Remarks by

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As in all societies, the history of rural America is the history of agriculture. From 1785 through 1935, when all federal lands were withdrawn from settlement, the states or the federal government offered land from $1 to $2 per acre. Indeed, the Homestead Act of 1862 offered 160 acres of federal land in the American Midwest for only a $10 filing fee and an agreement to cultivate the land for five years. Although crop production increased dramatically as the Great Plains were settled, the abundance of cheap land offered little incentive to cultivate the land intensively. Consequently, apart from fluctuations related to weather, crop yields not surprisingly remained remarkably stable. National average yields for corn were roughly twenty-five bushels per acre from the Civil War to around 1940. Wheat yields during the same three-quarters of a century seldom exceeded fifteen bushels per acre.

The end of the era of cheap land created incentives for intensive cultivation. Partly as a consequence, great waves of innovation and invention swept across American agriculture beginning just before World War II. Discoveries in the use of chemicals helped improve plant nutrition and pest control, and the introduction of new crop varieties, such as hybrid corn, boosted yield potential enormously. The average yield per acre of corn, for example, which was about twenty-five bushels in 1940, increased to more than 100 bushels per acre by the latter 1970s, and this past year, to more than 140 bushels per acre. Yields on wheat, soybeans, cotton, and even hay show similar but somewhat lesser gains. The development of the tractor, the combine, and a host of other farm implements helped intensify cultivation by enabling one farmer to do the work formerly done by ten farmers three quarters of a century earlier and by dispensing with the need to maintain a stable of draft animals that had to be fed and tended.
The rapid gains in farm productivity in the United States continue to this day and along myriad fronts. In agriculture, as everywhere else in our economy, the computer is coming into wider use, as are other new electronic and communications devices. For example, combinations of electronic sensors, computers, and global positioning equipment offer producers extraordinary precision in the application of fertilizers, pesticides, herbicides, and seeds. Not only do these technologies offer lower-cost production to farmers, they also tend to reduce total chemical use and runoff into streams or volatilization into the atmosphere.

Advances in genetics have made available varieties of crops that incorporate a naturally occurring deterrent to insects and thus require few or no pesticide applications. Other work in genetics has produced plant varieties that are resistant to certain herbicides, allowing farmers to reduce tillage and petroleum usage dramatically. A lengthy debate about the long-term healthfulness of these products has been ongoing. Irrespective of the outcome of that debate, the knowledge gained regarding the genome of the main crops should help accelerate plant breeding that underlies the increases in yields of the past six decades. Geneticists, for example, now have the ability to breed varieties of rice that contain vitamin A, which tends to be chronically deficient in countries where rice is a staple.

The gains in productivity have not been limited to crops—livestock productivity has also increased. On average over the past few years, the nation has a smaller cattle herd than it did three decades ago, but beef production has risen more than 20 percent. The dairy herd is about three-fourths the size that it was in the late 1960s, but the output of milk has increased more than one-third. In the poultry business, the flock of hens has changed little, on net, but the poundage of broilers delivered to retail has risen spectacularly. Pork production in 2003
was up about 50 percent from three decades ago, even though the inventory of hogs and pigs on the nation's farms was up only slightly. Over time, livestock producers have been exerting ever greater control at all stages of production and have been able to adapt some industrial methods to animal husbandry. In addition, a good part of the increased livestock productivity has come from increased attention to the genetic traits of animals, and these improvements are likely to accelerate with the rapid application of the recent advances in genomics to the livestock sector.

Other avenues of increasing productivity include greater knowledge of the most cost-effective practices regarding cultivation. Here I include the increased use of rotational grazing of livestock to improve rangeland quality and utilization. Reduced or no-tillage crop production techniques continues to gain in popularity, and ways to increase output with these modes of production continue to be found. Also, entomologists maintain active research programs on the use of natural predators for many insect pests.

