FARM TO MARKET
A SOYBEAN'S JOURNEY FROM FIELD TO CONSUMER

Prepared for:

UNITED SOYBEAN BOARD
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Acronyms

ADM (Archer Daniels Midland)
ALL (American Latina Logistica)
APROSOJA (Association of the Producers of Soy)
BEA (Business Economic Analysis)
CBOT (Chicago Board of Trade)
CIF (Cost, Insurance, Freight)
CIH (Comision Intergubernamental de la Hidrovia)
CNT (National Confederation of Transportation)
CONAB (Companhia Nacional de Abastecimento)
DDGS (Distillers Dried Grains)
FOB (Freight on Board)
GDP (Gross Domestic Product)
GO (Goiás)
H1N1 (Swine Flu)
IBGE (Instituto Brasileiro de Geografia e Estatística)
ICMS (Merchandise Circulation Tax)
IDB (Inter-American Development Bank)
IMEA (Mato Grosso Institute of Agricultural Economics)
MGY (Million Gallons per Year)
MT (Metric Ton)
MMT (Million Metric Tons)
PAC (Program to Accelerate the Economy)
PAC 2 (Program to Accelerate the Economy 2)
PNW (Pacific Northwest)
PPPs (Public-Private Partnerships)
PR (Paraná)
PUWB (Public Use Waybill)
RS (Rio Grande do Sul)
TEU (Twenty-Foot Equivalent)
USDA (United States Department of Agriculture)
USITC (United States International Trade Commission)

Unit Conversions

Bushel of Corn = 56 pounds
Bushel of Soybeans = 60 pounds
Bushel of Wheat = 60 pounds
Metric Ton of Soybeans = 36.74 bushels
Metric Ton of Corn = 39.37 bushels
Short Ton of Soybeans = 33.33 bushels
Short Ton of Corn = 35.17 bushels
One Pound = 2.2046 kilograms
Metric Ton = 2,204.6 pounds
Short Ton = 2,000 pounds
Long Ton = 2,240 pounds
Cargo Ton = 40 cubic feet
Metric Ton = 1.2204 short tons
Acre = 0.4046 hectares
Hectare = 2.471 acres
Meters = 3.28 feet
Kilometer = 0.6214 mile
Mile = 1.6093 kilometer

I. Executive Summary

The U.S. transportation infrastructure system is rapidly deteriorating. The interstate highway system is more than a half century old, the lock and dam system more than seven decades, the rail network dating to the late 1800s, while ports and terminals form the bedrock of the trade infrastructure. This infrastructure fostered the economic vitality of the United States, but its functional design has been eclipsed, desperately needing rebuilding and modernizing. Attention has been focused on the impact to the U.S. economy, but little on how the infrastructure system impacts agriculture.

The movement of agricultural commodities and products flow through a number of logistics options from farm to market. The logistics options often require the use of multiple modes across various geographies. The transportation of soybeans and soybean products and other grains and products were analyzed in this report. The goal of this project was to develop a more precise understanding of how U.S. soybeans and other leading agricultural products are transported to its customers.

In order to achieve these answers, the following tasks were performed:

- Baseline crop and livestock production outlook
- State level crop surplus and deficit outlook
- U.S. transportation system accommodating agricultural products
- Infrastructure enhancements among international competitors

This report was originally prepared by Informa Economics, Inc. (Informa) in 2011 and updated in 2015. For this report nine additional states were included as compared to the 2011 report. Summary information characterizing Informa is available in the appendix.

A. Report Highlights

- Crop Outlook
  - Production increasing on higher yields, stable cropping area; soybean area expanding, corn shrinking, but overall total production rising.
  - Corn ethanol will reach its Renewable Fuel Standard mandate cap of 15 billion gallons in 2015.
    - During the ethanol build out phase, surplus corn supplies diminished across the Corn Belt, especially along the geographic reaches of the upper Mississippi and Illinois Rivers.
    - Surplus corn supplies are increasing, which increases the exportable supply of corn in a barge draw area, which increases Center Gulf exports versus PNW.

- China will continue to import larger volumes of soybeans. China's annual soybean net imports have increased by 24 million MT from 2006 through 2010. From 2010 through 2023, soybean annual net imports are expected to increase an additional 74 million MT to 126 million MT in 2023.
  - China's consumption of soybeans is shifting world acreage away from grains to oilseeds.
- Cropping of soybeans and corn has been and will continue to expand into the north and to the west, and into the Delta at the expense of wheat, cotton, and other feed crops, such as sorghum and oats.

- Livestock Outlook
  - U.S. meat production is expected to increase on the strength of foreign demand.
    - Chinese beef consumption is expected to grow by 1.5 million metric tons over the next decade, with Chinese imports fostering growth.
    - The increase in beef consumption is a result of China's strengthening economy, rising incomes, and continued urbanization.
  - The U.S. livestock outlook is projected to be mixed with growth driven by export demand and not domestic consumption.
  - Free Trade Agreement rules are being finalized for implementation between the U.S. and South Korea, Panama and Colombia, to the benefit of U.S. meat exports.
  - Poultry production will increase through 2016/17, and then shrink slightly during 2017/18 and expand to 57.5 billion pounds or 26.0 million metric tons in 2022/23.
  - Hogs are projected to increase about 7.3 million head from the 2014/15 low point to 72.3 million in 2022/23 and remain steady from there.
    - Hog production will expand more rapidly within the Corn Belt, while essentially shrinking in other areas.
    - Even though head count will flatten out, hog productivity gains will expand total pork production.
  - Cattle head counts are forecast to increase to 2019/20 before declining through 2022/23, with no significant shift in geographic distribution.
    - South Korea experienced a severe outbreak of foot-and-mouth disease, which has reduced the size of its herd, and increases the prospect of increased imports from the U.S., especially with the newly established Free Trade Agreement.
  - Dairy cattle head count will remain relatively stable, but annual productivity gains of 1.6% will increase total milk production.
    - The size of the U.S. dairy herd is dependent on exports of milk and associated products, especially to Asia and more specifically to China.

- Transportation of Soybeans and Products
  - Long haul transport of soybeans and soybean products, grains and grain products move from areas of surplus into deficit areas of the United States for domestic feeding and processing purposes, and to export position.
  - After years of losing market share to the PNW, the Center Gulf is maintaining its market share.
  - Unit or shuttle train elevators exceed 500 efficient, rapid operational locations across the Corn Belt. These facilities allow fast loading of unit or shuttle trains of 90 to 110 cars per train in less than 12 hours.
  - The relative movement of soybeans and grains by barge had shifted away from the upper Mississippi and Illinois River origins toward the lower Mississippi and lower Ohio Rivers. With the ethanol mandate maxing out, surplus corn supplies are increasing, which expands the exportable supply of corn in the upper Mississippi and Illinois River surplus regions. That being stated, the unreliability of the locks and the ability to load heavier on the lower Mississippi River is encouraging loading below St. Louis, MO.
  - The fleet of covered barges has transitioned from older equipment with less carrying capacity and shallower draft to equipment that is 15% to 20% larger that has deeper hulls, which requires deeper draft capabilities when fully loaded. The ability to load heavier and avoid lock issues enables barge companies to charge 40 cents per bushel less on the lower Mississippi River as compared to locking areas of the navigation system.
  - Export capacity has increased 30% in the PNW, 10% across the U.S. The PNW capacity accommodates the westerly expansion of crops and increased soybean and grain trade with Asia.
  - Rail carloadings of soybeans will increase 20% to almost 240 thousand and barge loadings will increase 32% to over 21 thousand. The 26 states in this study currently represent 97% of the soybean carloadings in the U.S., while in 2022/23 it is expected they will represent 98%.
  - For barge movements of soybeans, the 26 states represent 100% of the soybeans moving on the navigable waterways of the Mississippi River System.

- Key Transportation and Infrastructure Issues
  - The locks and dams on the inland navigation system have exceeded the design life of the structures and have not been fully and efficiently maintained, and many are not adequate to accommodate modern tow configurations.
  - Dredging navigation channels to project depths, that is, the specified navigable waterway targeted by the U.S. Army Corps of Engineers at key ports and navigation channels is not being efficiently funded for reliable service to maintain adequate navigational draft. This limits the volume of soybeans and grains that can be loaded on a vessel or barge, leading to higher freight costs.
  - The Panama Canal expansion effort to add a new set of locks to accommodate increased traffic and larger vessels to transit the isthmus between the Atlantic and Pacific Oceans is almost complete. The expansion

project first started in 2007 and was targeted to be complete by October 2014. Through a series of delays with dredging, concrete and labor, the project is expected to be completed by April 2016. The expansion will allow vessels to be loaded to a 50 foot draft from the current draft of 39.5 feet, as well as longer and wider vessels to utilize the passage. This will allow dry bulk vessels loaded with grain to take on an additional 11,000 to 28,000 metric tons of cargo depending on the vessel class. Conceivably the heavier loadings to the deeper draft will lower the overall ocean freight rate transporting bulk grains and soybeans from the U.S. Center Gulf to Asia for vessels transiting the Panama Canal.

- South America Infrastructure Influence
    - Soybean production in Brazil is expected to exceed 129 million metric tons by 2023, up from 87 in 2013.
        - Exports of soybeans will expand commensurately with Brazil's exports to exceed 74 million metric tons in 2023 from 45 million in 2013.
    - Transportation in Brazil is key to remain competitive
        - Heavily oriented toward truck movement over long-haul distances, however efforts are underway to shift increasingly to rail and waterway modes to mitigate costs.
        - Since 2005, Brazil's modal shares have been realigning with the more efficient modes of rail and barge gaining notable shares.
    - Inland transportation expensive
        - The transportation cost to export position is expensive in South America, especially in Brazil where truck costs run upwards of U.S. $104 per metric ton (or U.S. $2.83 per bushel) during harvest on some routes. The movement of soybeans in Brazil is over long distances while in the United States the truck move is much shorter, to the next logistics option. In the United States, truck costs moving soybeans to the next market position are considerably lower, between $10 and $15 per metric ton.
            - The lower fuel costs are increasing the competiveness of Brazil.
    - Proposed soybean corridors
        - Several infrastructure projects have been proposed to accommodate the reliable and efficient movement of soybeans in Brazil. Many have yet to be realized or lack resources to be fully completed.
        - Based on information in Brazil, improvements to the infrastructure, including the addition of multi-modal options (e.g., truck-rail or truck-barge to export position), have been estimated by Informa Economics to reduce freight costs $40 per metric ton or between 20% and 30% depending on the origin. Based on information compiled and taking into account wait times between transportation events and eventual vessel loading for export movement, the more optimistic Department of Agriculture estimated cost savings could exceed 50% or U.S. $55 per metric ton to more than U.S. $60 per metric ton.

    - Such potential improvements will bring Brazil nearly on par with the United States in terms of inland transport costs, which effectively bolsters its farm industry.
  - For South America, and especially Brazil, projects have been discussed for many years with little fulfillment. Some portions of some proposed projects have been started, but due to poor construction and or the lack of on-going maintenance resources, the infrastructure quickly crumbles.

II. Introduction

The material, information and conclusions in this report define and quantify the requirements of the infrastructure for U.S. agriculture production, and moving that production from farm to final market position. The goal of this project was to develop a more precise understanding of:

- How U.S. soybeans and other leading agricultural products are transported to customers.

In order to achieve these answers, the following tasks were performed:

- Baseline crop and livestock production outlook
- State level crop surplus and deficit outlook
- U.S. transportation system accommodating agricultural products
- Evaluation of the impact of infrastructure enhancements among international competitors

The U.S. transportation infrastructure system is rapidly deteriorating. The interstate highway system is more than a half century old, the lock and dam system more than seven decades, and the rail network dates to the late 1800s. Ports and terminals form the bedrock of the trade infrastructure. This infrastructure fostered the economic vitality of the United States, but its functional design has been eclipsed, desperately needing rebuilding and modernizing. Decaying roads, bridges, railroads and transit systems cost the United States economy dearly. Attention has been focused on the impact to the U.S. economy, but little on how the infrastructure system impacts agriculture.

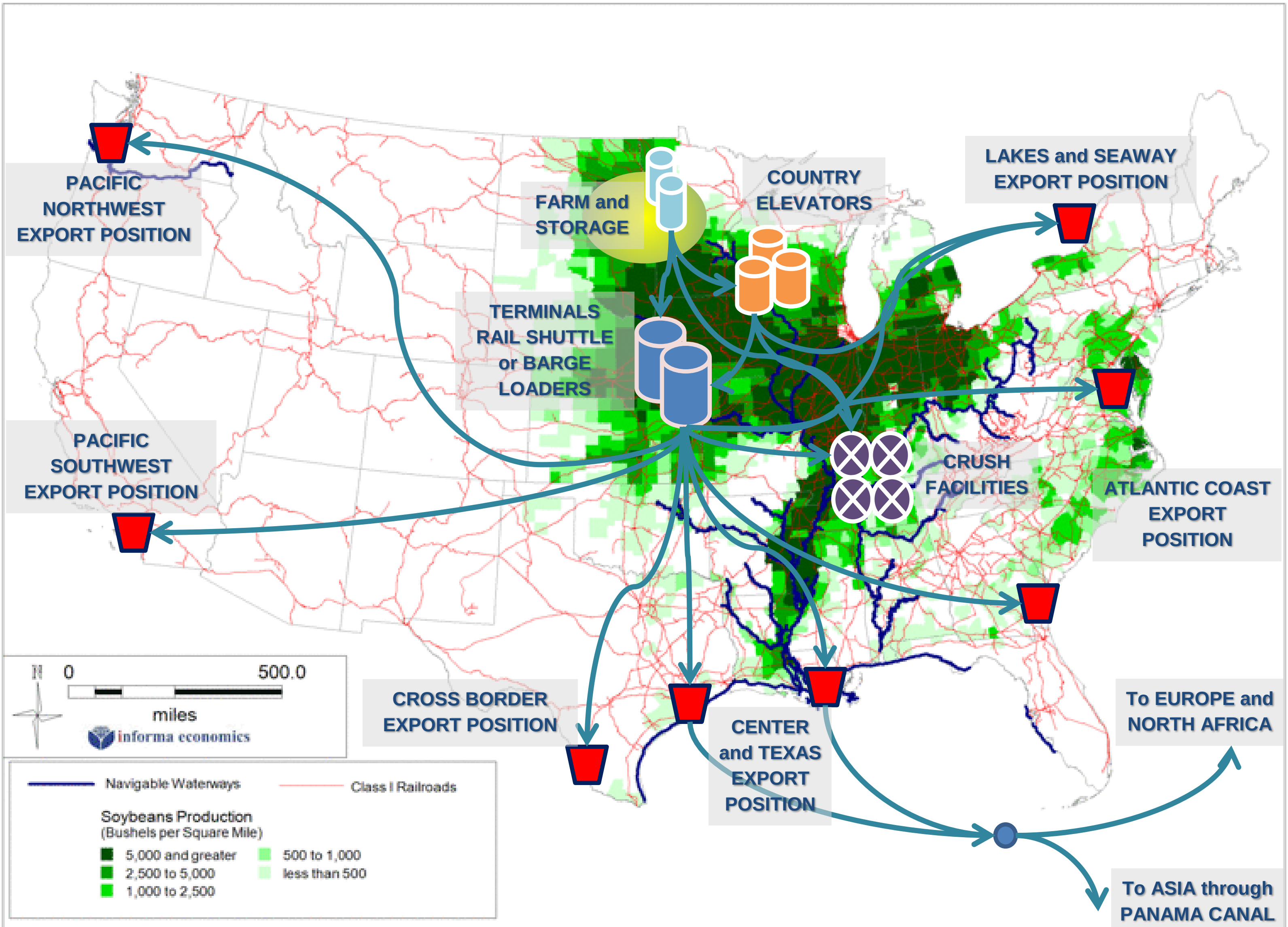
The movement of agricultural commodities and products flow through a number of logistics options from farm to market. The logistics options often require the use of multiple modes across various geographies. The U.S. soybean farm to market value chain and logistics flow is presented visually and is accompanied by a brief description of each component of the marketing chain. The value chain will provide a framework to analyze the journey of a soybean from its initial production region to end consumer as shown in Figure 1. The following information is based on a "typical" journey and does not include every possible outcome. The goal is to provide a foundation of how the vast majority of soybeans are transported from farm to market. The report provides a deeper dive on every area discussed in the logistics flow.

- The U.S. annually produces approximately 4 billion bushels or 109 million metric tons of soybeans. Soybean production occurs primarily in the Midwest, Northern Great Plains, and along the Mississippi River.

- The first move is from farm to market pipelines. During harvest the farmer has as many as six primary options, depending upon where they are located, transporting soybeans:
    - On-farm storage,

- Country elevator,
- Container yard or transloader,
- Barge terminal,
- Shuttle elevator, and
- Crushing plant.

Figure 1: Soybean Logistics Flow



- Approximately three out of four bushels of the soybeans either remains on-farm initially or is delivered to a country elevator during harvest.
  - On-farm storage is an important asset in terms of managing harvest pressure and making marketing decisions.
    - The combination of higher yields and larger harvesting equipment results in large quantities of soybeans needing to be handled in a short period of time. A farmer's response to increased harvest pressure has been to add more trucks delivering soybeans to the next step in the value chain, increasing the size of the trucks, and building more on-farm storage.
    - After harvest, approximately one-quarter of the soybean production remains on-farm and is then delivered to market position from April through September.
  - Harvest pressure makes the nearby availability of storage valuable. For farmers that are not located within 50 miles of a container yard, barge terminal, shuttle elevator, and/or crush facility, the country elevator is essential during harvest.
    - Interviews of country elevator operators indicated that the main draw area is 20 miles to 50 miles. Farmers west of the Mississippi River typically drive farther distances than farms east of the Mississippi River.
    - Farm to country elevators account for an estimated 55% of first moves.

