Assessing the Importance of Freight Transportation to U.S. Agriculture

Authors:

Marina Denicoff
USDA/AMS
email: Marina.Denicoff@ams.usda.gov
Ph: 202-694-2504

Eric Jessup
WSU
email : eric_jessup@wsu.edu
Ph: 509-335-5558

April Taylor
USDA/AMS
email: April.Taylor@ams.usda.gov
Ph: 202-694-3053

Daniel Nibarger
USDA/AMS
email: Daniel.Nibarger@ams.usda.gov
Ph: 202-694-2502

Ken Casavant
WSU
email: casavantk@wsu.edu
Ph: 509-335-1608

Bruce Blanton
USDA/AMS
email: Bruce.Blanton@ams.usda.gov
Ph: 202-694-2501

ABSTRACT:

A recently completed national study, conducted jointly by the U.S. Department of Agriculture (USDA) and Washington State University considers a variety of transportation policy issues as part of a comprehensive evaluation and examination of transportation and agriculture movements. One aspect of this study concentrates on the importance of freight transportation to U.S. agriculture and is the principal focus of this paper.

America's transportation system carries the food from our farms to our tables and to a hungry world. That system is based on four principal modes of transportation—trucks, trains, barges, and ocean vessels—that make up a seamless network. They cooperate and compete with one another to make a balanced and flexible system that moves our food and farm products efficiently and economically.

The transportation system is more heavily used by agriculture than any other business sector; in 2007, 31 percent of all ton-miles carried were agricultural products or inputs. Many of these products are bound for export. During the past 5 years, half of the U.S. wheat crop, 36 percent of the soybean crop, and 19 percent of the corn crop moved from farms to ports for export on a seamless transportation network.

The importance of transportation in making agriculture successful is noteworthy especially because of the role of agriculture in the U.S. economy. The U.S. gross domestic product (GDP) has been $13 to $14 trillion in recent years. Of this, $125 billion (1 percent) has been contributed directly by agriculture, and $540 billion (4.5 percent) by agriculture and its related industries.

Looking at the U.S. balance of payments, the importance of agricultural trade is even more substantial. USDA reports that total agricultural exports averaged $82.2 billion from 2005 to 2008, reaching $115.5 billion in 2008. Agriculture's net contribution to the balance of payments that year was $36.1 billion. If any of these international—and often highly competitive—markets are lost due to inefficient transportation or failures in the supply chain, jobs are lost and farmers and ranchers receive lower prices. Inefficient or costly transportation can hurt agriculture in both international and domestic markets, and affect the balance of payments and the U.S. economy.

Adequate, efficient transportation is especially critical to successful marketing of U.S. agricultural products, which depends on transportation to deliver goods. This paper reviews agriculture's use of transportation within the overall context of the entire freight transportation system, including major transportation corridors. We also examine the characteristics of agricultural supply and demand that make transportation so critical to successful marketing, and analyze the market characteristics of several agricultural commodities for transportation implications.

INTRODUCTION/BACKGROUND

The global economy experienced unprecedented growth and relatively low inflation from the 1990's through 2007. At the same time, U.S. agriculture also experienced strong growth. In 2007, the market value of agricultural products sold was more than $297 billion—83 percent higher than in 1992 (USDA, 2007). U.S. agriculture is increasingly dependent on transportation to deliver agricultural and food products to urban centers and coastal export facilities, most of which are distant from the producing regions.* Raw agricultural products also need to be moved to agricultural processing facilities such as grain mills, fruit and vegetable processors, and meat processors. The agricultural sector is the largest user of freight transportation in the United States.

Adequate and efficient transportation is especially critical to successful marketing of U.S. agricultural products, which depends on transportation to deliver goods. This chapter reviews how agriculture uses transportation in the context of all freight transportation moving along major transportation corridors. We also examine the characteristics of agricultural supply and demand that make transportation so critical to successful marketing, and analyze the market characteristics of several agricultural commodities for transportation implications.

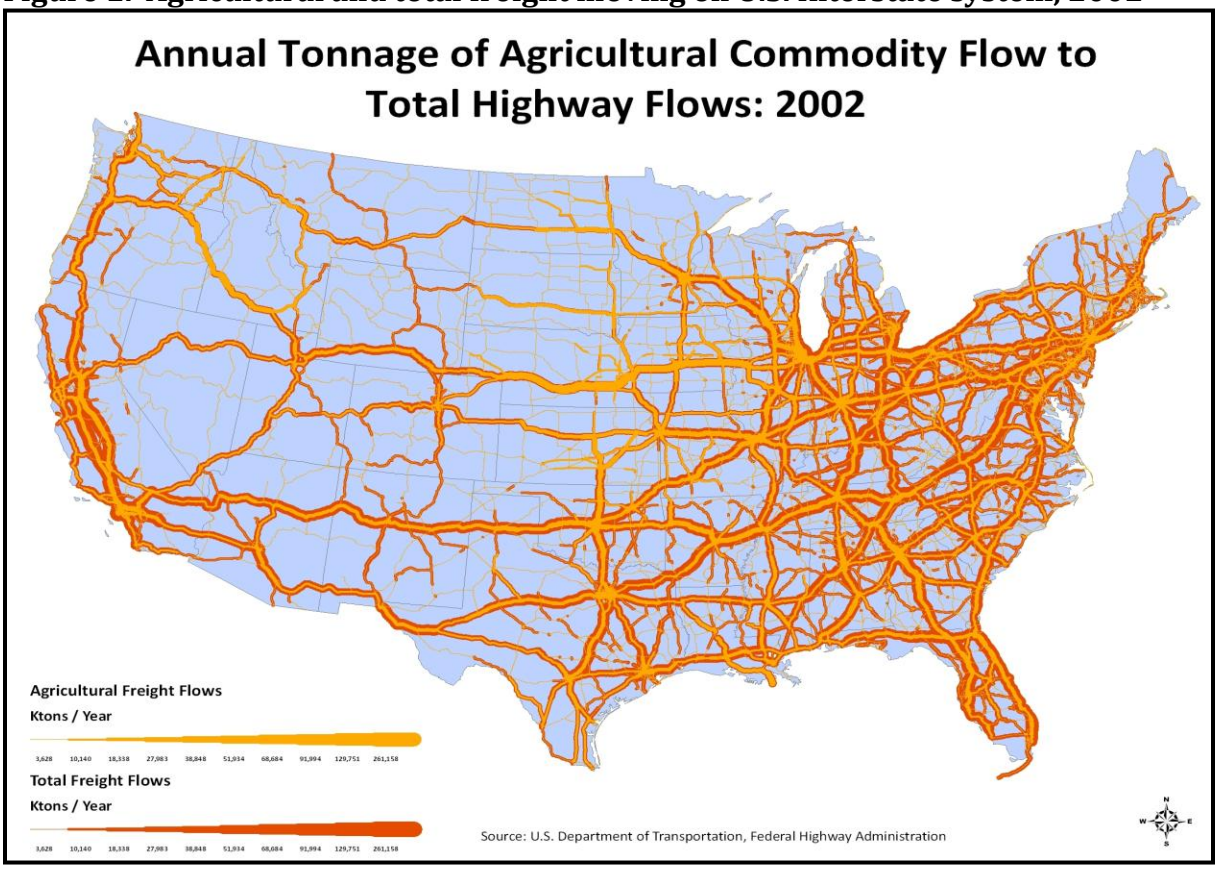
Agricultural freight moves by truck, rail, and barge along the nation's vast network of highways, rail lines, and navigable waterways, competing with other freight for capacity. The magnitude of agricultural shipments relative to other freight traffic moving along the critical transportation corridors is illustrated in Figures 1, 2, and 3. The colors on these maps indicate the type of shipment and the width indicates its volume. Orange represents all commodity movements and yellow indicates food and farm products as a component of all commodity movements—areas where food and farm products predominate are mostly yellow.