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Overall productivity gains in the United States following World War I reflected the ongoing shift of our workforce from farms, where the level of output per hour was low, to rapidly expanding high-value-added manufacturing. But with cheap farm land rapidly dwindling after 1935, intensive cultivation accelerated, increasing earnings per acre that were rapidly capitalized into land values. The value per acre of farm land adjusted for inflation has tripled since 1940.

But as land values have risen, intensive cultivation is also rapidly closing the gap between productivity on farms and ranches and productivity of nonfarm business
establishments. Indeed, over the past half-century, agricultural productivity rose at an annual rate of 5 percent, more than twice the rate for nonfarm business firms.

The surge in farm productivity has had profound implications for the size of the farm population and the structure of rural communities. The sharp rise in output per worker created excess supplies of agricultural labor and led to a huge migration of farmers and farm workers from agriculture to other industries, generally in urban areas. The farm population in the United States peaked at 33 million in 1916, held stable through the 1940s, but declined thereafter. Today only a few million people live on farms. Moreover, as rural workers declined in number, some of the smaller villages and trade centers that had formed when earlier, more labor-intensive technologies prevailed were no longer viable as commercial centers. In addition, declining farm populations in some communities in the Great Plains strained social institutions such as schools, county services, and hospitals that tend to require a “critical mass” of population to operate effectively.

Despite the migration of farm populations towards cities, the nonfarm population and the level of employment in rural America as a whole have increased substantially over time and have more than offset the declines in populations involved in farming and other resource-based industries. After World War II, growth in manufacturing created many jobs in rural areas, and more recently, many rural places have become home to service-based industries. For all counties that are labeled nonmetropolitan by current definitions, the population is about one-fourth larger than it was in 1960, and that finding does not take into account the very rapid growth in counties that were rural in 1960 but have since become part of expanding metropolitan areas. Recent surveys by the Department of Agriculture show
rapid population gains in communities close to metropolitan areas, but strong growth has also occurred in many other rural areas, especially those with attractive lifestyles and other amenities that are much in demand among today’s workers.

The growing tendency of workers today to migrate to rural areas also reflects space-reducing innovations in transportation, infrastructure, and communications, such as satellite television, that have helped to lessen the physical remoteness of many rural places.

What does this brief sketch of American agricultural history imply about global agricultural development? First, many of the countries where agricultural output is growing most rapidly still report yields that are considerably below those in the United States. For instance, according to Agriculture Department estimates, since the mid-1990s, yields per acre of corn in Argentina have been roughly one-third less than those in the United States, and in China they have been about one-half. Such lower yields suggest that these countries have yet to implement fully the intensive cultivation technologies available to today’s farmers and instead depend on a relatively higher input of land and labor. However, average yields in these countries are advancing rapidly, and we can reasonably expect that, just as in the United States, higher farm returns should come along with the yield improvements.

A second vital feature in the development of American agriculture was the importance of unfettered trade. Of course, initially much of the exchange of agricultural commodities occurred within the United States, but as output expanded, exports became increasingly important. Today, our nation’s farmers are highly dependent on exports to absorb their remarkable productivity, and their ability to compete internationally depends on lowering unit costs faster than producers in other countries are lowering costs. Given the institutions that
our nation has developed for maintaining rapid agricultural innovation and for quickly disseminating the new techniques through the farm economy, U.S. producers are well positioned in this regard. However, foreign producers are adopting farming innovations rapidly as well, and efforts to increase the openness of world markets will need to be maintained and intensified so that the full benefits of farm productivity gains can raise standards of living worldwide.

To sum up, the phenomenal gains in U.S. agricultural productivity of the past century brought profound benefits to all consumers, regardless of their connection to a farm, in the form of lower prices, better quality, and more choices at retail outlets. But those gains also have been associated with dislocations in many rural areas, largely in the form of a migration of farm workers to more urban areas and the resulting eclipse of many small towns and villages. Although dislocations are bound to accompany economic growth, we should rise to the challenges that come with innovation because innovation brings great improvements in material well-being.