- Approximately 20% of the soybean harvest is shipped directly from the farm to direct use, export position or crusher.
  - To consistently utilize containers requires a farmer to be located within close proximity of a transloader or container yard. Currently, container movements represent less than 1% of soybean production, but shows promise of expanding from 4% to 7% of soybean exports.
  - It is assumed that during the two peak months of harvest the farmer delivers directly to the barge terminal, shuttle elevator, and crushing plant.
    - Farm to barge terminal represents an estimated 5% of soybean production.
    - Farm to shuttle elevator is approximately 5% of soybean production.
    - Approximately 7% of soybean production moves directly from farm to crushing plant. According to crush plant managers located in the Corn Belt, the average reach of their facilities is 40 miles and nearly all soybeans arrive by truck.

Table 1: U.S. Soybean Farm to Market Pipeline Distribution at Harvest

	Thousand Bushels	Average Distance (Miles)	Total Ton-Miles (Thousands)	Truck Ton-Miles (Thousands)	Rail Ton-Miles (Thousands)	Barge Ton-Miles (Thousands)
Crop Size	4,000,000	26	3,072,450	3,072,450	-	-
On-Farm Storage	1,000,000	-	-	-	-	-
Country Elevator	2,200,000	35	2,310,000	2,310,000	-	-
Direct Use	120,000	35	126,000	126,000	-	-
Container	600	50	900	900	-	-
Barge Terminal	200,000	25	150,000	150,000	-	-
Shuttle Elevator	199,400	25	149,550	149,550	-	-
Crushing Plant	280,000	40	336,000	336,000	-	-

Source: USDA, USACOE, USITC, Informa

- On-farm stored soybeans are not transported during harvest, which increases the time available to market directly to an export position or crusher. The availability of time allows the farmer to ship the soybeans a greater distance than during harvest.
  - The on-farm move to export position or crusher is typically 20 miles to 150 miles and 100% is delivered by truck.
  - The moves are programmed, which reduces the wait time to unload and allows soybeans to be transported as a backhaul. The backhaul moves are less expensive than deadhead moves, but are also longer distances, which offsets the emission savings from avoiding deadhead moves. The report assumes no backhaul moves for the purpose of emissions.
  - Farmers in the western U.S. tend to drive farther distances than farmers in the eastern U.S.
  - Of the estimated 1 billion bushels remaining on-farm after March, approximately 40% are shipped to a crushing plant, 25% to a shuttle elevator, 15% to a barge terminal, and 20% to a country elevator as shown in Table 2.
  - The on-farm storage shipments are considered to be moved by truck.

Table 2: U.S Distribution of Soybeans from On-Farm Storage

	Thousand Bushels	Average Distance (Miles)	Total Ton-Miles (Thousands)	Truck Ton-Miles (Thousands)	Rail Ton-Miles (Thousands)	Barge Ton-Miles (Thousands)
On-Farm Storage	1,000,000	59	1,770,000	1,770,000	-	-
Country Elevator	200,000	35	210,000	210,000	-	-
Barge Terminal	150,000	50	225,000	225,000	-	-
Shuttle Elevator	250,000	50	375,000	375,000	-	-
Crushing Plant	400,000	80	960,000	960,000	-	-

Source: USDA, USACOE, USITC, Informa

- The country elevator provides marketing options for the farmer, nearby crushers, feeding operations, barge terminals and shuttle elevators.
  - Elevator operators indicate that approximately 85% of country elevator shipments are shipped out by truck with the remaining 15% by rail as shown in Table 3.
  - The moves are scheduled, which reduces the wait time to unload and allows soybeans to be transported as a backhaul. The backhaul moves are less expensive than deadhead moves, but are also longer distances, which offsets the emission savings from avoiding deadhead moves. The report assumes no backhaul moves for the purpose of emissions.
  - Country elevators are in essence feeder elevators to barge terminals and shuttle elevators.
  - Crushers typically either own country elevators and/or have marketing agreements with country elevators.

Table 3: U.S. Distribution of Soybeans from Country Elevators

	Thousand Bushels	Average Distance (Miles)	Total Ton-Miles (Thousands)	Truck Ton-Miles (Thousands)	Rail Ton-Miles (Thousands)	Barge Ton-Miles (Thousands)
Country Elevator	2,400,000	66	4,723,200	4,014,720	708,480	-
Barge Terminal	480,000	50	720,000	612,000	108,000	-
Shuttle Elevator	672,000	50	1,008,000	856,800	151,200	-
Crushing Plant	1,200,000	80	2,880,000	2,448,000	432,000	-
Export	48,000	80	115,200	97,920	17,280	-

Source: USDA, USACOE, USITC, Informa

- The shuttle elevator primary utilizes railroads to transport soybeans. The accumulation of soybeans in a single location has increased railroad efficiency and offers incentives to shippers.

- The expansion of soybean production west of the Mississippi River combined with strong Asian demand has increased exports to the Pacific Northwest (PNW).
- Increasingly, shuttle trains are delivering soybeans to St. Louis and East St. Louis to be transloaded onto barge. As the dependability of the locks continues to erode and as deeper hull barges become a greater percentage of the fleet, more soybeans will be loaded downriver from locks at deeper draft capable terminals downriver from St. Louis.
- Export elevators located at Texas and Louisiana ports do receive shuttle trains of soybeans for loading onto ocean going vessels.
- Crushers typically have the ability to receive shuttle trains especially those located outside the Corn Belt and ship products out by unit train.
- Approximately one-third of shuttle train moves have a backhaul. Fertilizer is quoted as the primary backhaul. Crushing plants can ship out products.
    - In addition, empty cars will be attached to the end of the train that is moving products. In effect only a-third of the train is coming back empty.

Table 4: U.S. Distribution of Soybeans from Rail Shuttle Elevators

	Thousand Bushels	Average Distance (Miles)	Total Ton-Miles (Thousands)	Truck Ton-Miles (Thousands)	Rail Ton-Miles (Thousands)	Barge Ton-Miles (Thousands)
Shuttle Elevator	1,121,400	1,323	44,492,386	-	44,492,386	-
Barge Terminal	78,498	400	941,976	-	941,976	-
Crushing Plant	89,712	600	1,614,816	-	1,614,816	-
Export	953,190	1,467	41,935,594	-	41,935,594	-
PNW	505,191	1,700	25,764,726	-	25,764,726	-
Mexico	238,298	1,600	11,438,280	-	11,438,280	-
Canada	28,596	400	343,148	-	343,148	-
Texas / Louisiana	114,383	900	3,088,336	-	3,088,336	-
East Coast	66,723	650	1,301,104	-	1,301,104	-

Source: USDA, USACOE, USITC, Informa

- Soybean barge movements to crushing plants and to export position in the Center Gulf are shown in Table 5. An estimated 90% of the soybean barge movements are to export position in the Center Gulf.

- Equipment flexibility allows greater backhaul opportunities for barge than rail. Informa assumed that one-third of the downbound soybean moves have corresponding upbound moves. The upbound moves include other commodities that depend on backhaul pricing, such as road salt, and other commodities that are considered high value, such as steel, iron ore, pig iron and fertilizer.

- Tow configurations for empty barges includes 45 barges versus 30 barges when fully laden. This effectively reduces the backhaul by one-third.

Table 5: U.S. Distribution of Soybeans from Barge Terminals

	Thousand Bushels	Average Distance (Miles)	Total Ton-Miles (Thousands)	Truck Ton-Miles (Thousands)	Rail Ton-Miles (Thousands)	Barge Ton-Miles (Thousands)
Barge Terminal	908,498	954	25,987,585	-	-	25,987,585
Crushing Plant	90,850	535	1,458,139	-	-	1,458,139
Export	817,648	1,000	24,529,446	-	-	24,529,446

Source: USDA, USACOE, USITC, Informa

- The journey from farm to crushing plant or export position requires soybeans to be handled 2.4 times, travel an average distance of 667 miles which amounts to 80 billion ton-miles, for the crop as shown in Table 6.
  - So, by mode, the average move from farm to market requires 74 miles by truck, 377 miles by rail, and 217 miles by barge.

Table 6: U.S. Soybean Distribution Summary for Farm to Crushing Plant or Export Position

	Thousand Bushels	Average Distance (Miles)	Total Ton-Miles (Thousands)	Truck Ton-Miles (Thousands)	Rail Ton-Miles (Thousands)	Barge Ton-Miles (Thousands)
Total	4,000,000	667	80,045,621	8,857,170	45,200,866	25,987,585
Harvest	4,000,000	26	3,072,450	3,072,450	-	-
On-Farm Storage	1,000,000	59	1,770,000	1,770,000	-	-
Country Elevator	2,400,000	66	4,723,200	4,014,720	708,480	-
Barge Terminal	908,498	954	25,987,585	-	-	25,987,585
Shuttle Elevator	1,121,400	1,323	44,492,386	-	44,492,386	-

Source: USDA, USACOE, USITC, Informa

- The crushing plants produce approximately 49 million short tons of soybean meal annually.
  - Utilizing Army Corps of Engineers *Waterborne Commerce of the United States* and the Surface Transportation Board's *Public Use Waybill* data for rail, 30 million tons of soybean meal are moved by barge and rail.
    - Barge moves 10%, rail moves 50% and the remaining 40% is moved by truck into local markets.

    - Crushing plant capabilities to load out varies by facility, but most soybean meal that is exported by barge is either loaded directly into the barge or is a short drive.
        - The crushing industry is an oligopoly, which allows companies to pick the most efficient route.
        - Local moves are within 200 miles because animal units and crusher gravitate towards each other.
  - Crushing plants receive approximately 15% of feedstocks by rail and 5% by barge. This translates into a 40% and 50% backhaul for meal rail and barge shipments, respectively.
  - Crushing plants are primarily located in production regions to take advantage of abundant soybean supplies.

Table 7: U.S. Crushing Plant Soybean Meal Marketing Pipeline

	Thousand Short Tons	Average Distance (Miles)	Total Ton-Miles (Thousands)	Truck Ton-Miles (Thousands)	Rail Ton-Miles (Thousands)	Barge Ton-Miles (Thousands)
Soybean Meal Production	49,453	42	2,052,320	2,015,229	37,090	-
Local	19,781	100	1,978,139	1,978,139	-	-
River Terminal	4,945	15	74,180	37,090	37,090	-
Rail Terminal	24,727	-	-	-	-	-

Source: USDA, USACOE, USITC, AAR, Informa

- Rail movements of soybean meal are 25% to export and 75% to domestic locations.
  - About 40% of rail exports are delivered to the Mexican and Canadian animal markets.
  - Domestic soybean meal is prominently sent towards the poultry and swine markets.
  - Ruminant animals have lower protein diets and soybean meal can be easily replaced in the feed ration by canola meal or distiller dried grains in dairy feed rations.
  - With animal feed consumption constant through the year, rail movements are more predictable and therefor easier to arrange a backhaul. The exception is the 60% of exports that leave North America. It is assumed that effectively two-thirds of rail movements have backhauls.

Table 8: U.S. Distribution of Soybean Meal by Rail to Market Position

	Thousand Short Tons	Average Distance (Miles)	Total Ton-Miles (Thousands)	Truck Ton-Miles (Thousands)	Rail Ton-Miles (Thousands)	Barge Ton-Miles (Thousands)
Rail	24,727	858	21,209,981	-	21,209,981	-
Domestic	18,545	773	14,333,474	-	14,333,474	-
Delta	4,636	590	2,735,396	-	2,735,396	-
East Coast	1,855	890	1,650,510	-	1,650,510	-
Southeast	3,709	600	2,225,407	-	2,225,407	-
Midwest	2,225	135	300,430	-	300,430	-
Southwest	3,338	890	2,970,918	-	2,970,918	-
West Coast	2,225	2,000	4,450,813	-	4,450,813	-
Export	6,182	1,112	6,876,507	-	6,876,507	-
Container	247	1,405	347,411	-	347,411	-
East Coast	1,484	890	1,320,408	-	1,320,408	-
PNW	1,855	1,700	3,152,660	-	3,152,660	-
Canada	1,360	430	584,787	-	584,787	-
Mexico	1,236	1,190	1,471,241	-	1,471,241	-

Source: USDA, USACOE, USITC, AAR, Informa

- The rail terminal at destination to end user is typically 0 miles to 150 miles and 100% is delivered by truck. The moves are programmed, which reduces the wait time to unload and allows soybean meal to be a backhaul. The backhaul moves are less expensive than deadhead moves, but are also longer distances, which offsets the savings from avoiding deadhead moves.

Table 9: U.S. Domestic Moves of Soybean Meal to Animal Operations or Feed Manufacturer

	Thousand Short Tons	Average Distance (Miles)	Total Ton-Miles (Thousands)	Truck Ton-Miles (Thousands)	Rail Ton-Miles (Thousands)	Barge Ton-Miles (Thousands)
Domestic	18,545	55	1,010,706	1,010,706	-	-
Delta	4,636	50	231,813	231,813	-	-
East Coast	1,855	50	92,725	92,725	-	-
Southeast	4,265	50	213,268	213,268	-	-
Midwest	2,225	25	55,635	55,635	-	-
Southwest	3,338	75	250,358	250,358	-	-
West Coast	2,225	75	166,906	166,906	-	-

Source: USDA, USACOE, USITC, AAR, Informa

- River terminals were assumed to handle soybean meal for export. Equipment flexibility allows greater backhaul opportunities for barge than rail. Additionally, tow configurations for empty barges is 45 barges versus 30 barges when fully laden. This effectively reduces the backhaul by one-third.

Table 10: U.S. Distribution of Soybean Meal from River Terminals

	Thousand Short Tons	Average Distance (Miles)	Total Ton-Miles (Thousands)	Truck Ton-Miles (Thousands)	Rail Ton-Miles (Thousands)	Barge Ton-Miles (Thousands)
River Terminal	4,945	1,000	4,945,348	-	-	4,945,348
Export	4,945	1,000	4,945,348	-	-	4,945,348

Source: USDA, USACOE, USITC, AAR, Informa

- The soybean meal journey from crushing plant to end user or export position requires it being handled twice, traveling an average distance of 591 miles, which amounts to 29 billion ton-miles as shown in Table 11.

- The average move from crushing plant to market requires 61 miles by truck, 430 miles by rail, and 100 miles by barge.

Table 11: U.S. Soybean Meal Distribution Summary to End User or Export Position

	Thousand Short Tons	Average Distance (Miles)	Total Ton-Miles (Thousands)	Truck Ton-Miles (Thousands)	Rail Ton-Miles (Thousands)	Barge Ton-Miles (Thousands)
Total	49,453	591	29,218,354	3,025,935	21,247,071	4,945,348
Crushing Plant	49,453	42	2,052,320	2,015,229	37,090	-
Barge Terminal	4,945	1,000	4,945,348	-	-	4,945,348
Rail	24,727	858	21,209,981	-	21,209,981	-
Domestic	18,545	55	1,010,706	1,010,706	-	-

Source: USDA, USACOE, USITC, AAR, Informa

- About 12 million short tons of soybean oil is produced annually with 90% shipped to a refiner and 10% exported as crude oil.
  - Crude oil is sometimes shipped to an adjacent building by pipeline, which is turned into an end product.
  - Refineries typically serve many functions, such as blending, hydrogenation, bottling, and of course refining. This requires vegetable oils to be shipped to a refinery, but because soybean oil is the largest, other vegetable oils make to longer journey. For example, canola oil is shipped to the Midwest to be blended with soybean oil for foodservice operations.

- Approximately 85% to 90% of U.S. soybean oil exports are crude.

Table 12: U.S. Distribution of Soybean Oil from Crushing Plants

	Thousand Short Tons	Average Distance (Miles)	Total Ton-Miles (Thousands)	Truck Ton-Miles (Thousands)	Rail Ton-Miles (Thousands)	Barge Ton-Miles (Thousands)
Soybean Oil Production	11,642	110	1,278,311	104,780	242,157	931,374
Refinery	10,478	10	104,780	104,780	-	-
Export	1,164	1,008	1,173,531	-	242,157	931,374
Center Gulf	931	1,000	931,374	-	-	931,374
Mexico	116	1,190	138,542	-	138,542	-
East Coast	116	890	103,615	-	103,615	-

Source: USDA, USACOE, USITC, AAR, Informa

- With manufacturing, the question always arises, "Is it less expensive to ship the product or the feedstocks?" In this case, should soybean oil be transported or have the manufacturing of finished goods near soybean oil source plants.

- With biodiesel, the economics of transporting biodiesel favors centralized production and shipping the product to the end user.
- Snack foods are in bags that are light and cube out before they weight out. So, the manufacturing tends to be located near the population centers.
- Retail and foodservice operations are also located near the population centers.

* Refined vegetable oil exports are shipped to Mexico and Canada.

* It is assumed the local moves are 100% truck.