Highways

Trucks moving food and agricultural products compete for capacity along the major interstate highways crossing the United States (Figure 1). Agriculture and food movements comprise most of the commodities on highways crossing several States. For example, the lines are mostly yellow in parts of North and South Dakota, Nebraska, Kansas, Idaho, and Washington, indicating that agricultural commodities make up most of the shipments on those highways.

* According to the 2000 Census, over 36 percent of the U.S. population resides in the East Coast States, 20 percent in the West Coast States, and almost 12 percent in the Gulf Coast States.

Figure 1. Agricultural and total freight moving on U.S. interstate system, 2002



Railroads

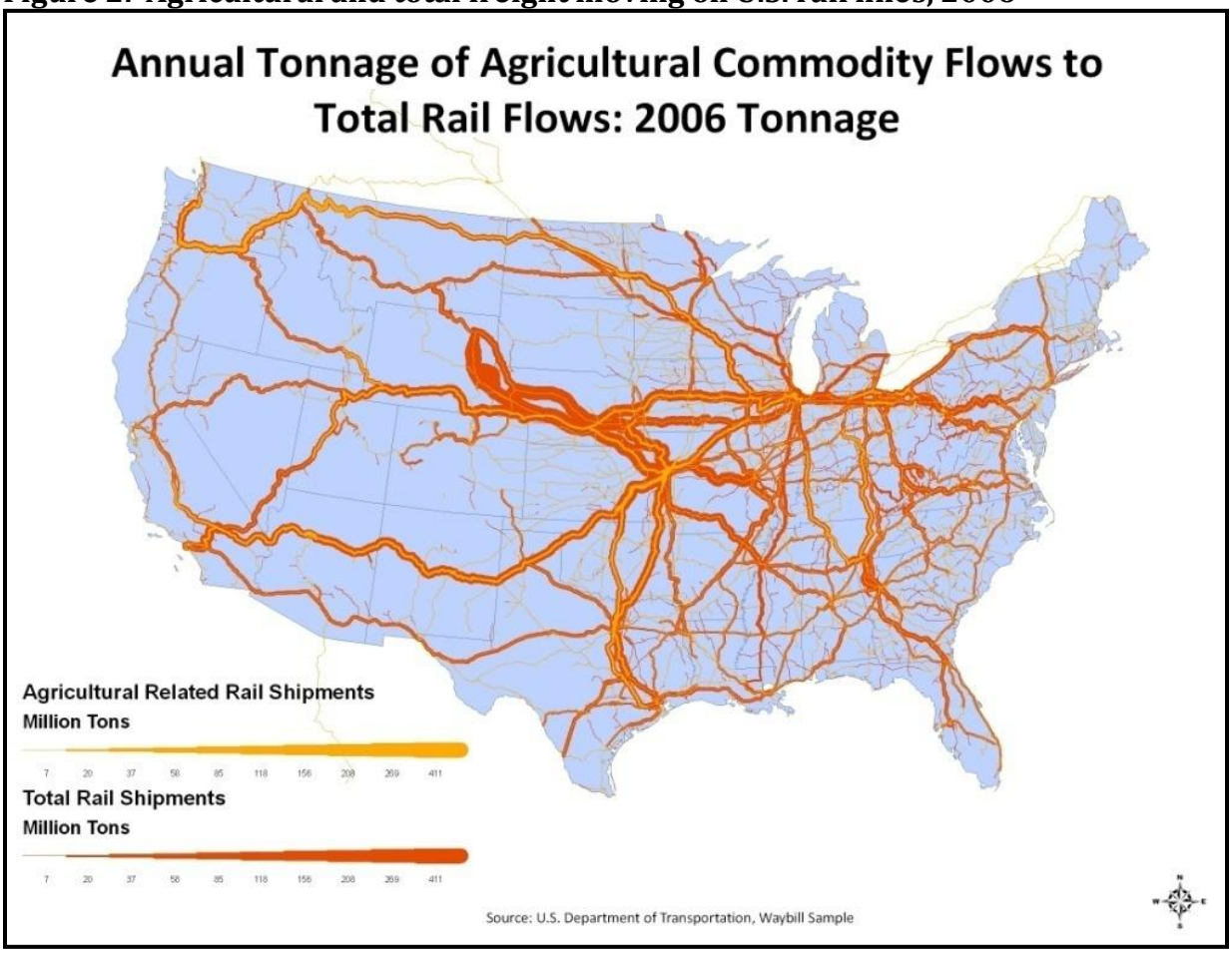
Agricultural traffic competes with other freight along key rail corridors. Agricultural commodities play an important role in several major corridors; agricultural movements are significant along many east-west corridors, as well as along the West Coast and parts of the Midwest (Figure 2). Seven Class I railroads are in operation in the United States today, and each is important to agricultural movements (AAR, 2008):*

- BNSF Railway (BNSF) operates in the Western corridors.
- CSX Transportation (CSX) operates in the Eastern corridors.
- Kansas City Southern Railway (KCS) operates in the South-Central region.
- Norfolk Southern Combined Railroad Subsidiaries (NS) operates in the East.
- Union Pacific Railroad (UP) operates in the West.
- Canadian National (CN, through its U.S. subsidiary, Grand Trunk Corporation) operates mainly in the central North-South corridors.

* Class I Railroads are line haul freight railroads with 2007 operating revenue in excess of $359.6 million each.

- Canadian Pacific (CP, through its U.S. subsidiary, Soo Line Railroad) operates in the corridors between the Northern Upper Great Plains to the Northern Midwest and Northeast.

