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A Brief History of U.S.A Agriculture

Almost 150 years have passed since U.S. public-sector agricultural research and development (R&D) began in earnest with the establishment of the U.S. Department of Agriculture and the passage of the Morrill Land Grant College Act in 1862, to be followed 25 years later by the passage of the Hatch Experiment Station Act in 1887. During that time, and especially in the more recent decades, U.S. agriculture changed dramatically. Public and private agricultural R&D played a major role in bringing about those changes, and the R&D systems and institutions evolved alongside and as part of agriculture. To provide some context for our econometric assessment of the impacts of agricultural R&D, which is presented in later chapters, this chapter provides an overview of some important structural changes in the role of agriculture in the economy, in the spatial location of production within the United States, and in the number of farms and their size distribution. The following chapters in Part II describe some of the more pertinent developments regarding agricultural inputs, outputs and productivity in the United States.

In this part of the book in particular we take a long-run perspective, emphasizing developments since the beginning of the 20th Century. In later parts of the book, while the analysis focuses on agriculture during the period since World War II, we emphasize the point that the long R&D lags mean that the postwar changes in U.S. agriculture were much influenced by agricultural R&D and related policies during the first half of the 20th Century.

About the Agriculture, Forestry, Fishing and Hunting sector

The Agriculture, Forestry, Fishing and Hunting sector comprises establishments primarily engaged in growing crops, raising animals, harvesting timber, and harvesting fish and other animals from a farm, ranch, or their natural habitats.

The establishments in this sector are often described as farms, ranches, dairies, greenhouses, nurseries, orchards, or hatcheries. A farm may consist of a single tract of land or a number of separate tracts which may be held under different tenures. For example, one tract may be owned by the farm operator and another rented. It may be operated by the operator alone or with the assistance of members of the household or hired employees, or it may be operated by a partnership, corporation, or other type of organization. When a landowner has one or more tenants, renters, croppers, or managers, the land operated by each is considered a farm.

U.S. Agriculture Components

In the United States, agriculture generated \$374 billion in revenue in 2018, when adjusted for inflation. Around 75% of this income was from meat and feed for the animals that produce it. By comparison, just 17% of U.S. agricultural receipts were from non-meat food for people. This includes fruits, nuts, vegetables, wheat, and rice. The remaining 10% of receipts were from cotton, tobacco, and miscellaneous products.

Animal feed comprised 25% of total receipts in 2018. This is primarily corn and soybeans. Sorghum, barley, and Oats are also used for feed. The nation's biggest crop is corn, and the United States is the world's largest producer. The 90-million acre "corn belt" is mostly in Illinois, Indiana, Iowa, Missouri, and Nebraska. Corn is also used for cereal, alcohol, and corn syrup. Another 40% of the crop is used for fuel ethanol. In 2017, 17% of U.S. corn was exported.

U.S. Meat Production

Half of U.S. agriculture revenue is from meat production. Most of this is cattle, dairy, poultry, hogs, and eggs. A smaller proportion is bison, rabbits, sheep, goats, and ostriches.

The United States is the world's largest beef producer. Large farms with 100 or more head of cattle produce 56% of all beef cows. The cattle forage on grasslands before they are shipped to grain feedlots for the last 90 to 300 days. Enormous feedlots with 32,000 head of capacity finish 40% of U.S. cattle.

The United States is also the world's second-largest beef importer. Most of it comes from Canada, Australia, Mexico, and New Zealand. They supply low-quality lean trim used to make ground beef.

The United States is also the world's largest poultry producer. Almost 18% is exported. The U.S. is the world's second-largest pork producer, and the second-largest pork exporter and importer.

Agricultural Exports

Exports totaled \$143.4 billion in 2018. Until 2018, China was the largest export recipient. However, the trade war initiated by President Donald Trump reduced exports of soybeans and other agricultural products. As a result, Canada became the largest export market in 2018:

Canada: \$20.7 billion

Mexico: \$19.0 billion

European Union: \$13.5 billion

Japan: \$12.9 billion

China: \$9.2 billion

Industrial Agriculture

The success of modern U.S. farming is a result of industrial agriculture. It is when mass-production techniques are used to create food. A big component is monocultural growing of the same crop in the same large field. Chemical fertilizers, pesticides, and feed additives must be used to boost production.

Between 1948 and 2015, industrial agriculture doubled U.S. farm production. At the same time, both the amount of land tilled and the number of farmers declined.

Industrial agriculture began in the 1900s. Chicago's Union Stock Yard slaughterhouse used conveyor belts to increase meat production. Henry Ford said industrial slaughterhouse operations inspired him to use assembly lines in his auto production.

In the late 1920s, chickens were the first animals to be raised in economical but large, cramped facilities. In the 1970s, pork and beef farmers followed suit. This type of factory farming is called concentrated animal feeding operations.

To prevent illnesses from these cramped conditions, animals are fed antibiotics. In 1951, the Federal Drug Administration approved antibiotic use because it also increases weight gain of the animals. Some scientists

estimate that 80% of all antibiotics sold are used in agriculture. There are now concerns that this use has increased antibiotic-resistance in human communicable diseases.

Trends in Agricultural Output

Over the past 150 years, the share of U.S. gross domestic product (GDP) accounted for by farm value-added declined significantly—from 37.5 percent of GDP in 1869 to 0.8 percent of GDP in 2006. This decline in the farm share of GDP was not the result of a shrinking farm sector. Indeed, farm value-added increased rapidly over the period but the U.S. economy expanded even more rapidly.