Table 13: U.S. Soybean Oil Distribution from Vegetable Oil Refinery to End User

	Thousand Short Tons	Average Distance (Miles)	Total Ton-Miles (Thousands)	Truck Ton-Miles (Thousands)	Rail Ton-Miles (Thousands)	Barge Ton-Miles (Thousands)
Refinery	10,478	392	4,108,988	195,545	3,829,662	79,632
Biodiesel	2,410	80	192,794	48,199	144,596	-
Local	1,928	25	48,199	48,199	-	-
Rail	482	300	144,596	-	144,596	-
Manufacturing	4,191	469	1,964,617	78,585	1,886,032	-
Local	1,048	75	78,585	78,585	-	-
Rail	3,143	600	1,886,032	-	1,886,032	-
Foodservice	2,096	469	982,308	39,292	943,016	-
Local	524	75	39,292	39,292	-	-
Rail	1,572	600	943,016	-	943,016	-
Retail	1,572	469	736,731	29,469	707,262	-
Local	393	75	29,469	29,469	-	-
Rail	1,179	600	707,262	-	707,262	-
Export	210	1,110	232,537	-	148,756	79,632
Center Gulf	84	1,000	83,824	-	42	79,632
Mexico	52	1,190	62,344	-	62,344	-
Canada	31	1,191	37,438	-	37,438	-
West Coast	10	2,000	20,956	-	20,956	-
East Coast	31	890	27,976	-	27,976	-

Source: USDA, USACOE, USITC, AAR, Informa

- The soybean oil journey from crushing plant to end user or export position requires it being handled 1.9 times, traveling an average distance of 463 miles, which amounts to 5 billion ton-miles as shown in Table 14.
- The average move from crushing plant to market requires 26 miles by truck, 350 miles by rail, and 87 miles by barge.

Table 14: U.S. Distribution of Soybean Oil from Crushing Plant to End User or Export Position

	Thousand Short Tons	Average Distance (Miles)	Total Ton-Miles (Thousands)	Truck Ton-Miles (Thousands)	Rail Ton-Miles (Thousands)	Barge Ton-Miles (Thousands)
Total	11,642	463	5,387,299	300,324	4,071,819	1,011,006
Crushing Plant	11,642	110	1,278,311	104,780	242,157	931,374
Refinery	10,478	392	4,108,988	195,545	3,829,662	79,632

Source: USDA, USACOE, USITC, AAR, Informa

- Assuming soybean meal and soybean oil are a continuation of the soybean, the average distance traveled to an end user or export position is 955 miles. Truck accounts for 101 miles, rail 588 and barge 266.
- Transporting soybeans requires an average move of 667 miles, soybean meal requires 591 miles and soybean oil requires 463 miles.
- Soybeans account for approximately 70% of the ton-miles while the soybean products account for remaining 30%.

Table 15: U.S. Distribution of Combined Soybean and Soybean Products by Mode

	Thousand Short Tons	Average Distance (Miles)	Total Ton-Miles (Thousands)	Truck Ton-Miles (Thousands)	Rail Ton-Miles (Thousands)	Barge Ton-Miles (Thousands)
Total	120,000	955	114,651,275	12,183,429	70,519,756	31,943,940
Soybean	120,000	667	80,045,621	8,857,170	45,200,866	25,987,585
Soybean Meal	49,453	591	29,218,354	3,025,935	21,247,071	4,945,348
Soybean Oil	11,642	463	5,387,299	300,324	4,071,819	1,011,006

Source: USDA, USACOE, USITC, AAR, Informa

- When accounting for the soybean moves as to crushing plant or export, the average distance is 700 miles and 1,227 mile, respectively.

  - The average move from farm through crushing plant to market position requires 135 miles by truck, 445 miles by rail, and 120 miles by barge.
  - The average move from farm to export position requires 66 miles by truck, 740 miles by rail, and 421 miles by barge.

- The soybeans for export are primarily loaded into an ocean going vessel at the Center Gulf and PNW.
  - Soybeans exported off the West Coast are destined for Asia.
  - Center Gulf soybean exports are primarily shipped to Europe and Asia.
    - Sixty-four percent of Center Gulf soybean exports transit the Panama Canal.
  - East Coast and Great Lakes exports are to Canada and Europe.

Table 16: U.S. Distribution of Combined Soybean and Soybean Products to End User by Mode

	Thousand Bushels	Average Distance (Miles)	Total Ton-Miles (Thousands)	Truck Ton-Miles (Thousands)	Rail Ton-Miles (Thousands)	Barge Ton-Miles (Thousands)
Total	4,000,000	955	114,651,275	12,183,429	70,519,756	31,943,940
Crushing Plant	2,060,562	700	43,255,270	8,365,923	27,470,703	7,414,494
Soybean	2,060,562	140	8,649,617	5,039,664	2,151,814	1,458,139
Soybean Meal	1,648,449	591	29,218,354	3,025,935	21,247,071	4,945,348
Soybean Oil	388,072	463	5,387,299	300,324	4,071,819	1,011,006
Exports	1,939,438	1,227	71,396,004	3,817,506	43,049,052	24,529,446

Source: USDA, USACOE, USITC, AAR, Informa

III. Baseline Crop and Livestock Outlook

This section includes Informa's baseline assumptions, upon which is built the company's long term grain and soybean supply and demand outlook through 2023. The next ten years will feature relatively higher commodity prices, increasing biodiesel mandate, a capping of the ethanol mandate, steady animal markets and China corn imports.

- Commodity prices are expected to remain at historically high levels for the next decade. Total planted acreage has declined to about 316 million acres in 2011 from just over 366 million acres in 1982. Informa does not expect higher commodity prices to increase total land acreage, but will shift acres between competing crops.

- Although it is no longer the dominant feedstock, usage of soybean oil in biodiesel production is forecast to continue to increase steadily, reaching 6.4 billion pounds in 2030/31. During the latter part of the forecast period, biodiesel would account for 25% to 27% of total domestic use of soybean oil.
    - Soybean oil usage in biodiesel production has more than tripled over the last decade, to a forecast 5.1 billion pounds in 2014/15. Soybean oil formerly accounted for a large majority of the feedstock used in biodiesel production, but over the last five years its share has declined to around 50%. This is due to technology adoption (the capability of some biodiesel facilities to use multiple feedstocks and some ethanol facilities to extract DCO) and the qualification of an expanded slate of products toward RFS2 and the LCFS.
    - Within RFS2, a minimum of 1 billion gallons (gal) of biomass-based diesel must be consumed in the U.S. annually. The EPA increased the renewable volume obligation (RVO) to 1.28 billion gallons in 2013 but failed to issue RVOs for all RFS2 standards in 2014. In May 2015, the EPA proposed biomass-based diesel RVOs retroactive to 2014 and going forward to 2017. The proposal was for the RVO to be set at 1.63 billion gal in calendar year 2014, 1.70 billion gal in 2015, 1.80 billion gal in 2016 and 1.90 billion gal in 2017.
    - It is assumed for this analysis that the finalized RVOs for biomass-based diesel will be set at levels roughly consistent with the proposed requirements, and that only incremental growth in the biomass-based diesel standard will be required after 2017, with the required volume reaching 2.4 billion gal by 2026. It is also assumed that a moderate volume of biodiesel and renewable diesel beyond the biomass-based diesel mandate will be used to meet the advanced biofuel standard, as the effective allocation to undifferentiated advanced biodiesel increases from the proposed 490 million ethanol-equivalent gallons in 2016 to 750 million ethanol-equivalent gallons in 2026.

- If the EPA is more aggressive in setting the advanced biofuel standard, and with the total renewable fuel standard in the future, this would present an upside risk to prices in the forecast. On the other hand, if there is congressional action to reform the RFS, it is possible that one or more statutory standards will be lowered, presenting a downside risk. (Repeal of RFS2 would lead to further downside.)

- U.S. mandated corn based ethanol production is not expected to expand beyond 2015 as it had the previous eight years. Ethanol capacity for corn based production is expected to crest at approximately 15 billion gallons per year. As corn yields increase corn production will expand, and as less additional corn will be used for ethanol, more corn will be available to the feeding and export markets. This situation will create an opportunity for China to import more corn without severely impacting the market.

- The higher cost of feed ingredients has reduced the size of herds and flocks. However, Informa expects animal numbers to increase with a growing world population and exports.

- China's increased use of soybeans, and subsequent higher levels of imports have been a major feature of U.S. agriculture the last five years. Crop year 2011, China corn imports are forecast to expand to four million metric tons (MT) and to 7.2 million MT in 2012/13. Informa expects China to remain a modest net importer of corn over the next decade, while other forecasters expect rapidly expanding imports. This difference in opinion plays a major role in the relative crop price forecasts and ultimately what crops are planted, which impacts production.

A. Macro-Economic Outlook

1. U.S.

- The U.S. economy through the Gross Domestic Product (GDP) grew at an annual rate of 3.9% in the second quarter of 2015 and at 1.5% for the first report of the third quarter. The second assessment put GDP at 2.1%.
  - Econometric models continue to forecast a strengthening economy as shown in Table 17. Econometric models assume past behavior reflects future behavior.
    - The issue is saving rates increased and spending rates decreased versus history. The reasons for the departure from history are by policies that limit access to cash, such as new laws on home equity loans, and less faith in the overall health of the economy.
    - Informa believes, like the previous six years, the annual growth in GDP will be forecast above 3% but likely will be in the 2.5% area. The reason is new job entrants are driving spending to prevent a recession, but existing job holders are not experiencing an increase in disposable income that is needed to drive GDP growth above 3%.

Table 17: U.S. Macroeconomic Outlook

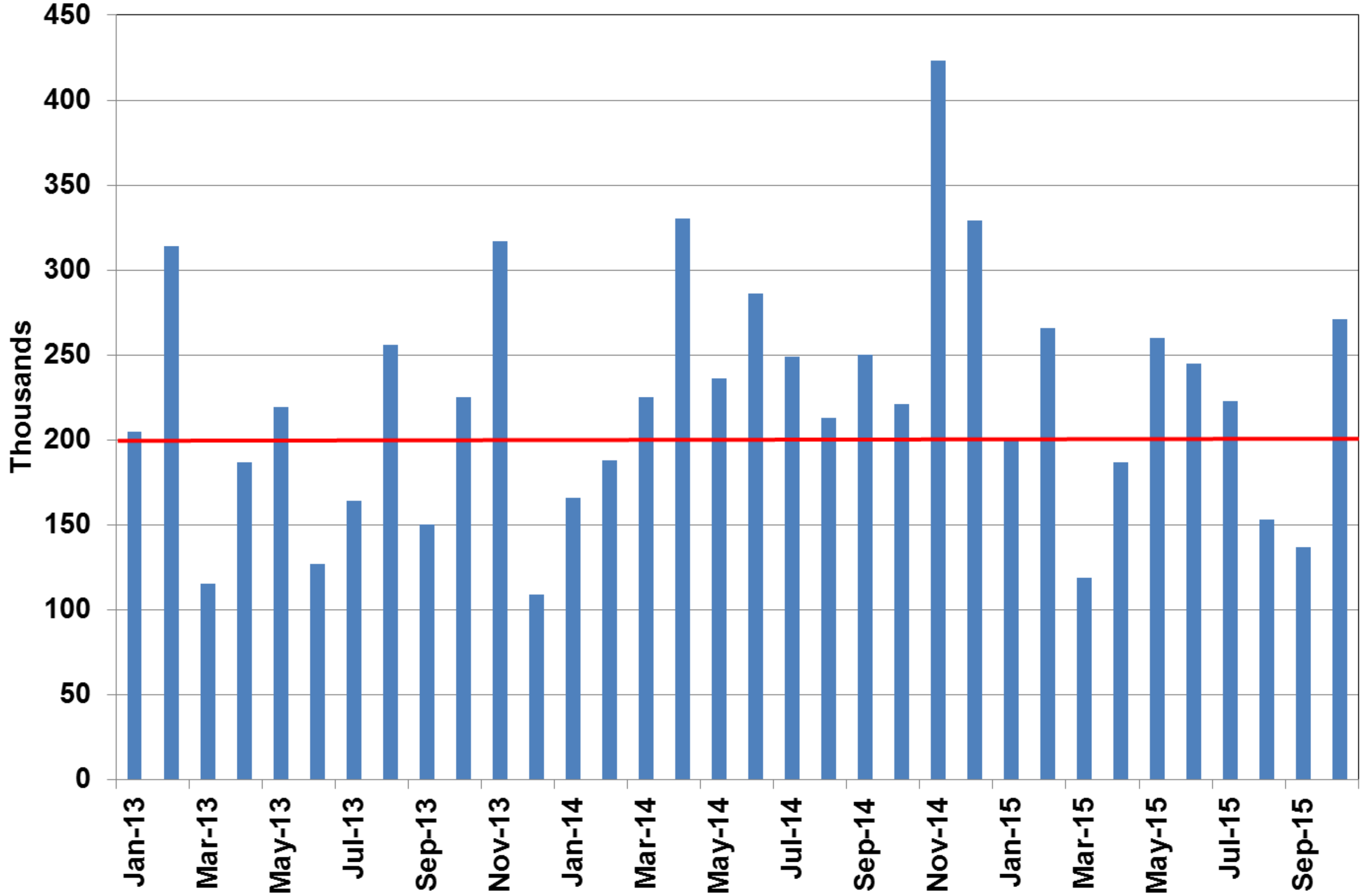
	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Economy															
Gross Domestic Product (GDP)															
Bils. Chain 2000 $'s	11,840.70	12,263.80	12,638.38	12,976.25	13,254.10	13,228.90	12,703.10	13,063.00	13,299.10	15,470.70	15,761.30	15,961.70	16,356.20	16,870.50	17,500.40
Ann. % Chg	2.49	3.57	3.05	2.67	2.10	-	(3.50)	2.40	1.80	2.80	1.90	2.40	2.50	3.10	3.70
% Chg. Yr. Over Yr.	4.00	3.40	2.90	2.60	2.50	(2.80)	(0.50)	2.40	2.00	2.00	2.60	2.50	2.30	3.40	3.50
Consumption	7,306.50	7,577.10	7,803.60	8,044.10	9,314.00	9,265.00	9,037.50	9,196.20	9,428.80	10,517.60	10,727.90	10,875.70	11,218.90	11,562.80	11,937.20
Ann. % Chg	2.90	3.90	3.20	3.10	2.70	(0.30)	(1.90)	1.80	2.50	2.20	2.00	2.70	3.20	3.10	3.20
Bus. Fixed Invest	1,085.00	1,145.80	1,225.80	1,306.80	1,544.20	1,556.60	1,263.20	1,268.50	1,378.20	1,931.80	1,984.40	2,148.30	2,220.20	2,366.70	2,559.60
Ann. % Chg.	1.30	5.90	7.10	6.60	6.20	0.30	(17.90)	0.70	8.60	7.30	2.70	6.20	3.30	6.60	8.20
Res. Const	509.40	559.90	597.10	569.50	585.00	444.20	345.60	332.20	327.60	433.80	486.60	486.40	527.70	555.00	592.80
Inven. Invest.	15.50	53.40	33.20	40.30	19.50	(37.60)	(145.00)	50.90	31.00	57.60	81.60	68.00	87.10	68.30	74.60
Net Exports	(521.40)	(590.90)	(618.00)	(624.50)	(647.70)	(504.10)	(358.80)	(419.70)	(408.00)	(430.80)	(412.30)	(442.50)	(539.90)	(551.90)	(559.10)
Fed. Govt.	687.80	716.60	726.30	742.20	906.40	971.80	1,029.50	1,076.80	1,047.00	1,220.30	1,157.40	1,116.30	1,110.40	1,108.90	1,113.20
Ann % Chg.	6.90	4.30	1.40	2.20	1.30	7.30	6.00	4.50	(2.80)	(1.40)	(5.20)	(2.40)	(0.50)	(0.10)	0.40
State and Local govt.	1,223.30	1,223.90	1,219.60	1,239.00	1,536.70	1,532.60	1,514.20	1,534.10	1,482.00	1,742.80	1,739.20	1,720.80	1,747.00	1,777.10	1,798.40
Ann % Chg.	0.60	0.50	(0.40)	1.60	2.00	0.30	(0.90)	(1.80)	(3.40)	(0.70)	(0.20)	0.60	1.50	1.70	1.20
Fed. Bdgt. Surpl.															
Unified (Qtry. Rate, NSA, FY)	(374.30)	(412.80)	(318.70)	(248.20)	(161.50)	(454.80)	(1,413.80)	(1,294.20)	(1,299.30)	(1,089.20)	(680.20)	(483.40)	(487.40)	(410.90)	(390.90)
Trade Bal., Gds, & Servs. - Bils. $/s	(494.80)	(611.30)	(711.60)	(753.30)	(701.40)	(698.80)	(374.90)	(494.70)	(559.90)	(547.00)	(534.00)	(530.00)	(526.00)	(522.00)	(518.00)
Vehicles, Housing, Production															
Vehicle Sales (Mils. Units)	16.70	16.90	16.90	16.50	16.10	13.10	10.30	11.60	12.70	14.40	15.50	16.40	17.40	18.10	18.30
Autos - Total (Mils. Units)	7.60	7.50	7.70	7.80	7.60	6.70	5.50	5.70	6.20	7.20	7.60	7.70	7.50	7.80	8.60
Light Trucks (Mils. Units)	9.00	9.40	9.30	8.70	8.50	6.30	4.90	5.80	6.50	7.20	7.90	8.70	9.80	10.30	9.70
Hous. Starts (Mils. Units)	1.85	1.95	2.07	1.81	1.34	0.90	0.55	0.59	0.61	0.78	0.93	1.00	1.14	1.33	1.43
Indus. Prod. (1997 =1.000)	1.01	1.04	1.07	1.10	1.11	1.09	0.86	0.90	0.94	0.97	1.00	1.06	1.07	1.11	1.14
Ann. % Chg.	0.60	2.50	3.30	2.20	1.50	(2.20)	(11.20)	5.40	4.10	3.80	2.90	3.70	1.60	2.80	3.40
Inflation and Wages															
GDP Price Defl. (% Chg.)	2.00	2.80	3.20	3.20	2.90	2.20	1.10	1.30	2.10	1.70	1.40	1.60	1.00	2.00	2.20
PCE Price Defl. (% Chg.)	1.90	2.60	2.90	2.90	2.70	3.30	0.20	1.90	2.40	1.80	1.10	1.40	0.30	1.70	2.20
PCE Core Price Defl. (% Chg.)			2.10	2.30	2.40	2.30	1.60	1.50	1.40	1.80	1.20	1.50	1.30	1.90	2.10
CPI-All Urban (% Chg.)	2.30	2.70	3.40	3.20	2.90	3.80	(0.30)	1.60	3.10	2.10	1.50	1.60	0.20	1.90	2.50
PPI-Fin Goods (%Chg.)	3.20	3.60	4.90	3.00	3.90	6.40	(2.50)	4.20	6.00	1.90	1.20	1.90	(2.70)	2.30	2.50
Hrly. Comp. (% Chg.)	4.00	3.60	4.00	3.90	4.20	3.10	2.00	1.90	2.60	2.60	1.60	2.70	2.40	3.70	4.00
Unemployment Rate (%)	6.00	5.50	5.10	4.60	4.60	5.80	9.30	9.60	9.00	8.10	7.40	6.20	5.30	4.60	4.30
Unit Labor Costs (% Chg.)	0.20	0.60	2.00	2.90	2.30	1.00	(0.70)	(1.10)	1.90	1.20	1.10	2.00	1.40	0.80	1.00
Productivity Growth (% Chg.)	3.80	3.00	1.90	1.00	1.90	2.10	2.30	3.10	0.70	1.50	0.50	0.70	1.00	3.00	2.90
Interest Rates (%)															
Fed. Funds	1.12	1.34	3.20	4.96	4.93	1.75	0.17	0.18	0.11	0.15	0.11	0.09	0.13	0.75	1.82
3-Mos Treas.	1.02	1.38	3.20	4.84	4.46	1.37	0.14	0.13	0.05	0.08	0.06	0.03	0.04	0.64	1.70
2-Year Treas	1.63	2.36	3.84	4.81	4.35	1.99	0.94	0.69	0.44	0.26	0.30	0.45	0.65	1.42	2.18
Prime	4.12	4.33	6.19	7.94	8.05	5.08	3.25	3.25	3.25	3.25	3.25	3.25	3.23	3.75	4.82
10-Yr. Treas	4.00	4.26	4.28	4.79	4.63	3.62	3.24	3.20	2.77	1.79	2.34	2.53	2.13	2.79	3.53
30-Yr. Treas	4.92	5.03	4.57	4.87	4.84	4.27	4.06	4.25	3.91	2.92	3.45	3.34	2.85	3.40	4.05