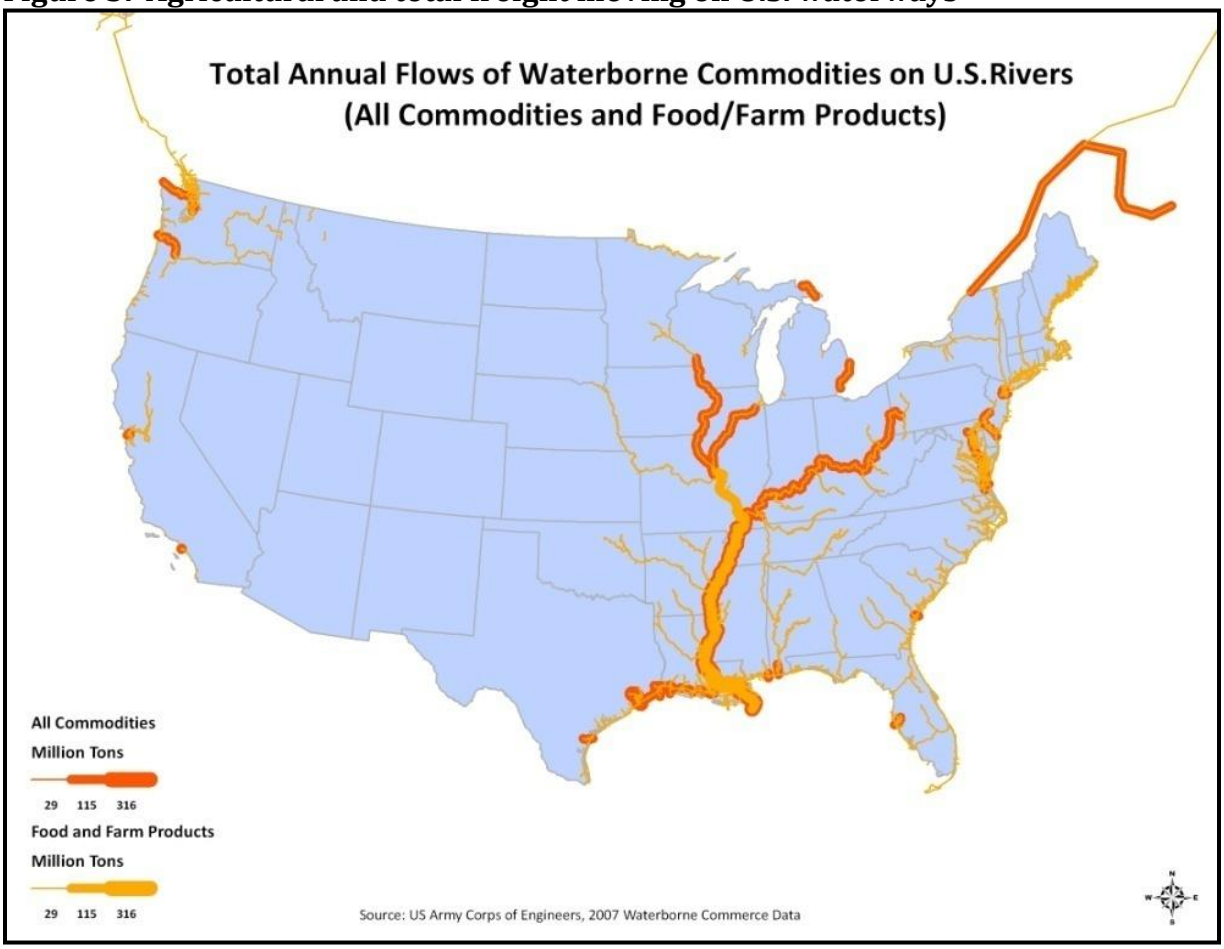
Figure 2. Agricultural and total freight moving on U.S. rail lines, 2006



Waterways

The Mississippi River system is the primary waterway for moving agricultural products by barge. Barge transport is especially important for moving bulk grains and oilseeds from the Midwest to export ports in the New Orleans region. Other important rivers include the Columbia River in the Pacific Northwest, which also moves some bulk grains and oilseeds, and coastal waterways that supply poultry and hog operations in the mid-Atlantic region.

Figure 3. Agricultural and total freight moving on U.S. waterways



Relative Modal Importance

Every 5 years, the U.S. Census Bureau conducts the Commodity Flow Survey (CFS), which collects information about the value, tons, and ton-miles moved by the U.S. transportation system, as well as modal share information.* Modal shares are modal characteristics that represent those portions of total tonnages or ton-miles that move by a specific mode of transport—truck, rail, barge, multimodal, or other.

In 2007, agriculture represented 22 percent of all tons and 31 percent of all ton-miles moved by the transportation system in the United States—almost the same as it was in 2002 (CFS, 2002).† The movement of coal, in comparison, accounted for 9 percent of all tons and 21 percent of all ton-miles.

* The most recently published CFS survey is for 2002; the 2007 CFS, available in December 2009, was not available in time for this paper.

† Includes movements of raw agricultural commodities (grains, livestock, timber, fruit, and vegetables), processed products (feedstuffs, dairy, canned foods, lumber, pulp, and paper), and agricultural inputs (fertilizer and pesticides).

According to the preliminary 2007 CFS, the value of all commodities transported grew by 41 percent, the tons by 12 percent, and the ton-miles by 11 percent in 5 years. The value, tons, and ton-miles of agricultural commodities moved grew by 34, 5, and 5 percent, respectively, from 2002 to 2007*.

Modal shares vary by commodity based on the quality of service and other factors, such as rates, availability, and customer needs. Commodities high in value or susceptible to deterioration or spoilage are more sensitive to handling procedures and to speed of delivery than less perishable commodities. For example, fresh fruits and vegetables require speed and careful handling above all. Trucks dominate movements of fresh fruit and vegetables, livestock, meats and poultry, dairy products, and bakery and confectionary products. Rail and barges lend themselves to bulk and lower-value products such as wheat and soybeans. Many commodities depend heavily on railroads, particularly grain and oilseed, alcohols, and fertilizers. The higher ratio of ton-miles for rail and barge indicates their efficiency at moving commodities longer distances, such as moving grains and oilseed to ports for export and to distant feedlot locations.

CFS data show that in 2002 trucks were the primary mover of agricultural products, claiming 70 percent of all agricultural tonnages and 46 percent of all agricultural ton-miles. Railroads followed with 18 percent of tonnages and 36 percent of ton-miles (although railroads' share is much higher in the heavier bulk commodities such as grains and oilseeds, milled grain products and animal feed, alcohols, fertilizers, and lumber). Barges have a 9 percent share of agricultural tonnages and a 12 percent share of agricultural ton-miles—most of which is accounted for by movements of grain, animal feed, and fertilizers on the Mississippi River and its tributaries.

Moving Agricultural Commodities to Market

Transportation demand is frequently referred to as a derived demand, suggesting that it is required to deliver products from producers to consumers. As such, it is an essential part of marketing; any change in supply or demand can affect the transport system's efficiency by bringing about either shortages or surpluses in transportation capacity. Additional factors that impact agricultural transportation demand include weather, the seasonality of the agricultural cycle and the resulting commodity price fluctuations that can translate into unexpected shifts in transportation patterns. America's agricultural producers depend on transportation as the critical link between the fields of growers and the tables of consumers, both here and abroad.

Developing a transportation "profile" of a commodity can show overarching transportation characteristics and relationships. The profile represents analysis of the supply and demand characteristics, notes significant industry trends, and reveals some significant transportation implications. Where possible, the location of processing facilities is included in the profile.

* The CFS data are estimated with coefficients of variance, which makes this comparison inexact.

This paper presents a transportation profile for grains and oilseeds and the associated overarching transportation characteristics and relationships. Transportation profile for corn was selected as the commodity example in the grains and oilseeds group.

GRAINS/OILSEEDS

The largest users of freight transportation in agriculture are the grains and oilseeds. In 2002, grains and oilseeds comprised 28 percent of all agricultural tons and 31 percent of agricultural ton-miles moved by all modes of transportation (CFS, 2002).

Industry Trends

Global agricultural supply and demand has changed rapidly since 1990. Table 1 shows changes in the eight major U.S. agricultural commodities between 1990/91 and 2007/08. Corn and soybeans have increased the most in production and demand since 1990. It is not surprising that they have also dominated the growth in transportation demand and account for most of the grain modal share. Between 2000 and 2006, corn accounted for 60 percent and soybeans 20 percent of all U.S. grain movements.

U.S. rice production, domestic use, and exports have also grown over the last 17 years. Production and domestic demand of wheat and the other feed grains (sorghum, barley, and oats) have declined since 1990. Wheat production has declined because of the slow growth in global demand, causing farmers to switch to more profitable crops such as soybeans and corn. Sorghum production has declined because many farmers have shifted to growing more profitable corn and soybeans. Cotton domestic use has declined as a result of the movement of the U.S. textile sector to Asia and because of increased cotton production in China and India.

