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Agricultural Transportation Challenges for the 21st Century

Transportation Implications of Structural Shifts in U.S. Agriculture

Jerry Norton

Issue

Agriculture continues to be a dynamic sector of the U.S. economy. Recent years have brought substantial adjustments for many of its industries. Structural shifts within U.S. agriculture, from grain production to livestock feeding and processing, have contributed to major changes in the quantities and types of transportation services needed to move agricultural products from the farm to consumers. Recent trends in production, feeding, and processing appear likely to continue into the next century bringing changes to the transportation sector that reflect these new and emerging markets for agricultural products.

Background

In the past two decades, major changes have occurred in U.S. agriculture. The number of farms has decreased, while the average size of farms has grown. The types of grains produced and the location of production have also shifted as grain varieties have been improved and cultivation techniques and practices have changed to reduce ground moisture losses. Livestock feeding has become more regionally concentrated with expansion in nontraditional areas that have better weather conditions, lower land and labor costs, less population pressure, and better proximity to markets. During this time, grain processing has also grown substantially as the demand for grain products, such as ethanol and high-fructose corn syrup, has grown. These shifts in the agricultural sector have increased the value of whole grains and oilseeds for producers and created new challenges for the transportation industry.

Since 1980, the number of U.S. farms has decreased from 2,433,920 to 2,057,910. This 15-percent decrease represents the loss of more than 376,000 farms. During the same period, the average size of U.S. farms has increased by nearly 11 percent. This consolidation within farming has had a substantial impact on the types of transportation used by producers, particularly grain producers. Farm consolidation has left grain producers, on average, with larger operations and more production to market. Increased volumes of grain to market, the need to better utilize hired labor, and better bid prices at larger and more distant elevator facilities and processors have been increasing the distances producers will truck their grain. In many instances, producers are

bypassing local country elevators in favor of larger facilities and processors miles away. These longer movements have been made possible largely because of increased producer ownership of semi-trailers. This trend seems likely to continue as producers show a strong interest in acquiring more semis and increasing their own grain-hauling capacity.

Large-scale shifts in production among crops and regions is also an important factor affecting the demand for transportation services. Increases in corn and soybean acreage, particularly in the western United States, are having significant impacts on grain transportation and handling. These shifts in production, which are being driven by market forces, have been accelerated by the planting and marketing flexibilities encompassed in the *Federal Agriculture Improvement and Reform Act of 1996*, also known as the *Freedom to Farm Act*. Since the late 1980's, average U.S. corn acreage has increased nearly 10 million acres (15 percent), and average soybean acreage has increased nearly 10 million acres (17 percent). During this period of expanded corn and soybean production, wheat acreage has remained relatively flat or has even decreased — wheat acreage in 1998 was the third smallest since the early 1970's.

The shifts toward corn and soybean production are even more dramatic when viewed regionally. During the late 1980's, average corn acreage in the States east of the Mississippi River accounted for half of all U.S. corn acreage. Today corn acreage in these States accounts for about 45 percent of total corn acreage. While eastern corn acreage expanded by 1 million acres over the past decade, corn acreage in the States west of the Mississippi River expanded by 9 million acres over the same period. The States of Kansas, Nebraska, Minnesota, North Dakota, and South Dakota have accounted for 5.6 million acres (62 percent) of this increase in western corn acreage. Similar shifts in soybean acreage have occurred since the late 1980's. While the States east of the Mississippi River have increased average soybean acreage by 2.9 million acres during this time, the States west of the Mississippi River have increased their average soybean acreage by 7 million acres. The same five States have accounted for 5.4 million acres (77 percent) of this expansion.

Accompanying these shifts in grain production have been substantial structural and regional shifts in poultry and livestock feeding. Most striking have been structural and regional shifts in broiler production since the late 1940's. Driven by less expensive land, labor, and capital and greater producer acceptance of contract production, the southern broiler industry has expanded throughout the last 40 years. This region, which accounted for only 20 percent of U.S. broiler production in 1947, accounted for 68 percent of U.S. broiler production in 1997. The Delmarva area (Delaware, Maryland, and Virginia) continues to be an important region for broiler feeding. Broiler production in these three States, however, accounts for only 11 percent of all U.S. production today as compared to 40 percent during the late 1940's. Trends in regional share of broiler production have remained relatively consistent over the past few decades. Growth in total production, however, has been substantial. Since the late 1970's, broiler production in the Southeast and Delta has more than doubled — exacerbating the feed grain deficits in these regions. Producing only 5 percent of the nation’s feed grains, these southern regions are heavily dependent upon feed grains delivered from the Corn Belt by rail.
Shifts in the structure and the location of the U.S. hog industry in the past 20 years have followed

a somewhat similar pattern to that of the broiler industry after World War II. As was the case with broilers, improvements in housing facilities, disease control, and nutrition facilitated large-scale, specialized hog production. Hog production has historically been tied to the Midwest with production viewed by many farmers as a method to add value to the corn they raised, diversify their operations, and better utilize their labor throughout the year. Hog production in the Corn Belt has traditionally been characterized by large numbers of producers and frequent entry into and exit from production. Following the example of the broiler industry, the hog industry has been quickly adopting production and marketing strategies in the past two decades that reflect vertical integration and coordination. These changes have led to substantial growth in hog production outside the Corn Belt.