Source: Decision Economics

- The U.S. economy is expected to continue its path of slow growth as the labor market slowly improves.
- A deterrent to more robust near term GDP growth is slack a labor market with stagnate worker compensation.
  - The slack is diminishing slightly but occurring slower than what required to generate strong growth.

    - There are indicators suggesting the labor market has run its short term cycle of improvement in the current business cycle.
  - Monthly employment situation reports that were becoming more encouraging have fallen below unofficial target for employment gains expected for a healthy employment market of 200,000 additions per month.
    - Though the October 2015 report was much better than expected sharp revisions lower to the previous two months take the sheen off the October report.
  - A data driven Federal Reserve wants better consistency in the employment numbers than has been recently observed.

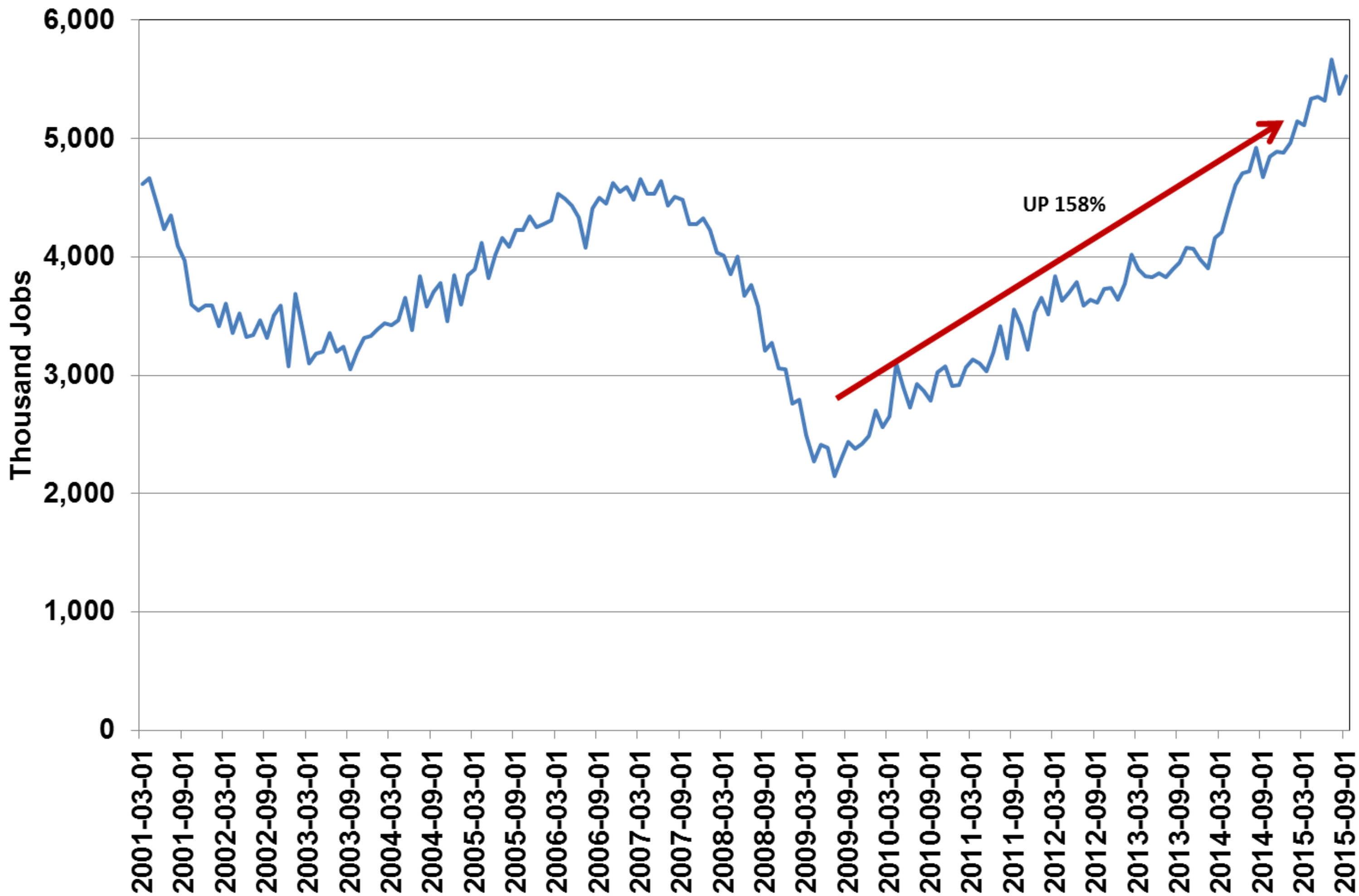
Figure 2: Nonfarm Payroll Monthly Change



Source: BLS

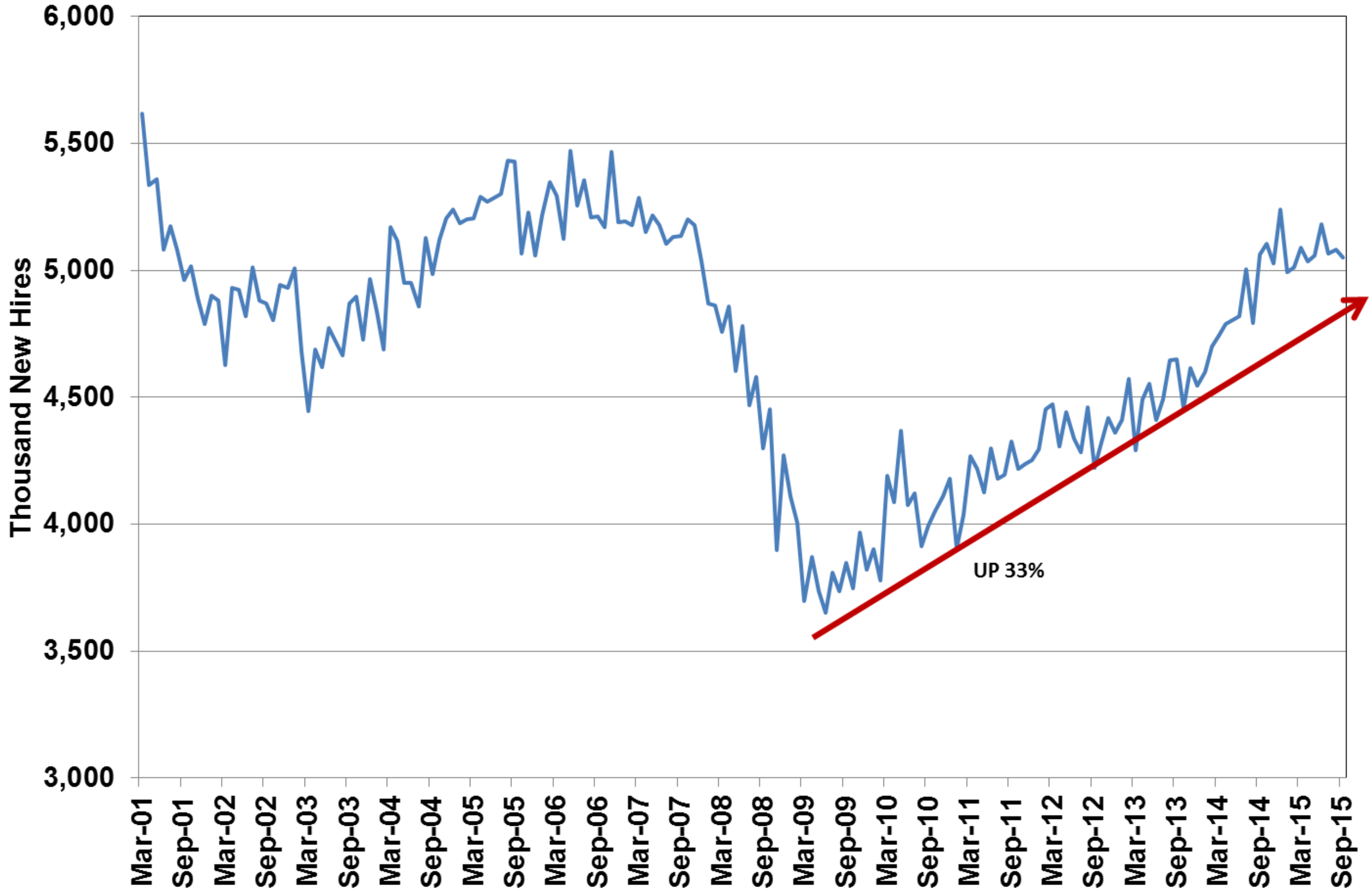
- Jobs openings have increased sharply but the ratio of hiring to job openings has dropped sharply implying an increase of wages would be in order. The openings demonstrated in Figure 3 through Figure 7 are compared to July 2009. However, the expected increase in wages as described above has not yet occurred.

Figure 3: Job Openings (annualized)



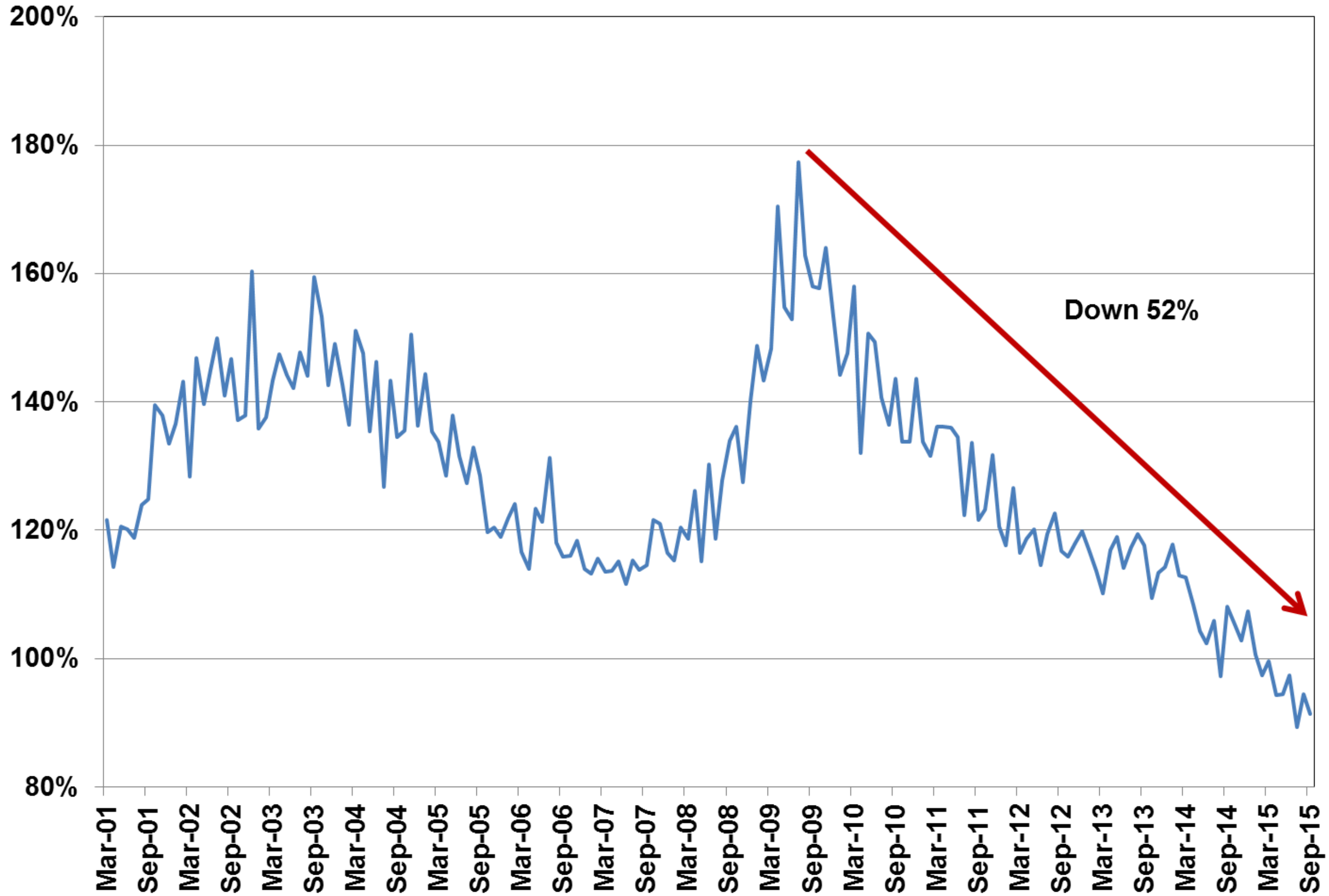
Source: BLS

Figure 4: New Hires (annualized)