Exports of corn and soybeans grew strongly during this time, increasing by 44 and 69 percent, respectively. Rice, cotton, and sorghum exports also rose. Transportation demand was the strongest for the three major commodities; corn, soybean, and wheat exports accounted for 89 percent of exports of the 8 major crops.

Transportation is impacted most by changes in crop production and export demand; domestic demand for the major crops tends to be relatively stable. A look at the previous 17 years and USDA's long-term projections—until the 2018/19 marketing year—shows that production and exports for the three major grains return to a more stable growth, contrasted with the dramatic changes of the past 17 years (Table 1) (USDA/ERS).

Table 1. Key Supply and Demand Indicators: U.S. Major 8 Field Crops, (million metric tons).

	----------5-year averages----------								
	1990-94	1995-99	2000-04	2005/06	2006/07	2007/08	USDA Long-term Projections 2018/19	% Change 1990-94 to 2007/08	% Change 2007/08 to 2018/19
Production									
Corn	209.7	228.8	255.4	282.3	267.5	331.2	370.3	**58**	**12**
Wheat	64.7	64.1	56.0	57.2	49.2	55.8	62.9	**(14)**	**13**
Soybeans	57.1	68.8	76.1	83.4	87.0	72.9	88.7	**28**	**22**
Sorghum	16.3	15.3	11.2	10.0	7.0	12.6	10.3	**(23)**	**(19)**
Barley	9.2	7.6	5.9	4.6	3.9	4.6	5.4	**(50)**	**19**
Oats	3.9	2.3	1.9	1.7	1.4	1.3	1.5	**(66)**	**11**
Rice	7.7	8.3	9.5	10.1	8.8	9.0	10.8	**17**	**20**
Cotton	3.7	3.8	4.2	5.2	4.7	4.2	4.0	**13**	**(4)**
Domestic Use									
Corn	165.8	180.3	207.2	232.0	230.7	261.7	312.3	**58**	**19**
Wheat	33.5	34.7	32.7	31.3	30.9	28.6	36.8	**(15)**	**29**
Soybeans	34.8	41.2	44.5	47.3	49.2	49.0	51.6	**41**	**5**
Sorghum	10.9	9.9	6.0	4.8	4.0	5.1	5.0	**(53)**	**(2)**
Barley	8.5	7.3	5.6	4.6	4.6	4.4	5.4	**(49)**	**23**
Oats	5.1	3.7	3.3	3.0	2.9	2.8	2.9	**(45)**	**2**
Rice	4.3	5.0	5.4	5.5	5.8	5.6	6.6	**30**	**18**
Cotton	2.2	2.3	1.6	1.3	1.1	0.9	0.8	**(58)**	**(8)**
Exports									
Corn	43.1	48.0	46.5	54.2	54.0	61.9	56.5	**44**	**(9)**
Wheat	33.3	29.5	29.0	27.3	24.7	34.4	29.3	**3**	**(15)**
Soybeans	18.7	23.9	27.7	25.6	30.4	31.6	32.7	**69**	**3**
Sorghum	6.2	5.4	5.3	4.9	3.9	7.1	5.3	**13**	**(24)**
Barley	1.69	0.98	0.68	0.61	0.44	0.90	0.5	**(47)**	**(40)**
Oats	0.04	0.03	0.04	0.03	0.04	0.04	0.0	**16**	**3**
Rice	3.61	3.85	4.67	5.21	4.12	4.89	5.9	**36**	**20**
Cotton	1.56	1.44	2.52	3.82	2.83	2.61	3.1	**67**	**20**

Sources: Economic Research Service, Commodity Yearbooks; USDA World Agricultural Supply and Demand Estimates; USDA Long-term Projections to 2018.

Mode of Transportation of U.S. Grains, 1978-2006*

The term "modal share" means the portion of the total tonnages of grain moved by each mode of transport—rail, barge, or truck. Almost all grain moves off the farm by truck to its first destination. However, this analysis looks only at the final mode used. Grain is frequently shipped by more than one mode. For example, corn may travel to St. Louis by rail and then be loaded on a barge to be shipped to New Orleans for export.

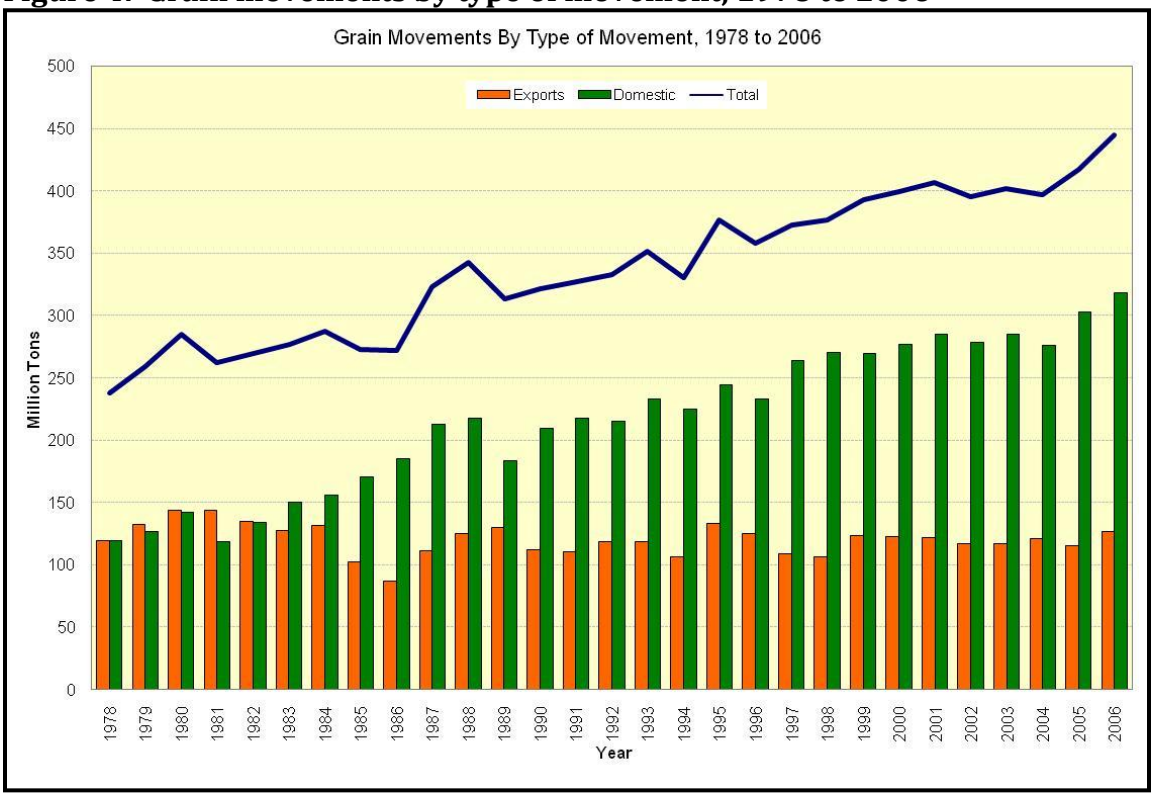
Barges, railroads, and trucks compete to transport grain. Despite this competition, the modes also complement each other. This balance between competition and integration provides farmers with an efficient and low-cost transportation system.

* Information for this section was developed through a preliminary update of the October 2006 report, *Transportation of U.S. Grains: A Modal Share Analysis, 1978-2004* to include the years 2005 and 2006. This report is periodically updated by AMS.

