costs

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What Is the Issue?

Over the past two decades, the size of U.S. farms growing rice and methods of rice production have changed substantially. As the total number of farms growing rice declined (from 9,627 in 1997 to 5,591 in 2012), total U.S. planted rice acres also dropped at an annual average rate of about 0.75 percent between 1995 and 2017. During this time, rice producers adopted several new technologies that improved the economic efficiency of rice production. This report shows the changing structural characteristics and production practices in U.S. rice production and examines how these changes have affected farm productivity, yields, and production costs. It also discusses how rice producers, consumers, and the global competitiveness of U.S. rice production have fared in the midst of these changes.

What Did the Study Find?

Structural and technological changes in U.S. rice production, 2000-2013:

Acres per farm expanded. Total acres operated on farms growing rice increased more than 40 percent to average nearly 1,850 acres per farm. During the same time, acreage planted to rice on those same farms increased more than 50 percent to an average of 600 acres per farm in 2013. Rice producers in the Gulf Coast region expanded farm acreage the most to achieve economies of size and remain competitive with other Southern regions. By 2013, about 33 percent of farms growing rice in the Gulf Coast planted 750 or more rice acres, whereas only 17 percent of farms growing rice were that large in California.

Producers adopted hybrid and non-genetically modified herbicide-tolerant rice seed varieties. Rarely planted in 2000, hybrid seed encompassed 29 percent of U.S. rice acreage, and herbicide-tolerant rice was planted on 43 percent of U.S. rice acres by 2013. All of the new seed varieties were for long-grain rice, adopted only in the South where long-grain rice predominates.

Precision farming technologies proliferated. Yield monitor use increased from 18 percent of rice acreage in 2000 to 58 percent in 2013. Most notable was the adoption of guidance systems for tractors and other self-propelled machines. Rarely used on farms growing rice in 2000, guidance systems were used on more than 50 percent of rice acreage in 2013.

Effects of structural and technological changes in U.S. rice production from 2000 to 2013:

- **U.S. rice productivity grew.** U.S. rice productivity rose an estimated 29 percent, about 2.2 percent annually—second only to peanuts (at 3.5 percent annually) among major U.S. field crops. These gains were facilitated by expanding acreage, exploiting economies of size (lowering production costs by increasing size), and by adopting new technologies—mainly improved seed stock and precision farming techniques.
- **Productivity growth varied by region.** Productivity growth for rice was greatest in the Gulf Coast at 43 percent (3.3 percent annually)—followed by California, 25 percent (1.9 percent annually); Mississippi River Delta, 24 percent (1.8 percent annually); and Arkansas Non-Delta, 18 percent (1.4 percent annually). Greater productivity growth in the Gulf Coast can be attributed in part to growth in farm size that far exceeded growth in other regions.
- **Per-acre production costs rose.** While improving rice yields, new technologies in rice farming also increased per-acre production costs more than 100 percent—led by seed and fertilizer costs that increased 200 percent and chemical costs that increased 108 percent. Production costs grew most where the new technologies were most readily adopted, in the Arkansas Non-Delta and Mississippi River Delta, and much less in California. As a result, regional cost differences narrowed.
- **Yield increases centered in the South.** U.S. rice yields increased by 22 percent, mostly in Southern regions. Compared with increases in planted acre yields of only 10 percent in California, yields in the Southern regions increased as follows: Arkansas Non-Delta (18 percent), Mississippi River Delta (24 percent), and Gulf Coast (31 percent). Consequently, yield differences diminished among the major rice-producing regions.
- **Domestic consumers and U.S. rice exporters benefited.** By holding long-grain rice prices lower than would otherwise be expected, productivity growth on U.S. farms growing rice benefited U.S. rice consumers. Productivity growth can also make U.S. producers more competitive in global rice markets and may have helped to increase U.S. medium-grain rice exports during this period.
- **Further capacity for productivity growth exists in the South.** Further gains from exploiting economies of size are widely available among Southern rice producers. There also remains a significant capacity for the adoption of technologies and practices that contribute to productivity growth in Southern rice production. The capacity for further productivity growth appears more limited in California.

How Was the Study Conducted?

This report used data from USDA surveys of U.S. rice producers conducted for 2000, 2006, and 2013 as part of USDA's annual Agricultural Resource Management Survey (ARMS). Data summaries for each year were used to describe farm and operator characteristics, production technologies, input use, production costs, and yields of U.S. rice producers and those in major rice-producing regions. This information was used to describe structural change in rice production from 2000 to 2013. Productivity change was identified by the change in price adjusted (deflated) unit production costs. Other data on rice input and output prices and rice exports were used to explore the implications of structural and productivity change in U.S. rice production.