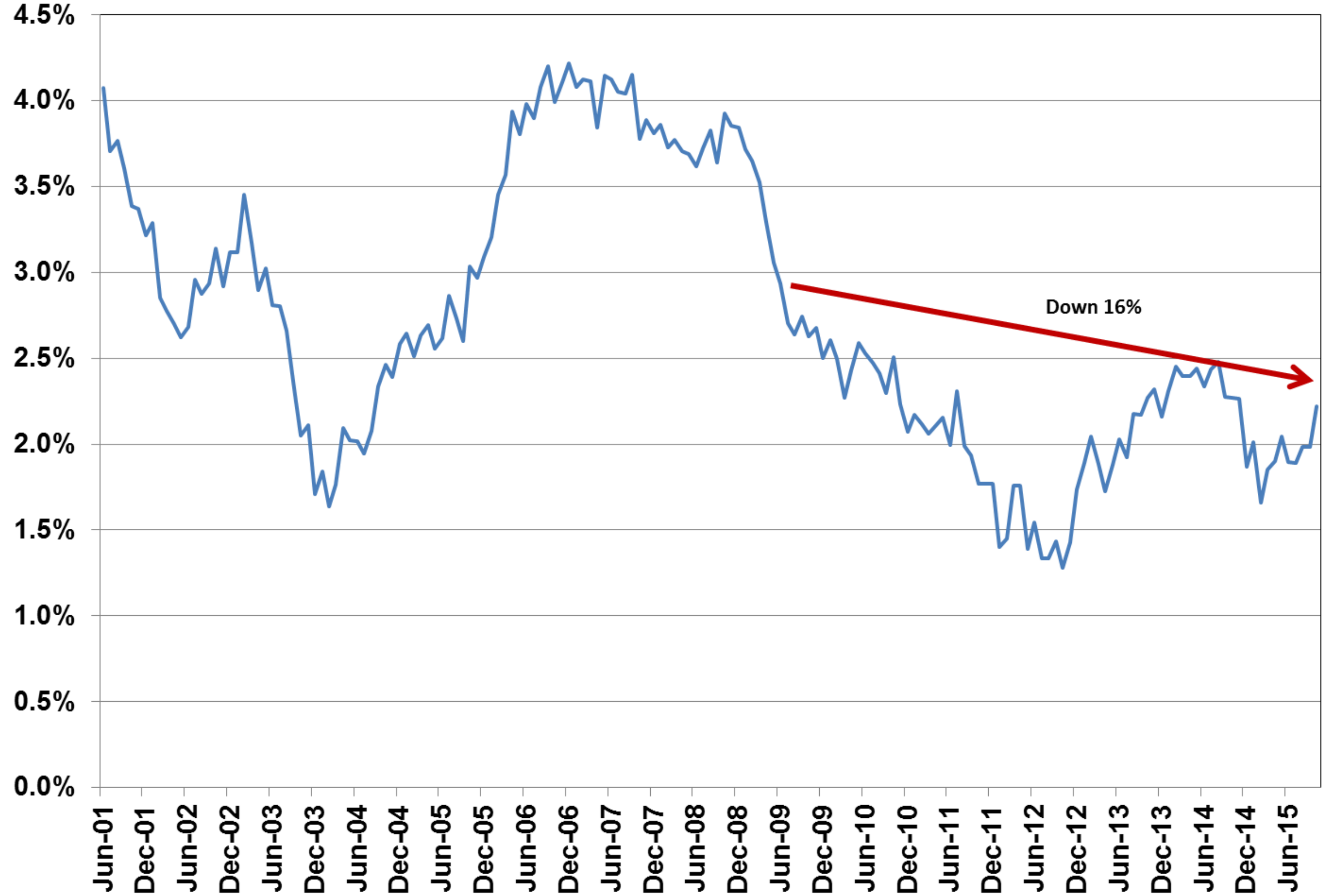
Source: BLS

Figure 5: New Hires to Job Openings Ratio



Source: BLS

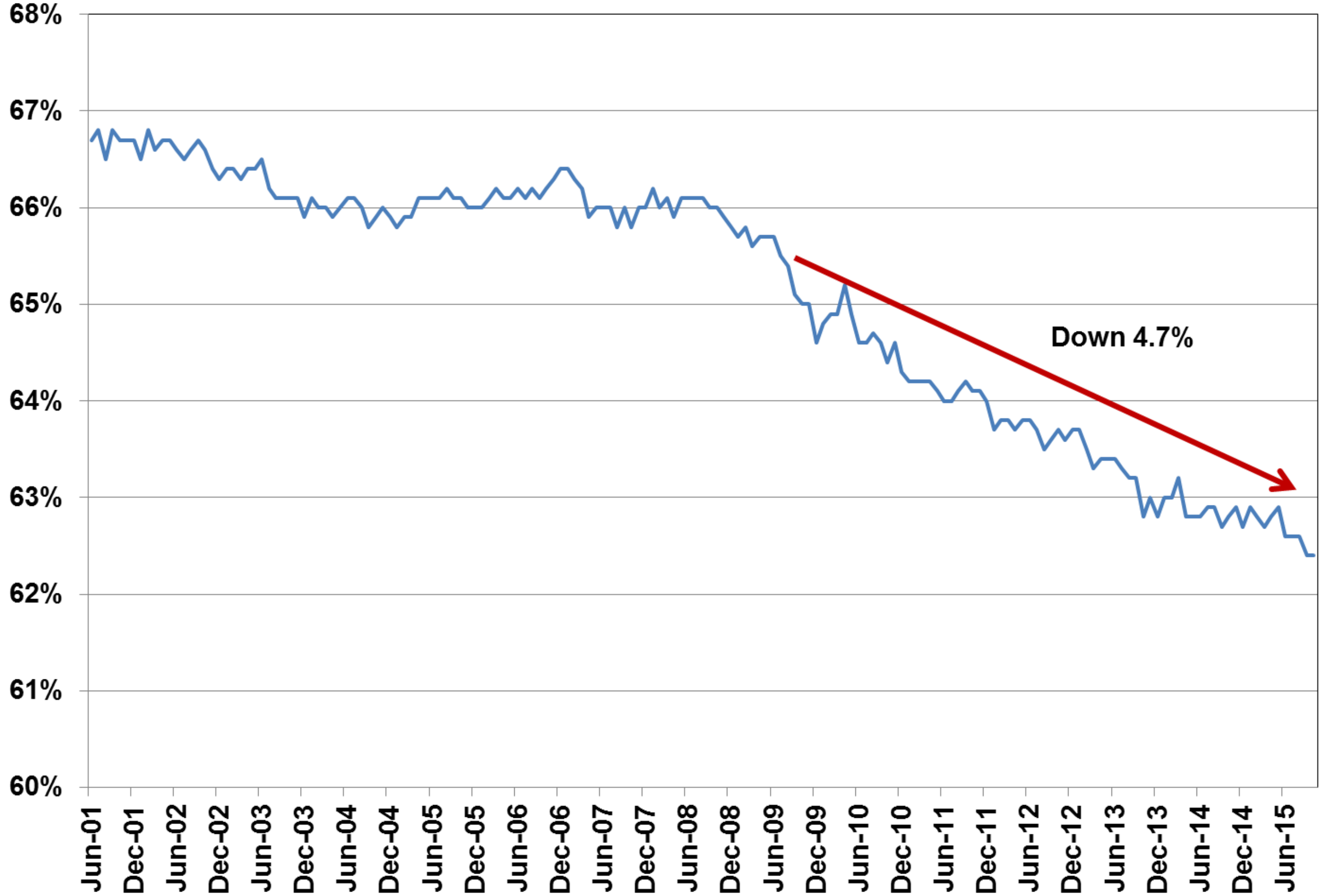
Figure 6: Year-over-Year Percentage Wage Increase



Source: BLS

- A negative feature for the labor market is the low participation rate. As the slack in the labor market declines the participation rate should increase therefore relieving some pressure on labor costs.

Figure 7: Labor Participation Rate

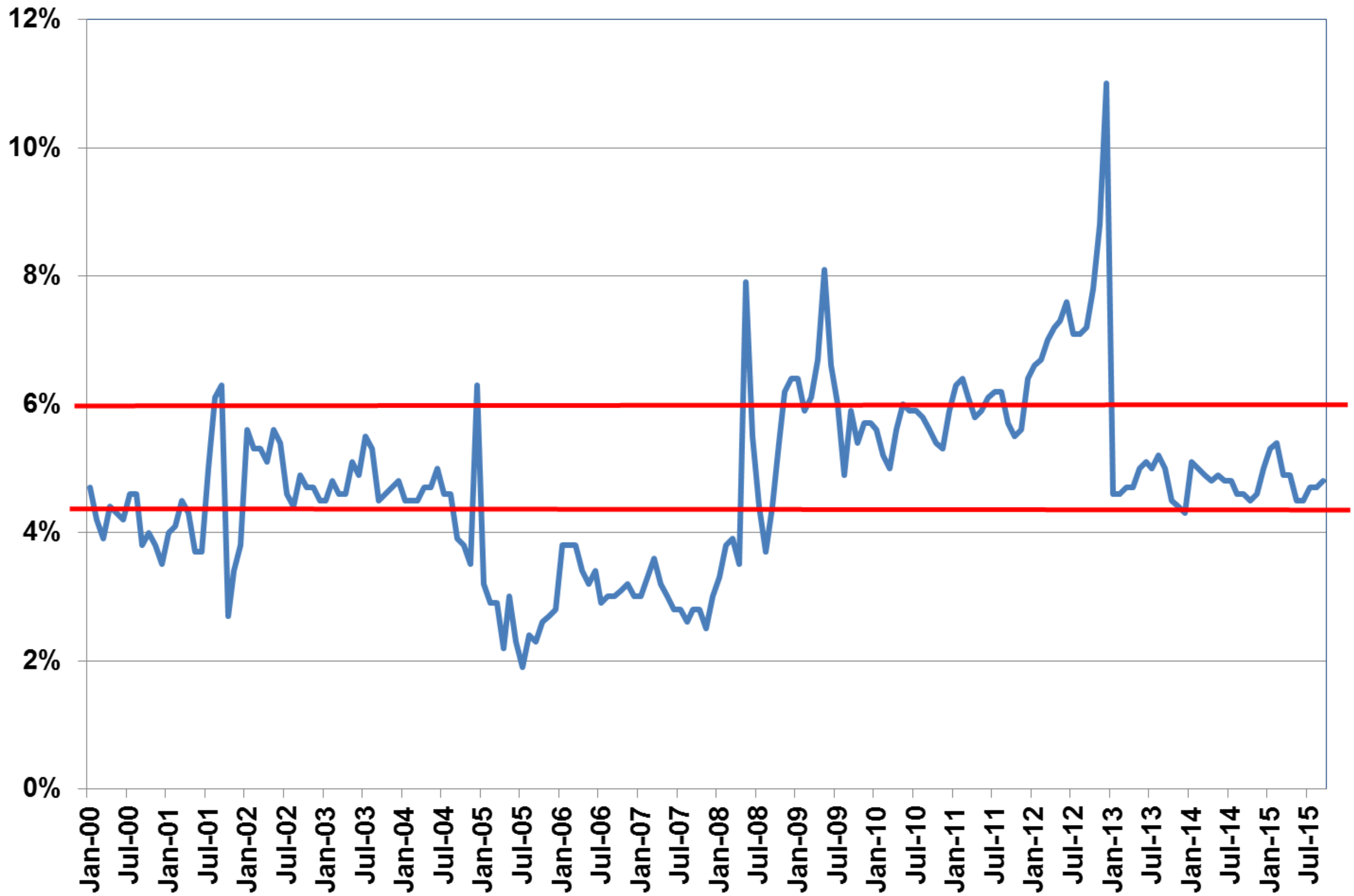


Source: BLS

- Consumer spending accounts for about 69% of U.S. GDP. Stagnant income growth and slow household formation, despite the current low interest rates, keeps a ceiling on U.S. growth prospects.

- The saving rate has fallen to about the median level in the early 2000s.

Figure 8: Personal Savings Rate



Source: BLS

- The stronger U.S. dollar has impeded growth with exports suffering amid a slowing global economy.

- Slower growth in China, the world's recent economic engine, and recessions in Brazil, Japan, and Russia will continue to support the U.S. dollar. Japan's recession is now the fifth in the past seven years.
- Emerging economies continue to show meager growth as trade with China slows along with the cooling Chinese GDP.
- The strong U.S. dollar, though not the only factor, has been particularly brutal on international trade taking quite a divot out of U.S. and selected emerging market GDP.

- The overriding U.S. economic factor is the timing on when short term interest rates will be increased. One of many problems associated with the current low interest rates in the current situation is that the economic expansionary cycle is, from a historic perspective, reaching its end.
  - Traditionally the Federal Reserve has reduced the short term interest rate to provide a lift to an economy that is in this stage of the cycle.
    - The options become more limited for the Federal Reserve if rates are already at zero.

- If the Federal Reserve decides to raise the short term rates even a quarter percent, which is the defacto level presumed almost universally, there is some concern of the impact on the U.S. economy.
  - Traditionally, the increase in interest rates will result in a stronger U.S. dollar. However, the dollar has already appreciated on the weakness of the European and consequently other foreign currencies.
  - Exports have already been impacted by the stronger U.S. dollar and imports have not shown the typical increase associated with the strong U.S. dollar increase due, in large part, to lower energy prices and relatively weak U.S. consumer demand.

2. World

- The World economy continues to be burdened by debt and government actions to limit the negative impact of the debt problems. Several European banks have taken the unusual step of implementing negative interest rates. That is depositors are required to pay the bank for the service of keeping money in the bank.

- The U.S. expected increase in the short term interest rate in December may cause quite a ripple in the global economy.

- The EU is expected to establish more Quantitative Easing (QE) actions but at this point the form of action is uncertain.

- China is expected to devalue its currency in the near term as its economy continues to underperform and competition from other countries, notably Japan leaves China little choice with the chronically strong U.S. dollar. The Chinese currency trades in rather tight band tied, in large degree, to the U.S. dollar.

- The Middle East countries are beginning to feel domestic financial problems with the low prices for crude oil. Oversupplies of crude oil largely the result of increased production in the U.S. and OPEC action led by Saudi Arabia to force high cost producers out of the market. There some concern that the potential for civil unrest is higher if the crude oil price remains low and country coffers continue to be negatively impacted.

- Global commodity prices have declined sharply largely a result of China's economic slowdown and have reduced GDP for resource rich exporters. Many emerging markets are dependent on commodity exports so those countries are suffering. This commodity price decline has been defined by some as deflation and has created a bit more dismal outlook than may be warranted.

Figure 9: Commodity Research Bureau (CRB) Spot Index

B. Baseline Crop Assumptions

This section includes the Informa baseline assumptions for stocks, area, and supply and demand outlook. These baseline assumptions are the foundation for the projections.

- Open trade policies continue that allow countries to import and export.

- U.S. renewable fuels standard will not be repealed or changed significantly for the current policy. Informa recognizes the EPA has the discretion to lower the ethanol mandate. Informa assumes as the economy continues to grow, the ethanol mandate will be fully restored.

- China's appetite for oilseeds is driving the switching of acres from corn to soybeans in the U.S.

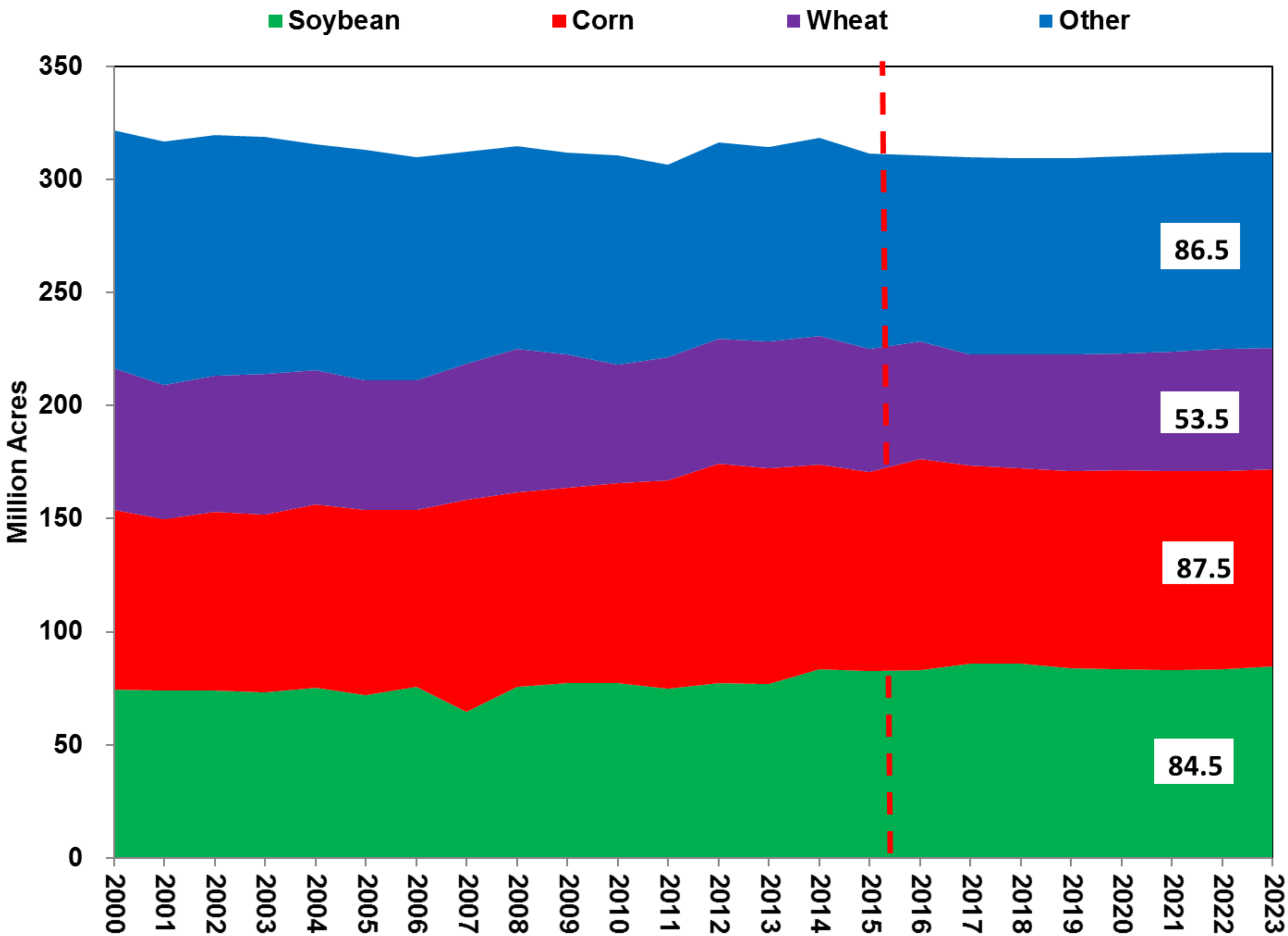
- Cotton is expected to continue to lose acreage to corn and soybeans.

- Brazil has available crop acreage not currently in production.

- Southern Africa has social issues that will limit the expansion of corn production within the next ten years.

- Argentina and Brazilian farmers export crops out of the country quickly because:
    - Lack of adequate storage;
    - Lower hedging opportunities; and
    - Political risk involving policy.