Over the period 1929–2006, U.S. farm value-added grew nearly six fold, from \$17 billion to \$98 billion (2000 prices), while U.S. GDP increased thirteen fold, from \$866 billion to \$11.3 trillion. As agriculture declined as a share of the economy and became increasingly more productive, substantial labor was released from the sector, helping to fuel growth elsewhere in the economy.

Data on the share of national income by sector are available since 1929. The graph shows that the share of national income attributable to agriculture (here, including forestry and fisheries) held steady through to the end of the World War II, averaging about 9 percent over the period 1929–1948, but since then it declined to around 0.8 percent of national income during the period 2000–2007.

Agriculture now represents a much smaller share of the industrial sector which itself shrank as a share of the economy. During the period from the 1930s through to the mid-1950s, the share of national income generated by industry increased generally (although with a temporary dip after the cessation of war in 1945) to a peak of 48 percent in 1953. Since then, the share of national income generated by industry declined to around 23 percent in 2007, while the share generated by the service sector increased inexorably, up to almost two-thirds of national income by 2007.

Importance of American agriculture

The United States contains some of the best cropland in the world. Cultivated farmland constitutes 19 percent of the land area of the country and makes the United States the world's richest agricultural nation. In part because of the nation's favorable climate, soil, and water conditions, farmers produce huge quantities of agricultural commodities and a variety of crops and livestock.

The United States is the largest producer of corn, soybeans, and sorghum, and it ranks second in the production of wheat, oats, citrus fruits, and tobacco. The United States is also a major producer of sugar cane, potatoes, peanuts, and beet sugar. It ranks fourth in the world in cattle production and second in hogs.

The total annual value of farm output increased from \$55 billion in 1970 to \$207 billion in 2002. Farmers in the United States not only produce enough food to feed the nation's population, they also export more farm products than any other nation. Despite this vast output, the U.S. economy is so large and diversified that agriculture accounted for less than 1 percent of annual GDP and employed less than 2 percent of the workforce in 2004.

During the 20th century, many Americans moved from rural to urban areas of the United States, resulting in large population decreases in farming regions. Even though the number of farms has been declining since the 1930s, overall production has increased because of more efficient operations.

Bigger farms, operated as large businesses, have increasingly replaced small family farms. The owners of larger farms make greater use of modern machinery and other equipment. By the 1990s, farm operations were highly mechanized. By applying mechanization, technology, efficient business practices, and scientific advances in agricultural methods, larger farms produce great quantities of agricultural output using small amounts of labor and land.

In 2008, there were 2,200,000 farms in the United States, down from a high of 6.8 million in 1935. As smaller farms have been consolidated into larger units, the average farm size in the United States increased from about 63 hectares (about 155 acres) to 169 hectares (418 acres) by 2008.

Cattle production is widespread throughout the United States. Texas leads in the production of range cattle, which are allowed to graze freely. Iowa and Illinois are important for nonwage feeder cattle, which are cattle that eat feed grain provided by cattle farmers. The Dairy Belt continues to be concentrated in southern Wisconsin but is also prominent in the rural landscapes of most northeastern states and fairly common in other states, too. Hog production tends to be concentrated in Iowa, Illinois, and surrounding states, where hogs are fattened for market. Chicken production is widespread, but southern states, including Texas, Arkansas, and Alabama, dominate.

Corn and soybean production is concentrated heavily in Iowa and Illinois and is also important in surrounding states, including Missouri, Indiana, Nebraska, and the southern regions of Minnesota and Wisconsin. Wheat is another important U.S. crop. Kansas usually leads all states in yearly wheat production. North Dakota, Montana, Oklahoma, Washington, Idaho, South Dakota, Colorado, Texas, Minnesota, and Nebraska also are major wheat producers.

For more than a century and a half, cotton was the predominant cash crop in the South. Today, however, it is no longer important in some of the traditional cotton-growing areas east of the Mississippi River. While some cotton is still produced in the Old South, it has become more important in the Mississippi Valley, the Panhandle of Texas, and the Central Valley of California. Cotton is shipped to mills in the eastern United States and is exported to cotton textile plants in Japan, South Korea, Indonesia, and Taiwan.

Vegetables

Vegetables are grown widely in the United States. Outside major U.S. cities, small farms and gardens, known as truck farms, grow vegetables and some varieties of fruits for urban markets. California is the leading vegetable producing state; much of its cropland is irrigated.

Fruits

Most fruits grown in the United States fall in the categories of multitude and citrus fruits. Midlatitude fruits, such as apples, pears, and plums, grow in northern states including Washington, Michigan, Pennsylvania, and New York. Citrus fruits—lemons, oranges, and grapefruits—thrive in Florida, southern Texas, and southern California. Nuts grow on irrigated land in the Central Valley of California and in parts of southern California. Production of specialty crops and livestock has increased in recent years, particularly along the East and West coasts and in the Southeast.

Ranches in New York and Texas have introduced exotic game, such as emu, fallow deer, and nilgai and black buck antelope. Deer and antelope meat, known as venison, is served mainly in restaurants. Specialty vegetable and fruit operations produce dwarf apples, brown and green cotton, canola, and jasmine rice. Farmers raise more

than 60 specialty crops in the United States for Asian-American markets, including bean sprouts, snow peas, and Chinese cabbage.

Sources

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