The most remarkable trend in grain transportation is the nearly constant annual increases in the amount of grain transported each year. Total grain movements increased 84 percent from 1978 to 2006. During those 28 years, there were only 8 years in which annual grain movements decreased. The decreases in 1989 and 1994 are notable. The 1989 decline reflected production losses due to the widespread 1988 drought. The 1994 decrease was caused by production losses due to massive flooding in 1993.

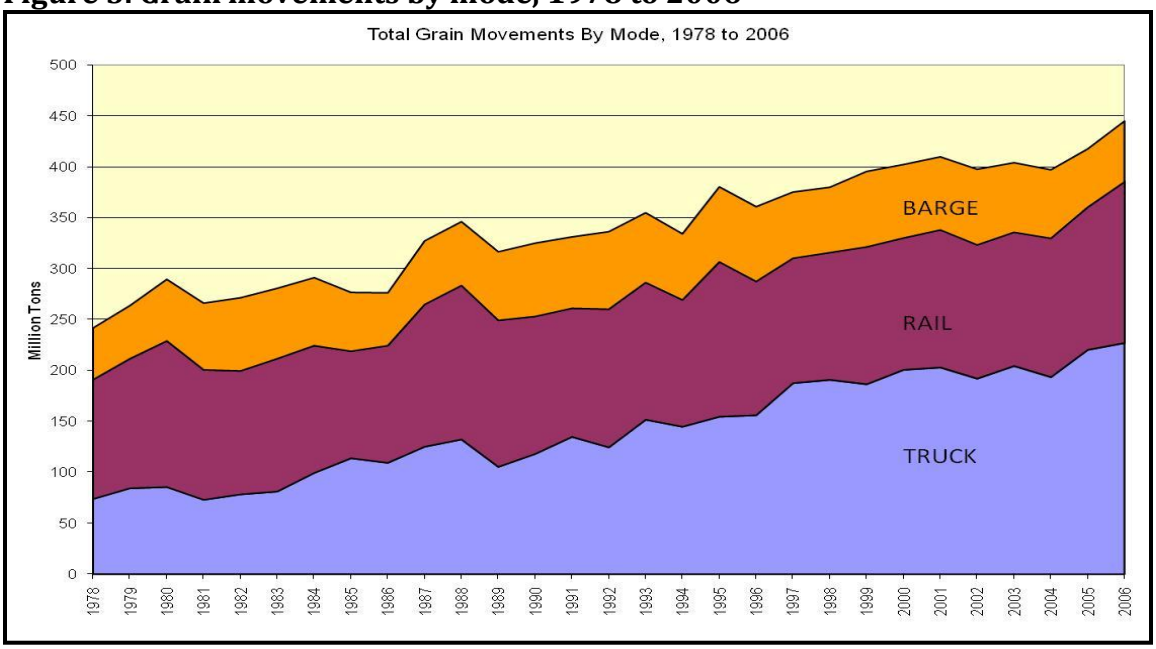
Grain movements have two distinct patterns, depending upon whether the final destination is domestic or foreign. From 1978 to 2006, all growth in grain transportation was a result of increases in the domestic market. During this time, the export market peaked in 1980 and 1981, with record levels for corn in 1980 and wheat in 1981 (Figure 4). The trucking sector experienced the largest growth in grain movements from 1978 to 2006, when tonnage increased from 74 million to 227 million tons—growing at a compound annual growth rate (CAGR) of 4.1 percent. During this period, rail movements increased from 117 million to 158 million tons (1.1 percent CAGR), and barge movements from 51 million to 60 million tons (0.6 percent CAGR) (Figure 5).

Figure 4. Grain movements by type of movement, 1978 to 2006



Source: USDA/AMS/Transportation Services Division, Transportation of U.S. Grains A Modal Share Analysis, 1978-2006.

Figure 5. Grain movements by mode, 1978 to 2006



Source: USDA/AMS/Transportation Services Division, Transportation of U.S. Grains A Modal Share Analysis, 1978-2006.

Location of Elevators

The location of agricultural storage facilities—mainly grain elevators and warehouses—has played a key role in the development of the United States. As Eastern cities expanded and Midwest farms increased their capacity, an efficient system of transportation and storage was introduced to prevent spoilage and reduce transportation costs. In 1842, a retail merchant named Joseph Dart constructed what is believed to be the first grain elevator on Buffalo Creek, near Buffalo, NY. Since then, storage facilities have evolved to highly mechanized modern operations that include the grain-barge and ocean-vessel loading facilities of today.

Two key factors play a role in the location of elevators and warehouses. The first is the need to store grain, oilseeds, and other agricultural products immediately after harvest to prevent spoilage and infestation. The second factor is the need to efficiently gather and load the quantities required to fill a tow of barges or an ocean-going vessel. As can be seen in Figure 6, the highest concentrations are in the Midwest and West Coast—near major grain and oilseed producing and/or consuming areas—and the port regions of the Gulf and Pacific Northwest. Storage capacity is also located near the dairy farms of the Northeast, West and Southwest; and the poultry and swine operations of the Mid-Atlantic.

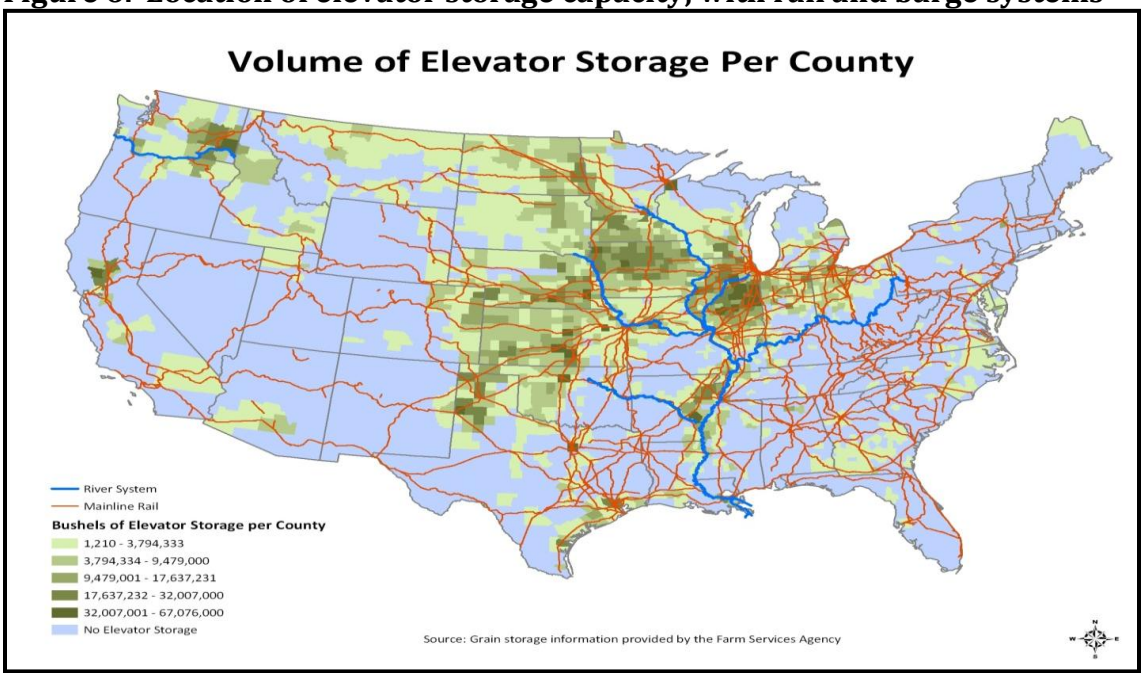
Elevator and warehousing operations in the United States fall into two categories: those with a Federal license issued under the United States Warehouse Act (USWA) and those licensed by States. Many of these facilities also have storage agreements with USDA's Commodity Credit Corporation (CCC). Either State or Federal licensing is required by many States and under some of the CCC storage agreements.