Figure 10: U.S. Planted Acreage



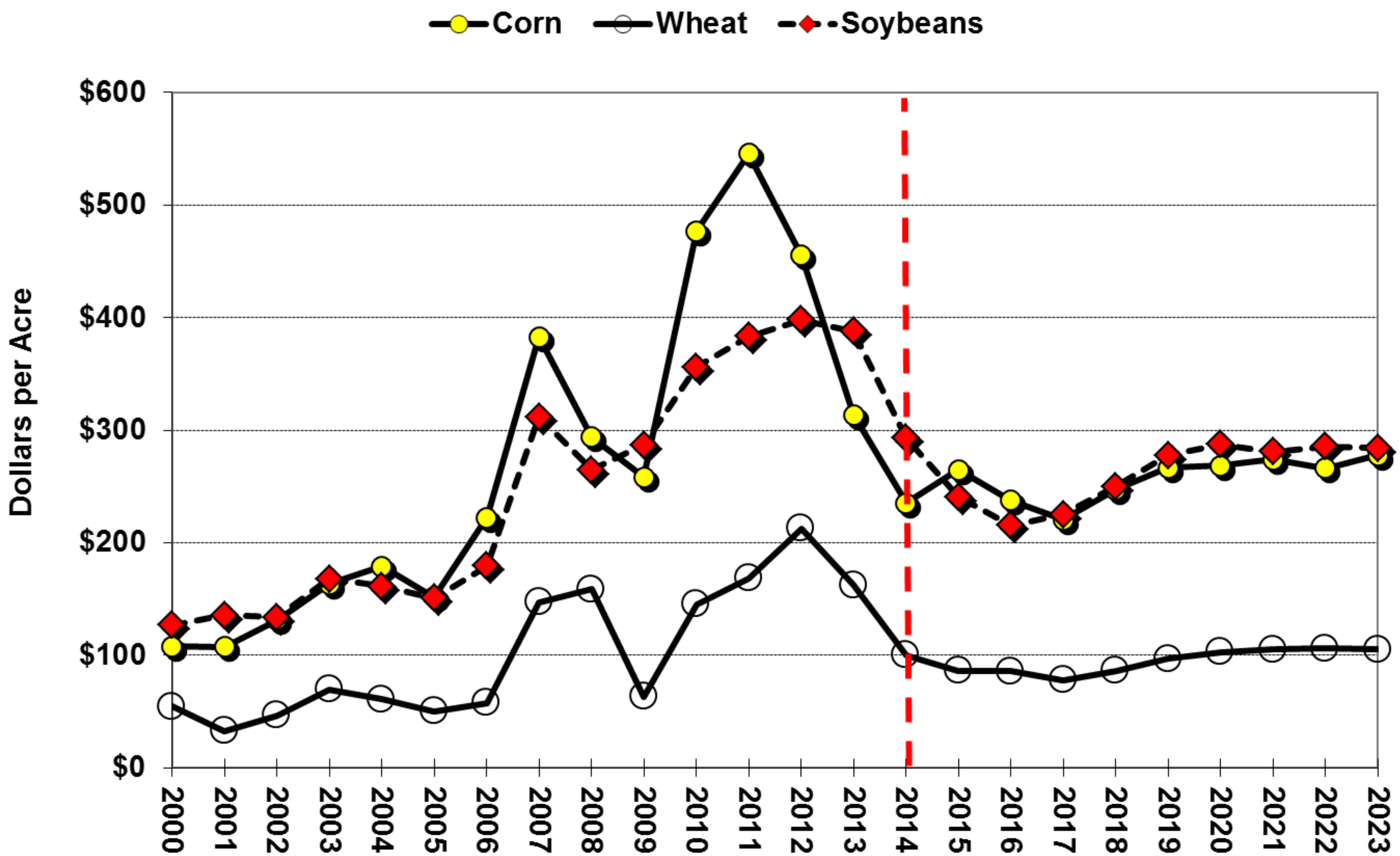
Source: USDA (History) and Informa (Forecast)

1. Informa Crop Balance Sheets

- Informa's crop balance sheets were derived from a dataset that includes detailed supply and demand situation and outlook for each individual grain and oilseed crop by country, and relative net returns to the farmer as shown in Figure 11.
    - Trade is based on production surplus or deficit for a particular crop. For example, if the relative crop prices encourage the farmer to plant more corn in Argentina, then Argentina will have more corn to export or build ending stocks.
    - Prices will reach a level to increase consumption and decrease production, or decrease consumption or increase production.
    - The advantage of this methodology is that it provides constraints to the forecasts and establishes a methodology that continuously adjusts the market projections toward a state of equilibrium.

- Throughout the forecast, farmers in the U.S. will be rewarded to plant soybeans over corn and wheat acres will decline.

Figure 11: U.S. Major Crop Aggregate Net Revenue



Source: USDA (History) and Informa (Forecast)

a) CORN

- U.S. planted corn acreage is expected to decline to 86 million acres in 2023, as shown in Figure 12.
- By the 2023 crop year, U.S. corn yields are expected to reach 187 bushels per acre, up 9% from 171 in 2014.

- U.S. corn production is expected to average 14.4 billion bushels over the forecast period.
- Feed use is expected to increase by 653 million bushels over the forecast period to 5,970 million in 2023, while ethanol consumption is unchanged.
- Over the next ten years, U.S. corn exports are expected to increase 411 million bushels to 2,275 million in 2023.

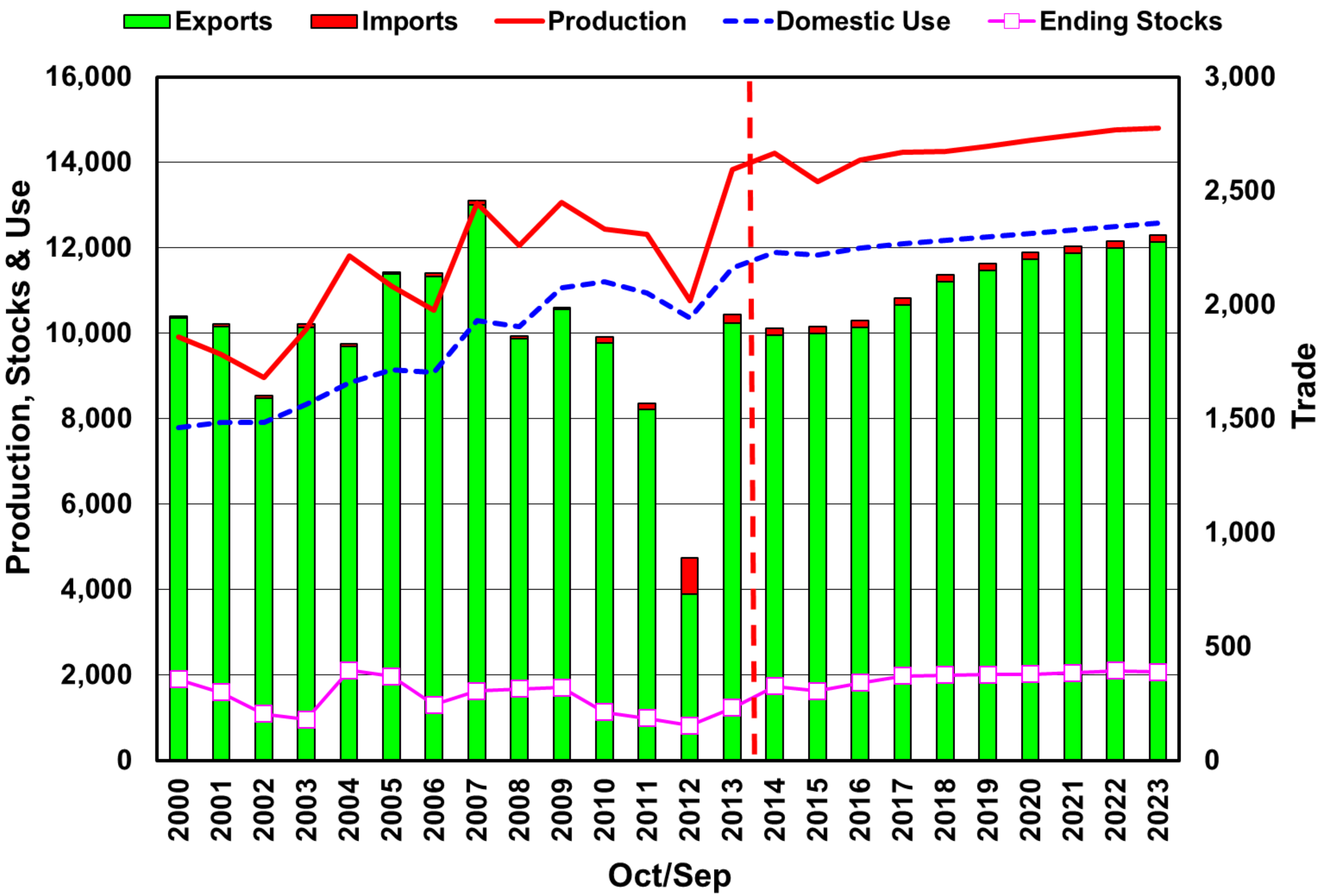
(1) ETHANOL

- U.S. ethanol mandate for corn based ethanol peaked at a level of 15 billion gallons in 2015 (or the equivalent of 5.2 billion bushels of corn).
- The vast majority of ethanol imports are produced from sugarcane in Brazil.

(2) DISTILLERS DRIED GRAINS WITH SOLUBLES (DDGS)

- DDGS is a co-product of the ethanol manufacturing process. It is a highly valued component of livestock feed rations.
- U.S. DDGS production is expected to reach 46.5 million tons in 2015.
- While Chinese corn imports are limited by internal policy, and currently U.S. DDGS exports to China are also limited.
- Since 2015, DDGS production is remained steady, consistent with corn consumed for ethanol production being capped.

Figure 12: U.S. Corn Supply and Demand (million bushels)



Source: USDA and Informa

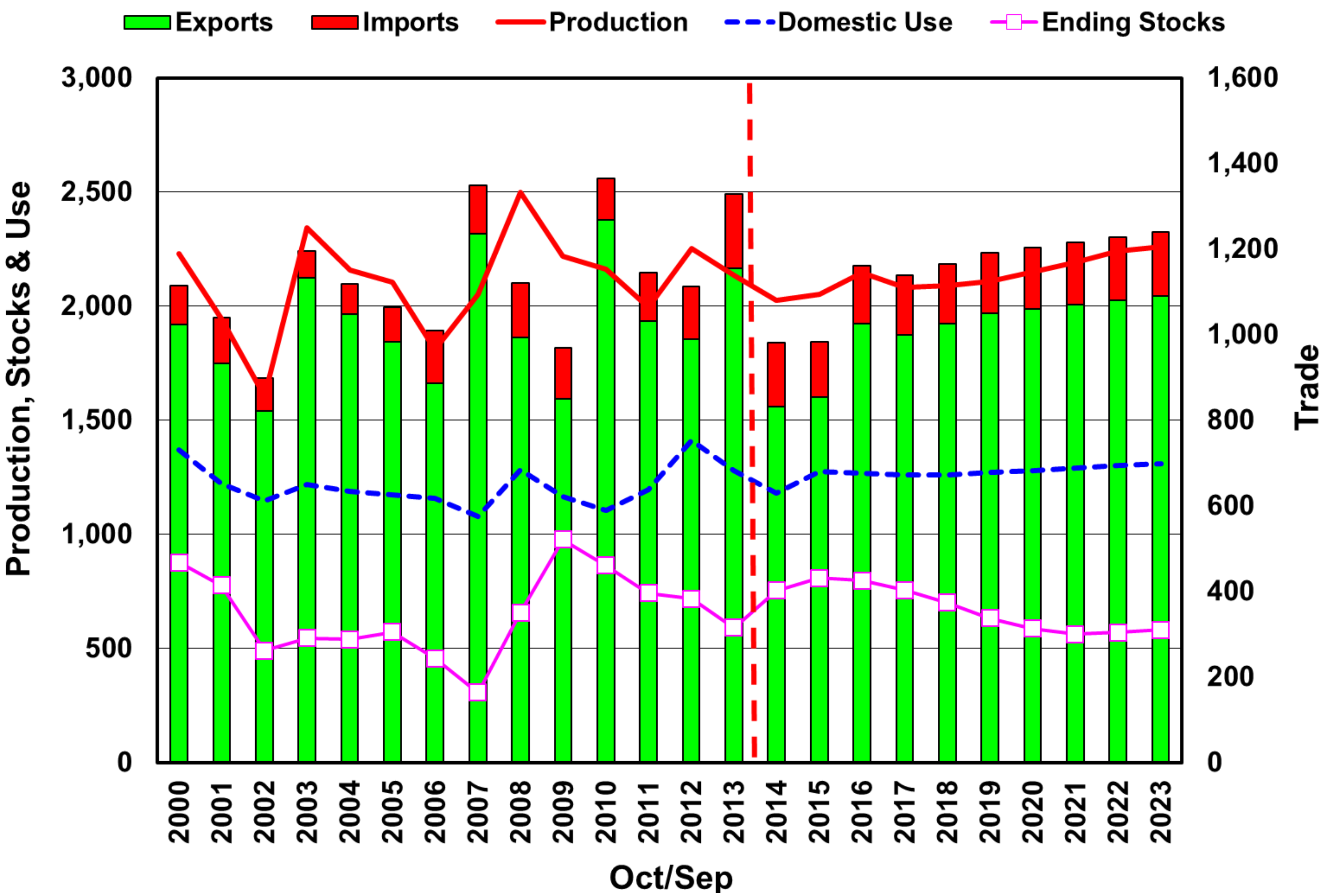
b) WHEAT

- U.S. wheat acreage is expected to remain in a tight range, with little incentive to expand. Any increase is in response to shortages throughout the world.

- U.S. wheat yields are not increasing as much as other crops. Wheat is grown continuously on marginal land.
  - As a result, U.S. wheat production expansion is limited over the forecast period.

- Over the next ten years, U.S. wheat exports are expected to be on the order of 1 billion bushels annually.

Figure 13: U.S. Wheat Supply and Demand (million bushels)



Source: USDA and Informa

c) BARLEY

- U.S. barley planted acreage is expected to remain around 3 million acres, and yields are expected to remain below 78 bushels per acre throughout the forecast period.

- Barley that can be grown to malting quality, returns profit that is competitive with corn and soybeans. Feed quality barley is losing acreage to corn and soybeans.

- Barley required for brewing and other food processes is limited.

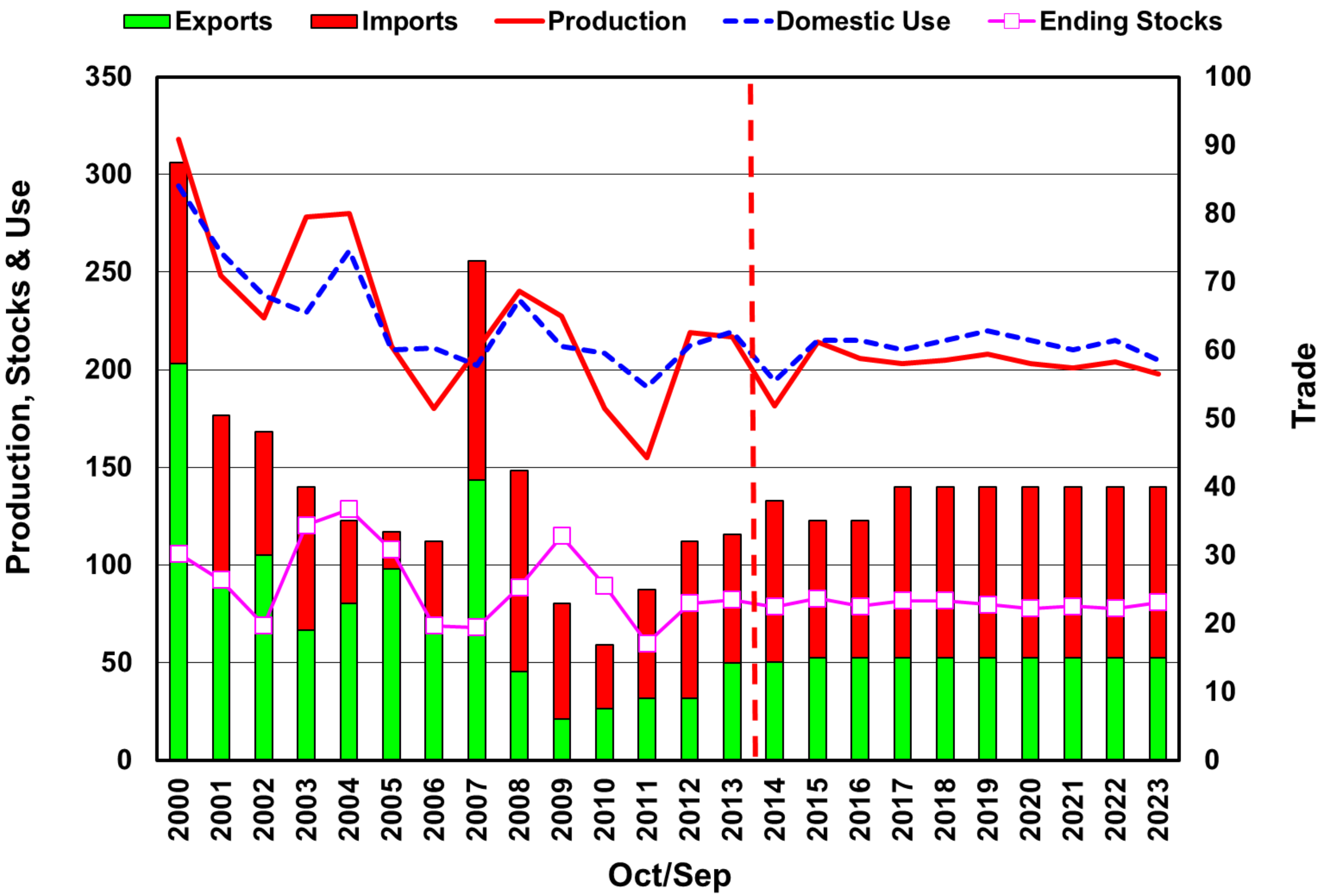
d) OATS

- U.S. oats planted acreage is expected to decline over the forecast period.
    - Oats yields have not increased as quickly as corn and soybeans.
        - Oats have become a niche market.