The 12 midwestern States that make up the Eastern Corn Belt, Western Corn Belt, and Northern Plains continue to be the dominant producing area for the U.S. hog industry, accounting for 69 percent of all live-weight marketings of hogs in the United States in 1997. That share, however, has fallen substantially since 1980, when these States accounted for 79 percent of the U.S. total. Growth in production outside these traditional grain-producing States has been led by increases in production in the Southeast and, to a lesser extent, the Southwest. Growth in hog production in the Southeast has resulted almost entirely from expansion in North Carolina, where production has increased more than threefold since 1980. In 1997, North Carolina was second only to Iowa in hog production and accounted for 70 percent of the Southeast region's hog production. The Southwest has also expanded its hog production since 1980. Although this region accounted for only 4 percent of all U.S. production last year, its share of U.S. production has actually doubled since 1980. This growth has been led by expansion in Oklahoma, where hog production has increased nearly fivefold since 1980. Regional shifts in hog production from the Midwest to feed-deficit areas like the Southeast and Southwest have increased the demand for grain transportation capacity.

Although environmental pressures in some parts of the Southeast may slow or limit future expansion, overall trends in production appear likely to continue, particularly expansion into the nontraditional hog-producing areas. Structural changes in the hog-producing industry over the past few years appear to support these trends. Farms with fewer than 1,000 head of hogs accounted for 65 percent of the total U.S. inventory in 1987, whereas farms with fewer than 1,000 head accounted for only 29 percent of the U.S. inventory in 1997. Several major States in the Midwest still have half or more of their hog inventory on farms with less than 1,000 head. With these small-size producers leaving the industry as larger operations expand, regional shifts in hog production appear likely to continue.

Major shifts in beef and dairy cattle feeding have also contributed to a growing demand for grain outside the Corn Belt and other feed-grain producing areas. Changes in the structure of the beef feeding industry continue to bring consolidation and greater concentration in the western and southwestern States where feed-lot expansion has been closely tied to changes in the location and the technology of beef packing. In 1960, the Corn Belt accounted for 33 percent of all U.S. cattle marketings. Last year, this same region accounted for only 14 percent of U.S. marketings. Since

1980 alone, the number of cattle marketed in the Corn Belt has decreased by 33 percent. In 1960, cattle marketings in the Plains and Southwest accounted for 34 percent of the U.S. total. Last year, these regions accounted for 53 percent of U.S. cattle marketings. Since 1960, cattle marketings in the Plains and Southwest have more than doubled, increasing 23 percent just since 1980. Expansion in cattle feeding in regions outside the major feed-grain-producing States creates additional demand for grain transportation.

Regional shifts in the U.S. dairy industry are also contributing to the growing demand for feed grains outside the Grain Belt. The size of the U.S. milk cow herd decreased by more than 1.5 million head (15 percent) between 1980 and 1998. Only States in the West and Southwest have expanded their herds in recent years. This regional expansion has resulted in major shifts in the location of U.S. dairy production. In 1980, 42 percent of the nation's milk cows were in the eight States that make up the Corn Belt. As of January 1998, the Corn Belt accounted for just 35 percent of the milk cow herd. During the same years, the West and Southwest increased their share of the nation's dairy cow herd from 12 to 23 percent. Even more dramatic are the changes in the herd size in key producing States. Since 1980, Wisconsin has decreased its dairy cow herd by 433,000 head. During the same period, California increased its herd by 472,000 cows. Arizona, California, Nevada, New Mexico, and Texas, together, have increased their milk cow herds by 770,000 head since 1980. Today, these five States account for nearly one-fourth of the nation's dairy cows. These increases in dairy production in the West and Southwest have substantial implications for feed use and transportation demand.

Shifts in poultry and livestock feeding have also reduced the amount of grain used on-farm since the late 1970's. Domestic corn feed use has increased from 3.6 to 5.4 billion bushels annually between the 1976-77 and 1996-97 marketing years. Annual feed use on-farm has dropped during this time by nearly 1 billion bushels. In 1980, corn fed on-farm represented 60 percent of total U.S. domestic corn feed use, but in 1996, on-farm feeding use was just 44 percent of the total amount of corn fed domestically. This shift away from on-farm grain use has created greater demand for all modes of transport.

Paralleling these changes in feeding patterns has been expansion in domestic grain processing, particularly for corn. During the 1976-77 marketing year, 522 million bushels of corn were used in processing. Processing that year accounted for 9 percent of total U.S. corn disappearance. In 1996-97, domestic plants processed 1.2 billion bushels of corn – 16 percent of total disappearance. Much of this growth in processing demand in recent years has resulted from plant construction and expansion west of the traditional corn milling centers in central Illinois and eastern Iowa. Shifts in the location of corn processing have significant implications for the entire grain-handling and transportation system.

Implications

The dramatic shifts that are occurring in U.S. agriculture have substantial implications for the U.S. grain-handling and transportation system. Farm consolidations are resulting in fewer but larger farms. With increased sizes of operations, grain farmers have greater incentive to acquire more transportation capacity and are doing so through the purchase of semi-trailers. Purchases of this equipment open up new marketing opportunities for producers, but can also mean longer truck hauls on local and State roads. Over time, this phenomenon will drive major adjustments in the nation's grain collection and transportation infrastructure.

Shifts that are occurring within the feeding industry are creating greater demand for transportation, especially long-haul transportation. If growth in the poultry and livestock sectors continues to be driven by the expansion of production outside the traditional grain-producing areas, these industries will become increasingly dependent upon rail transportation to meet their feeding needs. This has significant implications, not only for the quantity of available capacity to move grain, but also for the quality of transportation service in terms of timeliness and predictability.

Increased corn processing and the movement of processing farther into the western reaches of the corn-growing areas imply greater reliance upon rail transportation, not so much for inbound grain movements, but to move processed products longer distances to domestic users and to ports for export. Again, quality of the rail service will be a significant issue for the movement of higher value processed products manufactured at facilities that operate around the clock and that serve customers who require JIT deliveries.

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