The USWA authorizes the Secretary of Agriculture to license warehouse operators who store agricultural products. Warehouse operators must meet USDA standards established by Congress within the USWA and its regulations. Application is voluntary and applicants who agree to be licensed under the USWA observe the rules for licensing and pay associated user fees. The CCC enters into storage agreements with private individuals and companies to allow warehouse operators to store commodities owned by CCC or pledged as security to CCC for marketing assistance loans. Typically, these agreements are in the form of the Uniform Grain and Rice Storage Agreement (UGRSA). Warehouse operators that enter into these agreements must meet standards established by USDA, agree to comply with the terms and conditions of the agreement, and pay any associated user fees. In some agreements, the warehouse operators are required to be licensed either by the USWA, or by a State authority.

Transportation Implications

Agricultural processing facilities are usually located in close proximity to the raw agricultural products they use, in part due to the economic advantages that include lower transportation costs. This is also the case with the grain and oilseed milling facilities. As the map in Figure 7 shows, the processing facilities that use wheat, corn, rice, and soybeans to manufacture flour, vegetable oil, and other products are concentrated in the same areas as the storage facilities.

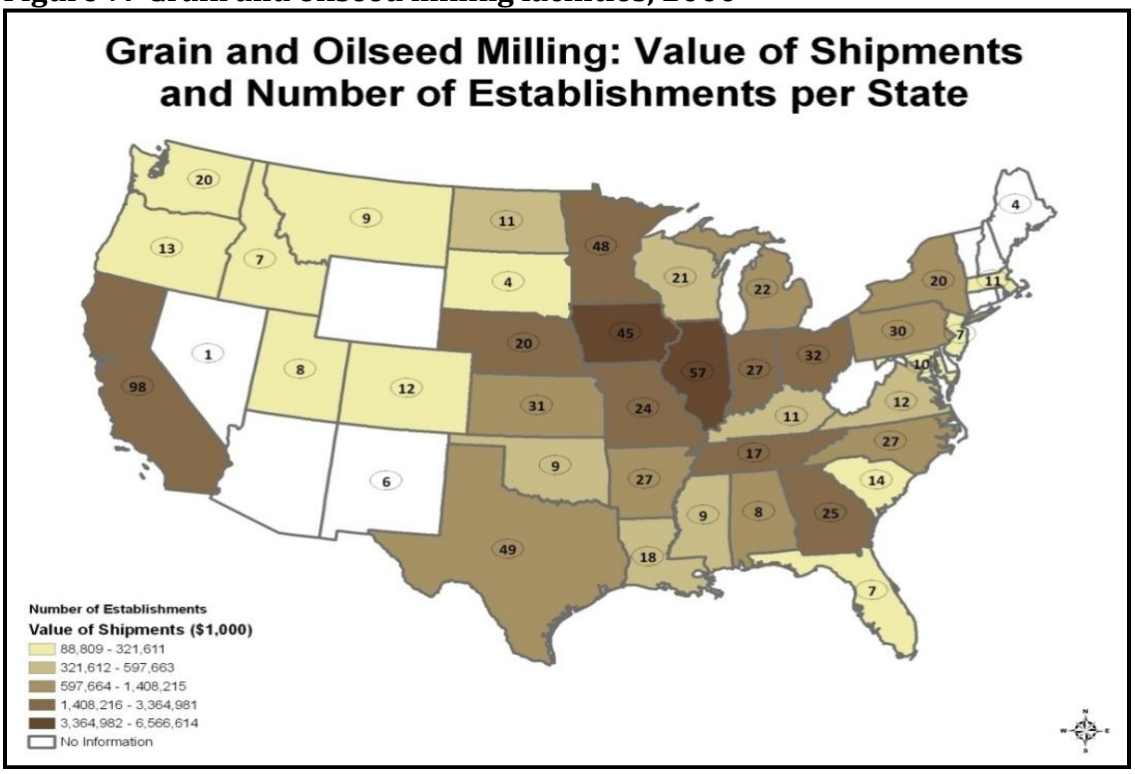
Figure 6. Location of elevator storage capacity, with rail and barge systems*



Data Source: Farm Service Agency USWA/UGRSA database (as of January 2009). This database is estimated to include more than 80 percent of total storage capacity.

* This map includes storage operations that warehouse several commodity groups. Each warehouse may hold different commodities at different times of the year or, in multi-silo elevators, different commodities at the same time. However, the vast majority of the elevators on this map primarily handle grains.

Figure 7. Grain and oilseed milling facilities, 2000



Source: Econ 02 Report Series, 2002, Economic Census, U.S. Census Bureau.

CORN PROFILE

Corn produced in the United States is used mainly as animal feed, with smaller portions exported, used for ethanol, human food, and seed.

Supply and Demand

Supply and demand patterns in the U.S. corn market have shifted dramatically since 1990. Domestic and export shares have decreased and the share used by industry has grown substantially. Feed use has decreased from 59 percent in the 1990/91 growing season to 47 percent in 2007/08; exports decreased from 22 to 19 percent. During the same period, industrial use increased from 18 percent to 34 percent (Table 2). Most of the change occurred after the rapid expansion of the ethanol sector.

Table 2. Corn usage by sector, percentage

	Feed	Exports	Industrial
1990/91	59	22	18
2007/08	47	19	34

Domestic demand for feed corn has grown by only 29 percent between 1990/91 and 2007/08 marketing years (Table 3). But demand for corn for food, seed, and industrial products, including ethanol, has surged by 206 percent. About a third of the corn used to make ethanol ends up as distiller grains, which are used as animal feed. Corn exports peaked in 2007/08 at a record 2.4 billion bushels—41 percent higher than in 1990/91. Corn exports are expected to decrease to 1.75 billion bushels in 2008/09 due to reduced global demand for corn feeding as a result of the worst global recession since World War II. In 2009, USDA projected that by 2018/19, corn exports will recover to 2.25 billion bushels.

Table 3. U.S. corn supply and use for various marketing years, million bushels

	Supply				Use			
Marketing Year[a]	Beginning Stocks	Production	Imports	Total	Food, seed, and alcohol	Feed	Exports	Total
1990/91	1,344	7,934	3	9,282	1,425	4,609	1,727	7,761
2000/01	1,718	9,915	7	11,639	1,957	5,842	1,941	9,740
2001/02	1,899	9,503	10	11,412	2,046	5,864	1,905	9,815
2002/03	1,596	8,967	14	10,578	2,340	5,563	1,588	9,491
2003/04	1,087	10,087	14	11,188	2,537	5,793	1,900	10,230
2004/05	958	11,806	11	12,775	2,687	6,155	1,818	10,661
2005/06	2,114	11,112	9	13,235	2,982	6,152	2,134	11,268
2006/07	1,967	10,531	12	12,510	3,490	5,591	2,125	11,207
2007/08	1,304	13,038	20	14,362	4,363	5,938	2,436	12,737
2008/09[b]	1,624	12,101	15	13,740	4,900	5,300	1,750	11,950
2009/10[c]	1,790	12,365	15	14,170	5,400	5,200	1,850	12,450

