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U.S. Hog Production From 1992 to 2009: Technology, Restructuring, and Productivity Growth

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What Is the Issue?

Over the past two decades, hog producers have adjusted the size, organizational structure, and technological base of their operations; some have ceased hog production. The effects of these changes have extended beyond the industry as restructuring may have heightened environmental risks and nuisance impacts and lowered prices for pork consumers. In addition, the economic environment for pork producers changed as new uses for corn, the primary ingredient of hog feed, have increased feed prices. A slowdown in productivity growth after 2004 suggests that the era of dramatic growth in hog production is likely over, absent new technological innovation. This report presents information about changing structural characteristics and economic relationships in hog production, and discusses what these suggest for the future of hog farms.

What Did the Study Find?

The number of hog farms fell by more than 70 percent from 1992 to 2009 while the hog inventory remained stable. The average hog farm grew from 945 head of hogs sold or removed under contract in 1992 to 8,389 head in 2009. Specialized finishing operations (feeder-to-finish) increased their share of production from 22 to 77 percent during 1992-2004, while the share of production from farrow-to-finish operations fell from 65 to 18 percent. However, from 2004 to 2009 the shift toward operations specializing in a single phase of production slowed, and farrow-to-finish producers slightly increased their production share over this period. High corn and soybean prices during 2007-09 raised hog feed costs considerably. Declining hog farm numbers during this period suggest that many small, likely high-cost operations ceased production, adding to the average size of hog operations.

Hog operations organized under production contracts grew from 5 percent of production in 1992 to 67 percent in 2004. Operations producing under contract were larger than other operations and more likely to specialize in a single production phase. Between 2004 and 2009, the share of hogs produced under contract grew only 4 percentage points, to 71 percent. Few farrow-to-finish farms produce under contract. An expanded share of production from large-scale farrow-to-finish operations likely slowed growth in the use of production contracts on hog farms after 2004.

The rapid growth of hog operations along the southeast coast of the United States during 1992-98 slowed in subsequent years partly because the North Carolina State legislature placed a moratorium on expanded hog production in the State (the leading hog producer in this area) in response to environmental concerns. In contrast, the size of hog operations increased more rapidly in the

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Heartland (mainly Iowa and Illinois) during 1998-2004 as contract production in this area expanded. This trend continued during 2004-09 as average production from both farrow-to-finish and feeder-to-finish hog operations increased in the Heartland.

Substantial productivity gains for hog farms since 1992 were attributable to increases in the scale of production and technological innovation. The increased size of operations accounted for almost half of the total increase in hog farm productivity since 1992. However, individual and total factor productivity growth on feeder-to-finish farms, where most market hogs are produced, slowed considerably between 2004 and 2009.

Productivity gains in hog production during 1992-2009 have likely benefited U.S. consumers in terms of lower pork prices, and enhanced the competitive position of U.S. producers in international markets. However, increases in the scale of production have resulted in greater animal density, creating possible environmental risks. On the other hand, increased feed efficiency accompanying structural change offset some of these risks as the waste per animal fell. In addition, concentrating manure sources in fewer locations potentially affects fewer people and may also make some manure treatment technologies (e.g., energy from bio-waste, or processing into concentrated fertilizer) feasible.

The era of dramatic productivity growth in hog production from 1992 to 2009 will likely remain unmatched, absent significant technological innovation. The 1992-2009 data support this conclusion on two fronts. First, the gains from exploiting scale economies are nearly exhausted, as most hog production now takes place at a size where returns to scale are nearly constant. Second, the measurable technological and organizational innovations contributing to productivity growth (e.g., confinement housing, production contracts, artificial insemination, all-in/all-out management) are now widely diffused.

How Was the Study Conducted?

Data used in this report come from USDA surveys of U.S. hog producers conducted for 1992, 1998, 2004, and 2009. Summaries of each data year were used to describe hog farm differences by producer type according to size, business organization, region, and production technology. A regression analysis was used to measure hog farm total factor productivity growth between 1992 and 2009 and decompose it into changes in four components: (1) technical change, the increase in the maximum output produced from a given level of inputs; (2) technical efficiency, the farm's ability to achieve maximum output given its set of inputs; (3) scale efficiency, the degree to which a farm optimizes the scale of its operations; and (4) allocative efficiency, a farmer's ability to choose a less costly mix of inputs to produce the same level of output. This study focused particularly on economies of scale, analyzing how increases in scale have contributed to productivity growth, and investigating whether scale economies in hog production have increased over time.