e) SORGHUM

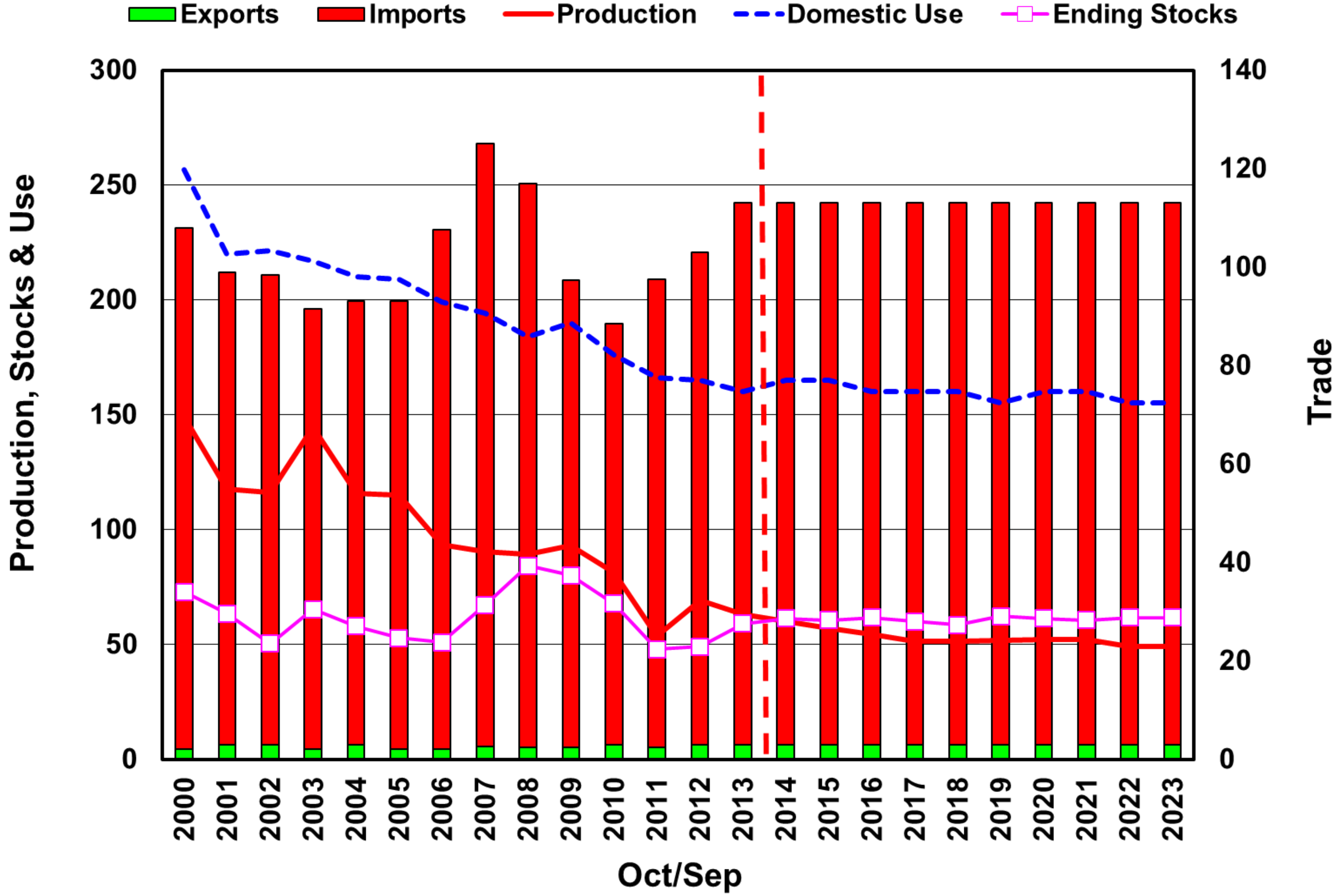
- U.S. sorghum exports spiked on Chinese policy of excluding U.S. corn and DDGS imports. The increase in demand is driving an increase in acreage and production. Informa believes by the end of the forecast, policies that favor sorghum will shift and production will decline to current levels.

Figure 14: U.S. Barley Supply and Demand (million bushels)



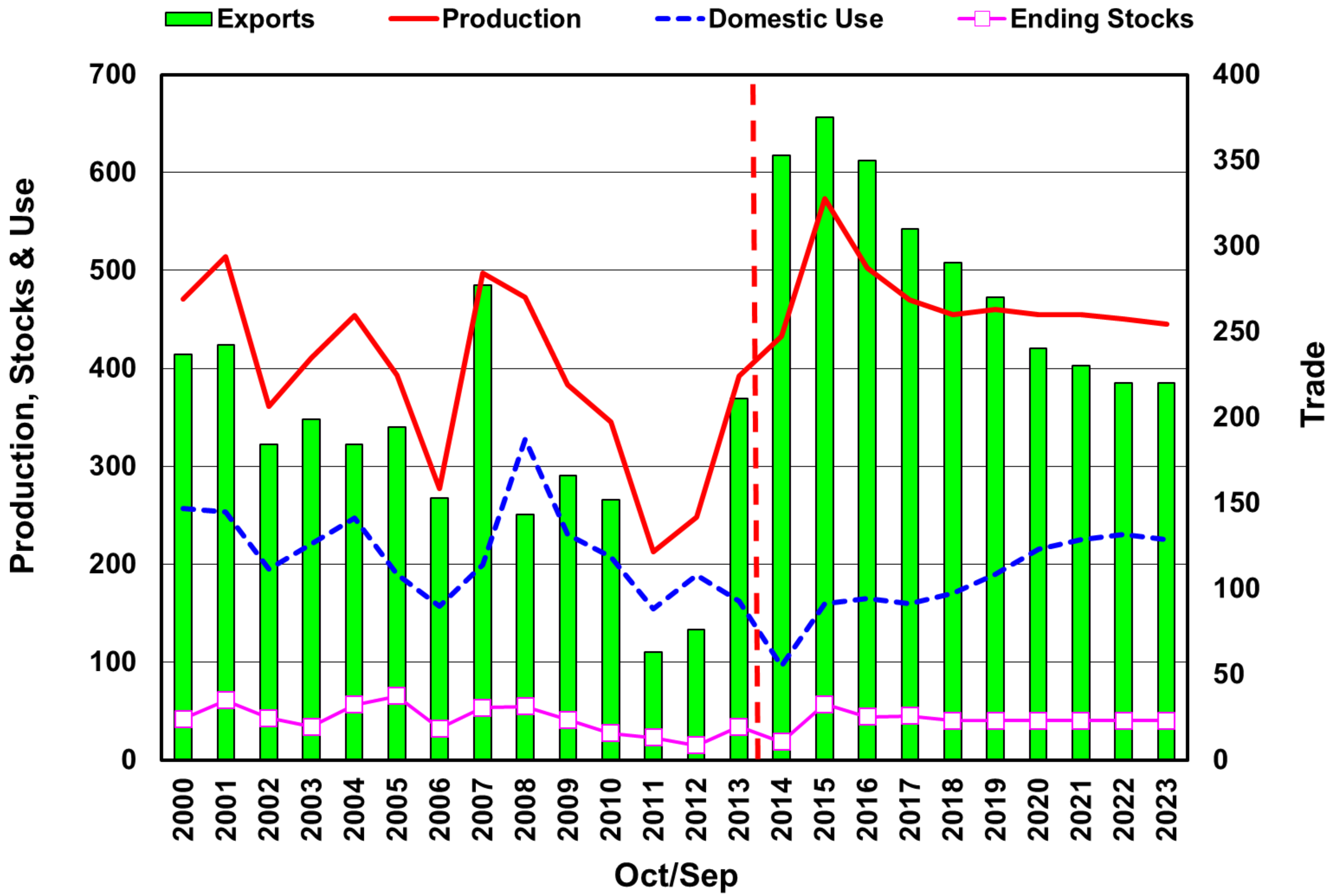
Source: USDA and Informa

Figure 15: U.S. Oats Supply and Demand (million bushels)



Source: USDA and Informa

Figure 16: U.S. Sorghum Supply and Demand (million bushels)



Source: USDA and Informa

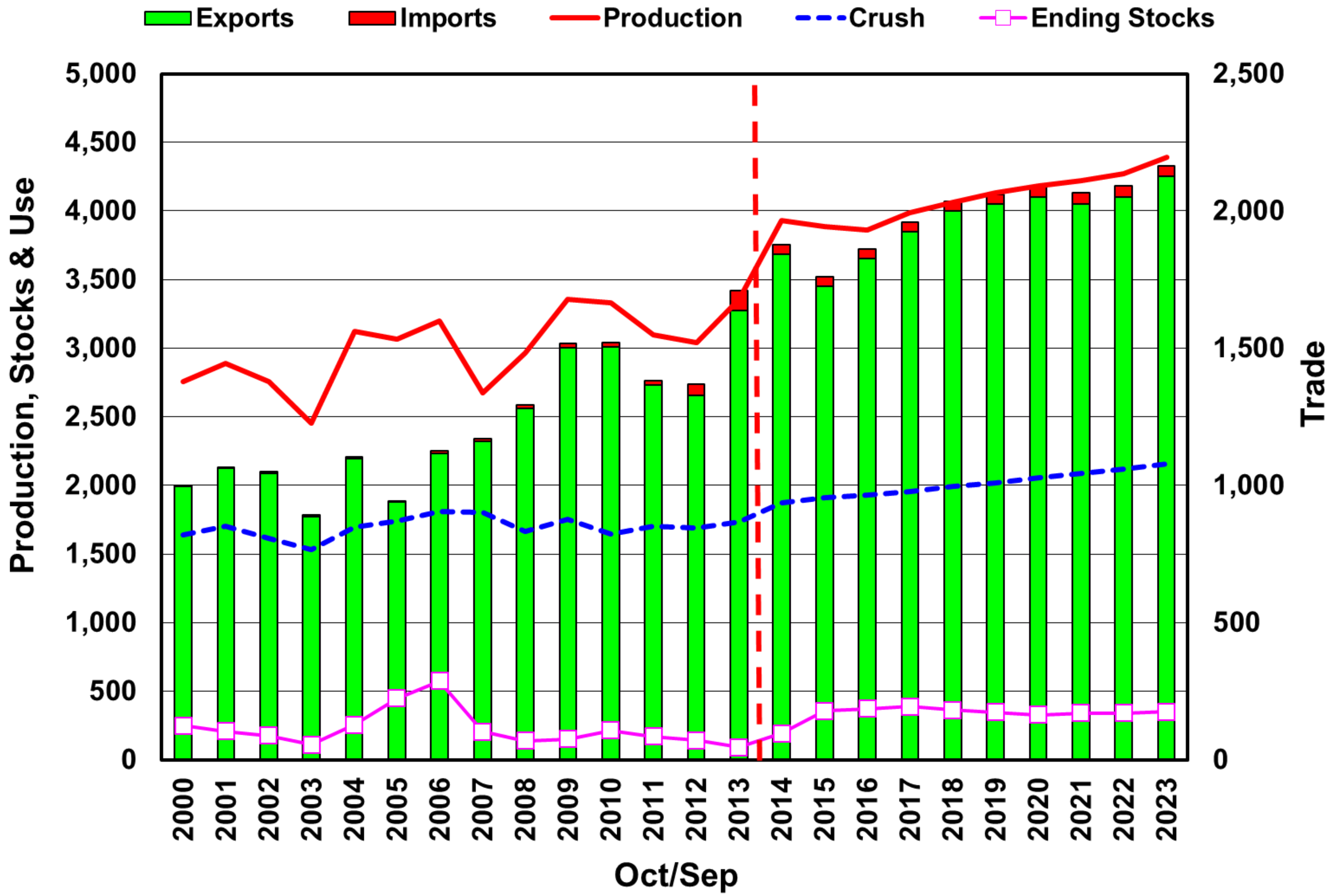
f) SOYBEANS

- U.S. soybean planted acreage is expected to increase 5.7 million acres over the forecast period.
- U.S. soybean yields are expected to increase 2.2 bushels per acre or an increase of 5%.
- Expected soybean production increases are forecast to exceed 463 million bushels over the forecast period.
- Soybean crush and exports are expected to increase 280 million bushels and 282 million, respectively, from the baseline year of 2014 through to 2023. Soybean exports are driven by China's domestic crush industry.

(1) SOYBEAN PRODUCTS

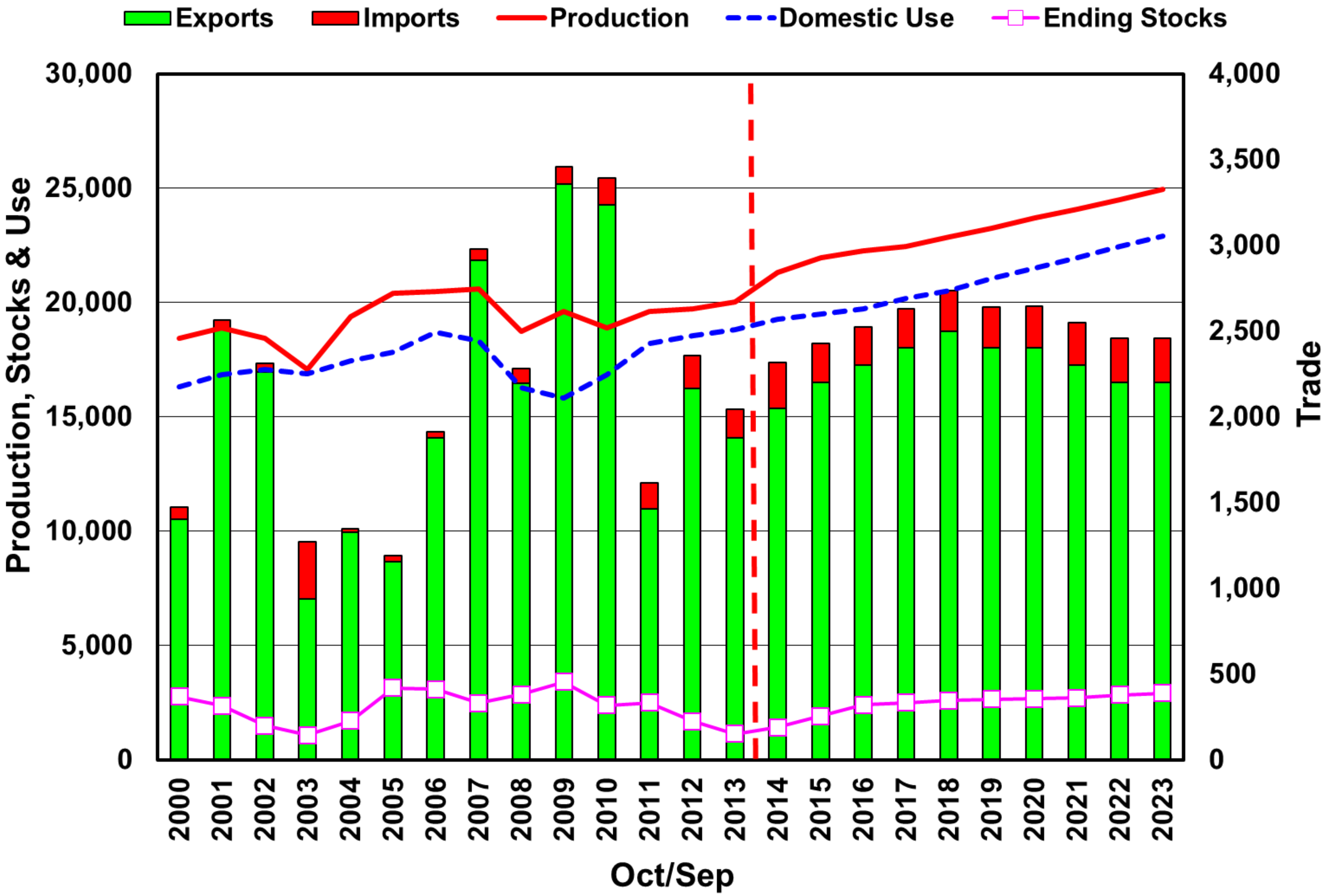
- Soybean product demand is driven by a combination of continued expansion in global protein demand and a leveling off of U.S. distillers grains (DDGS) availability as the U.S. ethanol industry grows slowly after a decade of rapid growth. Canola meal continues to increase and displace domestic soybean meal consumption.
- Meal demand is the largest determinant of soybean crush levels, since meal represents 80% of the volume of a bushel of soybeans (though a lower share of combined product value, as oil is more valuable on a per-pound basis).
- Soybean oil usage is expected to increase 3.7 billion pounds. Biodiesel usage is forecast to increase 650 million pounds and food use is expected to increase 3.0 billion pounds.
- Throughout the forecast period, soybean oil production will increase as domestic use and exports do the same.
- The U.S. will continue to be a large soybean meal exporter.
    - Exports are forecast to decrease by 1.3 million short tons as U.S. animal numbers rebound.
- Domestic soybean meal usage is expected to increase approximately 7.4 million tons from 32.3 million in 2014 to 39.6 million in 2023.