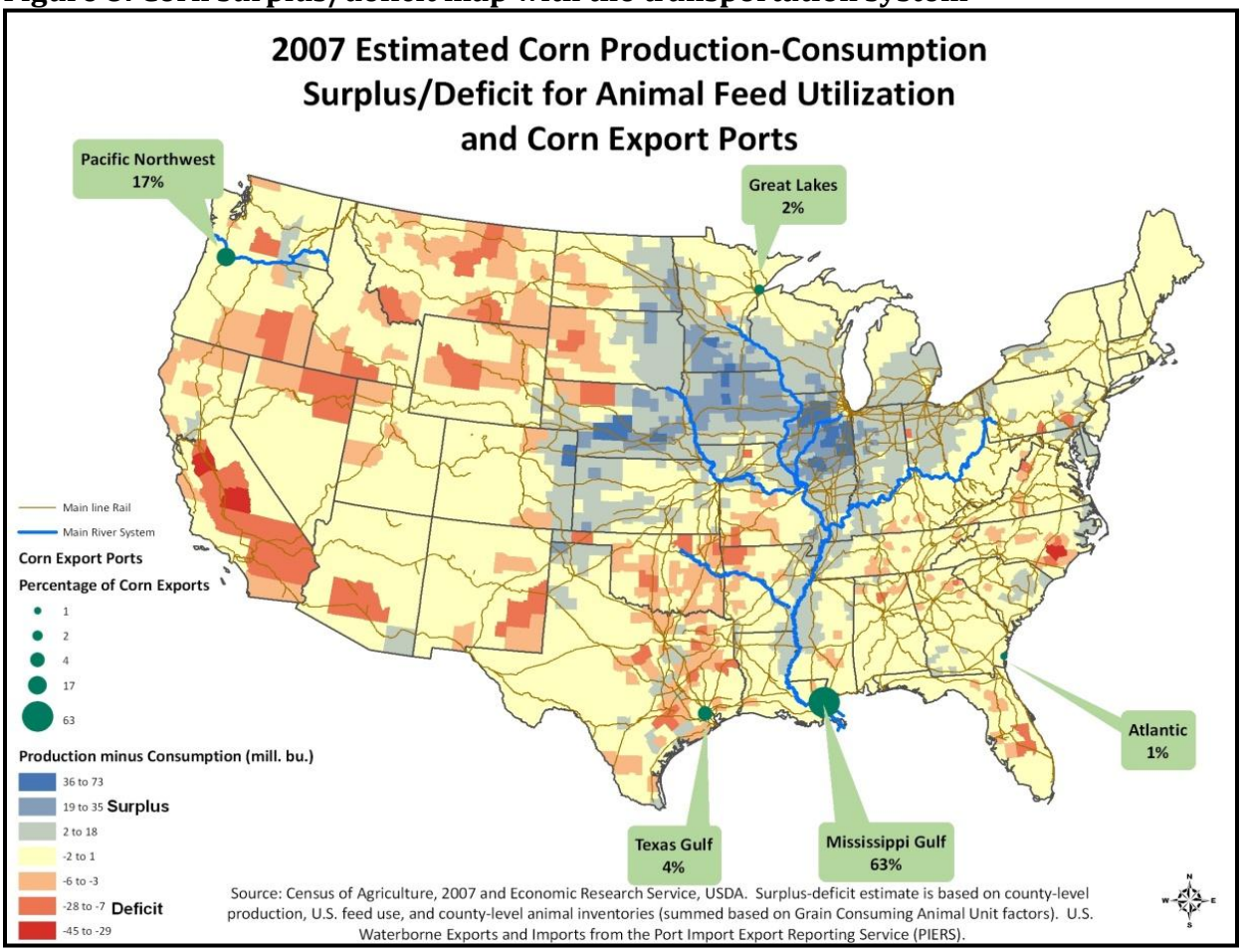
[a] Marketing Year: September 1-August 31
[b] Projected, WASDE, February 10, 2009
[c] Preliminary, February 27, 2009

Source: USDA/ERS, Feedgrains database. http://www.ers.usda.gov/data/feedgrains.

Corn Transportation Characteristics

In 2007, more than 60 percent of U.S. corn was harvested in five states: Iowa, Illinois, Nebraska, Minnesota, and Indiana. Demand for corn, however, was more diverse, creating areas of deficit throughout the West, Texas, the Southeast, and Northeast. Corn is also shipped to export port regions in the Gulf, the Pacific Northwest, the Atlantic Coast, and the Great Lakes. Figure 8 demonstrates that this imbalance of surplus and deficit creates the need for long distance transportation.

Figure 8: Corn surplus/deficit map with the transportation system



Because of the projected trend in supply and demand, long-term transportation demand for corn exports can be expected to grow at a stable rate. Domestic corn transportation patterns will continue to be dominated by the dynamics of corn used for ethanol and distillers grain because the growth of the ethanol industry in the Corn Belt introduced additional transportation needs. More than 90 percent of ethanol production capacity is located within a 50-mile radius of the corn producing areas, so trucks have been the primary mode of transportation for inbound corn. However, the newer and larger bio-refineries are able to receive corn shipments by rail.

Corn Modal Shares

During 2000 to 2006, corn accounted for 60 percent of all grain movements. It dominates the bulk transportation market because of its large production volumes; it usually has the largest harvested acreage of any crop, although soybean acreage has risen in the last several years and sometimes surpasses the number of corn acres. However, the high yield-per-acre of corn makes it a driver in the transportation market. Corn yields can be more than 3 times those of soybeans or wheat.

Corn is transported to distant markets in two patterns—one for domestic use and the other for export. Trucks supply most of the transportation for the domestic market, and barges

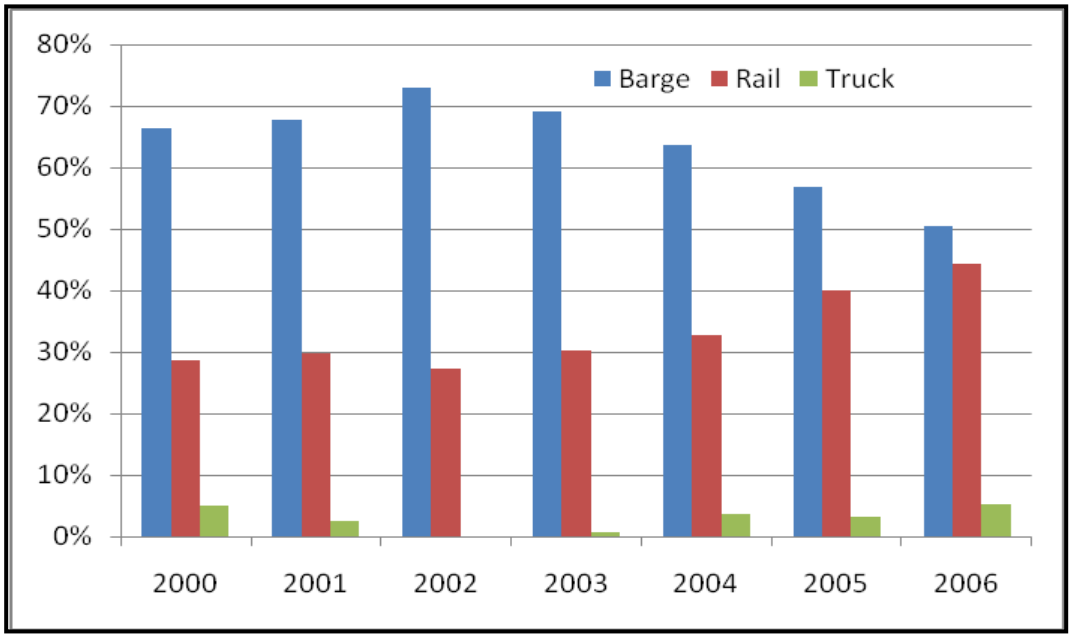
supply the export market. From 2000 to 2006, trucks transported, on average, about 68 percent of the corn used by the domestic market (Table 4). During the same period, barges transported 64 percent of the corn exports. Rail handled about 33 percent of the export market and 30 percent of the domestic market. Barges continue to be the main mode of transportation for corn moving to port regions for export. But the modal share trend for exported corn has seen an increase in the rail share and a decrease in barges. By 2006, rail's share of export corn increased to 44 percent—15 points higher than in 2000. At the same time, barge's share had decreased to 50 percent after peaking at 73 percent in 2002 (Table 4 and Figure 9).

Table 4. Corn modal shares

CORN						
Year & Type of Movement	Rail		Barge		Truck	
	1,000 Tons	Percent	1,000 Tons	Percent	1,000 Tons	Percent
TOTAL						
2000	68,984	30%	37,831	16%	122,531	53%
2001	73,633	31%	38,864	16%	125,340	53%
2002	72,615	31%	41,598	18%	119,713	51%
2003	71,443	30%	36,488	15%	127,916	54%
2004	77,377	32%	37,302	15%	126,588	52%
2005	77,908	30%	31,739	12%	150,519	58%
2006	91,552	32%	34,587	12%	159,086	56%
Average	76,216	31%	36,916	15%	133,099	54%
EXPORT						
2000	15,213	29%	35,150	66%	2,594	5%
2001	15,822	30%	35,904	68%	1,306	2%
2002	14,327	27%	38,125	73%	Not available *	
2003	14,371	30%	32,872	69%	364	1%
2004	17,422	33%	33,974	64%	1,978	4%
2005	20,251	40%	28,778	57%	1,600	3%
2006	28,145	44%	31,941	50%	3,342	5%
Average	17,936	33%	33,821	64%	1,598	3%
DOMESTIC						
2000	53,771	30%	2,681	2%	119,936	68%
2001	57,811	31%	2,960	2%	124,034	67%
2002	58,288	32%	3,473	2%	119,835	66%
2003	57,072	30%	3,616	2%	127,552	68%
2004	59,955	32%	3,328	2%	124,611	66%
2005	57,657	28%	2,961	1%	148,918	71%
2006	63,407	29%	2,646	1%	155,744	70%
Average	58,280	30%	3,095	2%	131,519	68%

Source: USDA/AMS/Transportation Services Division, Transportation of U.S. Grains A Modal Share Analysis, 1978-2006.

Figure 9. Modal shares of corn exports, 2000-2006



Source: USDA/AMS/Transportation Services Division, Transportation of U.S. Grains A Modal Share Analysis, 1978-2006.

Corn Exports by Port Region

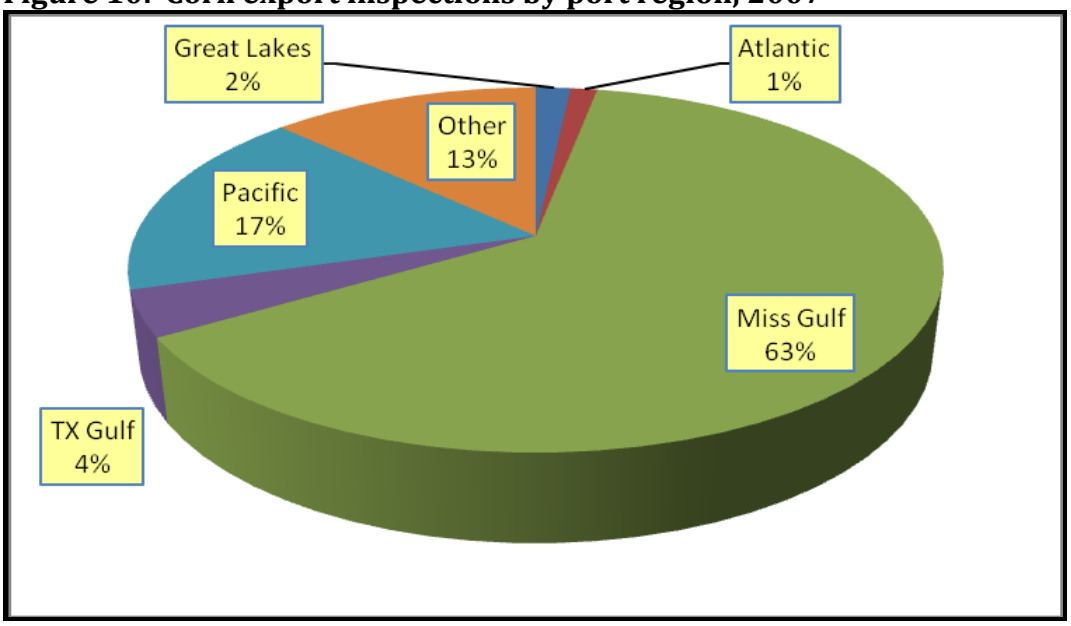
- Most corn exports are shipped through the Mississippi Gulf region—63 percent of all corn volumes exported in 2007 (Figure 10).

- The Pacific Northwest accounted for 17 percent of all corn exports in 2007.

- The top five destinations—Japan, Mexico, Korea, Taiwan, and Egypt accounted for 64 percent of all U.S. exports in 2007/08.

- The port share of corn exports depends on the ocean rate spread (the difference between the cost of shipping from the Gulf to Japan and the cost of shipping from the Pacific Northwest).

Figure 10. Corn export inspections by port region, 2007



Source: FGIS, 2007.

CONCLUSIONS

America's transportation system carries the food from our farms to our tables and to a hungry world. That system is based on four principal modes of transportation—trucks, trains, barges, and ocean vessels—that make up a seamless network. They cooperate and compete with one another to make a balanced and flexible system that moves our food and farm products efficiently and economically.

The transportation system is more heavily used by agriculture than any other business sector; in 2007, 31 percent of all ton-miles carried were agricultural products or inputs. Many of these products are bound for export. During the past 5 years, half of the U.S. wheat crop, 36 percent of the soybean crop, and 19 percent of the corn crop moved from farms to ports for export on an unbroken transportation chain.

As the world develops, its eating patterns change, demand rises for high-quality food products and bulk commodities, and these changes increase America's needs for transportation. Domestically, during the last decade, the livestock, poultry, and dairy industries have become more concentrated and experienced geographic shifts. The production and consumption areas are geographically dispersed, creating the need for efficient long-distance transportation from the highly concentrated producing areas to the growing domestic and international markets.

Raising concerns for the safety of urban areas are making fertilizer transportation more regulated, even as the need for fertilizers grows, increasing the demand for rail, barge, and trucks to transport it. The need for agricultural transportation will continue to increase, based on projected growth in demand for U.S. agricultural products domestically and overseas.

REFERENCES

Association of American Railroads, Class I Railroad Statistics, November 18, 2008. http://www.aar.org/~/media/AAR/Industry%20Info/Statistics.ashx

Bureau of Transportation Statistics, Commodity Flow Survey, 2002. http://www.bts.gov/programs/commodity_flow_survey/

USDA, 2007 Census of Agriculture. http://www.agcensus.usda.gov/. (Does not account for inflation.)

USDA, Economic Research Service, 2009. http://www.ers.usda.gov/Briefing/Baseline/crops.htm