Figure 17: U.S. Soybean Supply and Demand (million bushels)



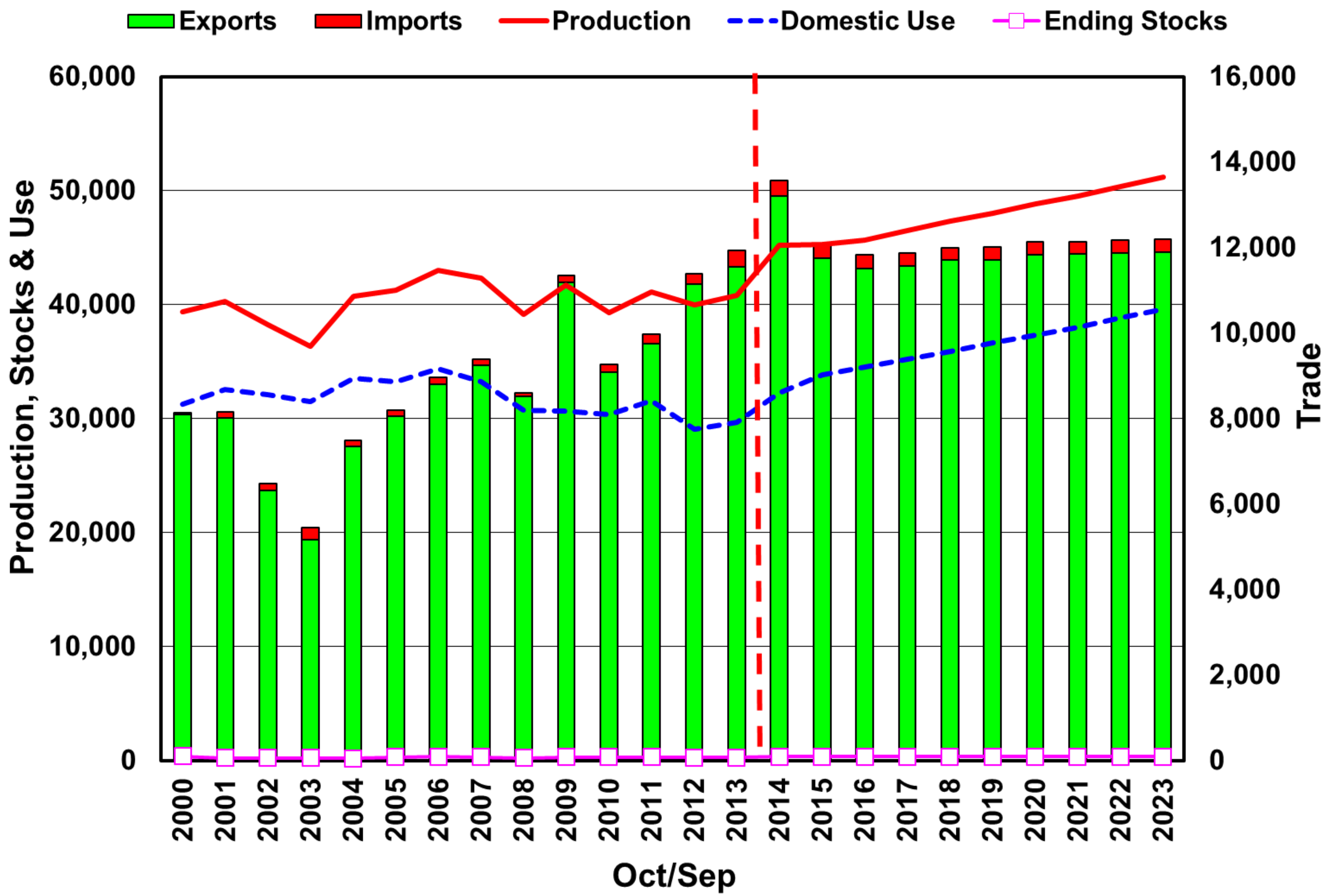
Source: USDA and Informa

Figure 18: U.S. Soybean Oil Supply and Demand (million pounds)



Source: USDA and Informa

Figure 19: U.S. Soybean Meal Supply and Demand (thousand tons)



Source: USDA and Informa

2. Major Importing Countries

- U.S. barley exports to any one country are less than 500 thousand MT.

- Sorghum exports to China have soared, but are expected to return to previous levels by the end of the forecast.

- U.S. oat imports primarily come from the Netherlands and Canada.

- U.S. corn exports are largely shipped to Asia and Mexico.
  - The two largest importers are Japan and Mexico.
    - Japan is a developed country with a declining population.
      - Corn import levels are declining.
  - In crop year 2011, China has imported a significantly higher level of corn than in the last ten years. Since 2011, China has successfully limited imports of corn.
    - Increasing corn imports are offsetting export declines in Japan and South Korea.
    - China has shifted from not buying any corn to an acceptance that a minimum level of imports are necessary as long as they are not too dependent on one country.
      - Informa believes China will accept a minimum level of corn imports as a necessity, but still attempt to remain nearly grain self-sufficient.
        - China does not want U.S. corn to become a trade negotiation tool. China still remembers the U.S. grain embargo of the former U.S.S.R. in the late 1970s.
    - Once China's policy allowed soybean imports, China's soybean imports exploded and changed world trading patterns.

- U.S. soybean trade is dominated by China as shown in Figure 24.
  - In crop year 2014/15, China accounted for 61% of U.S. soybean exports.
  - China is also buying South American soybeans, which creates an export surge between the U.S. and South American harvest periods.

- China's buying of soybeans is continues to create optimism for other agricultural products, such as corn and pork.

Figure 20: U.S. Soybean Export Market Destinations

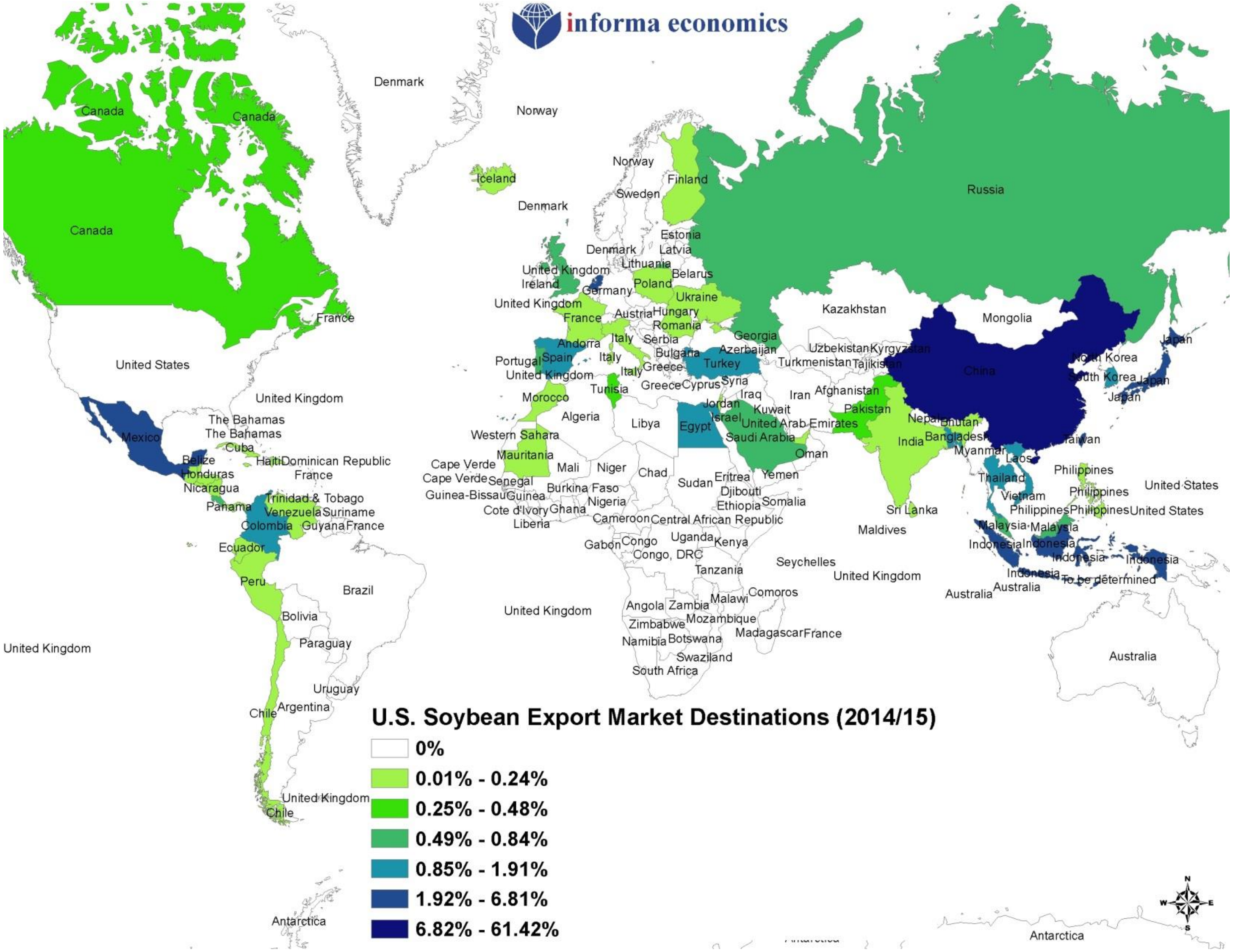


Figure 21: U.S. Soybean Meal Export Market Destinations

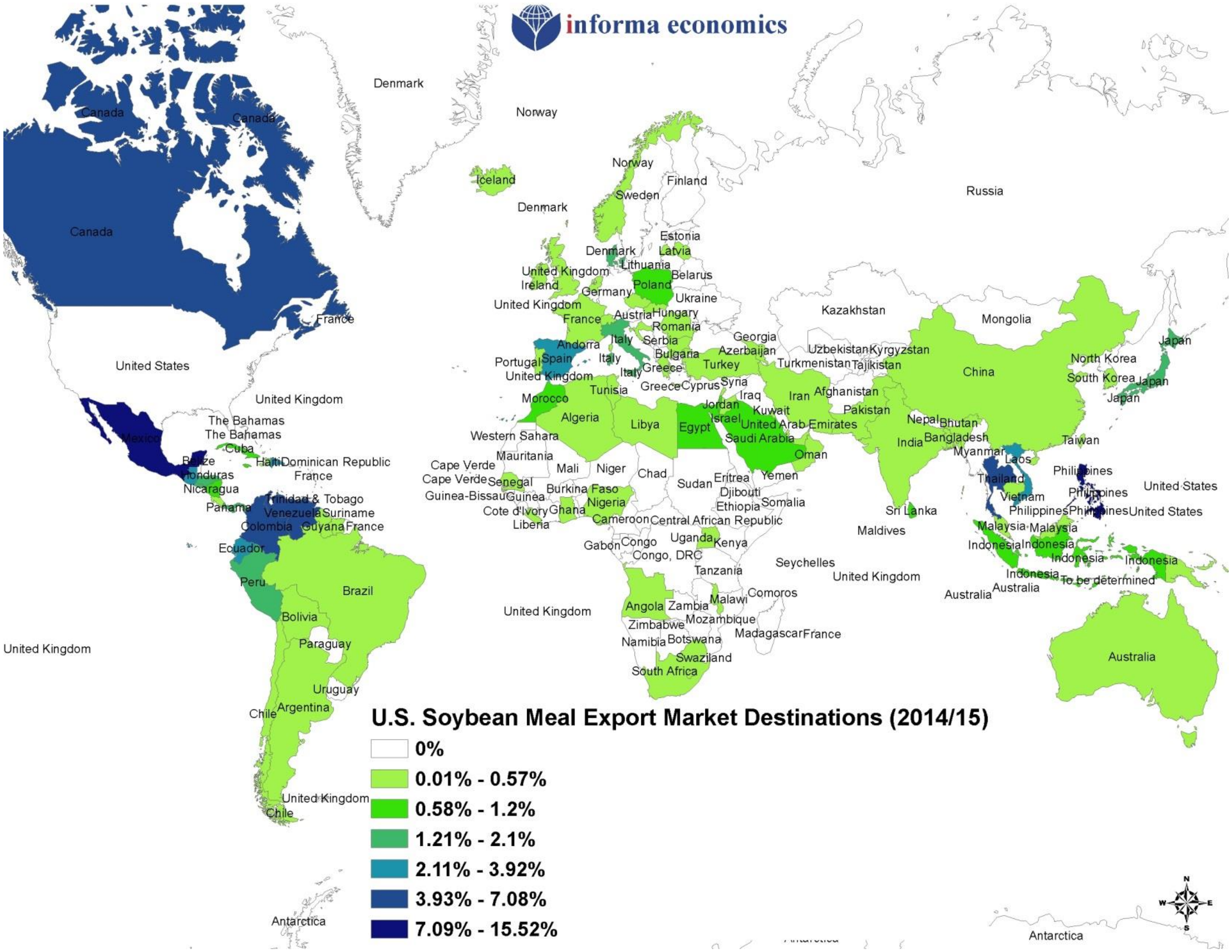
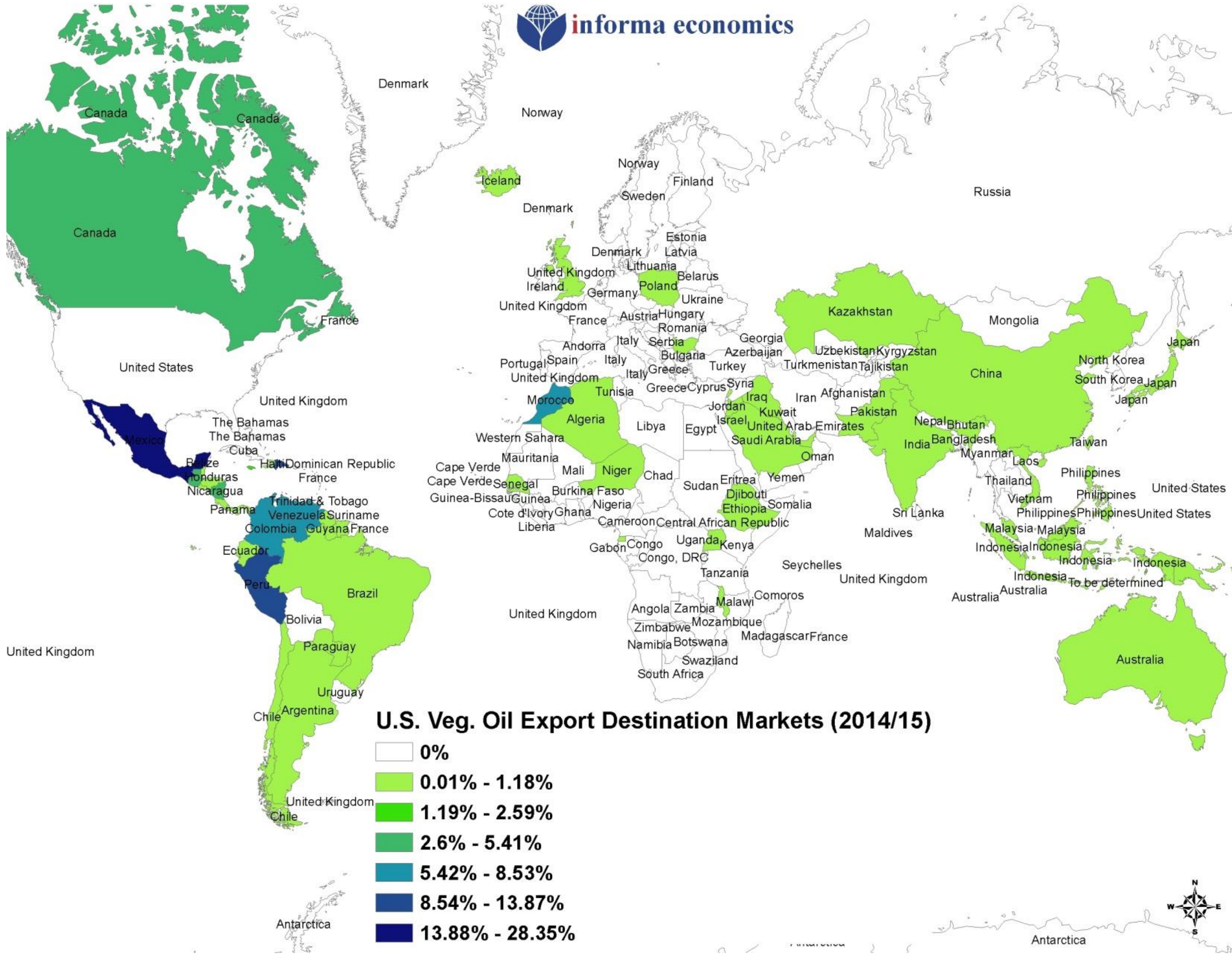


Figure 22: U.S. Soybean Oil Export Market Destinations

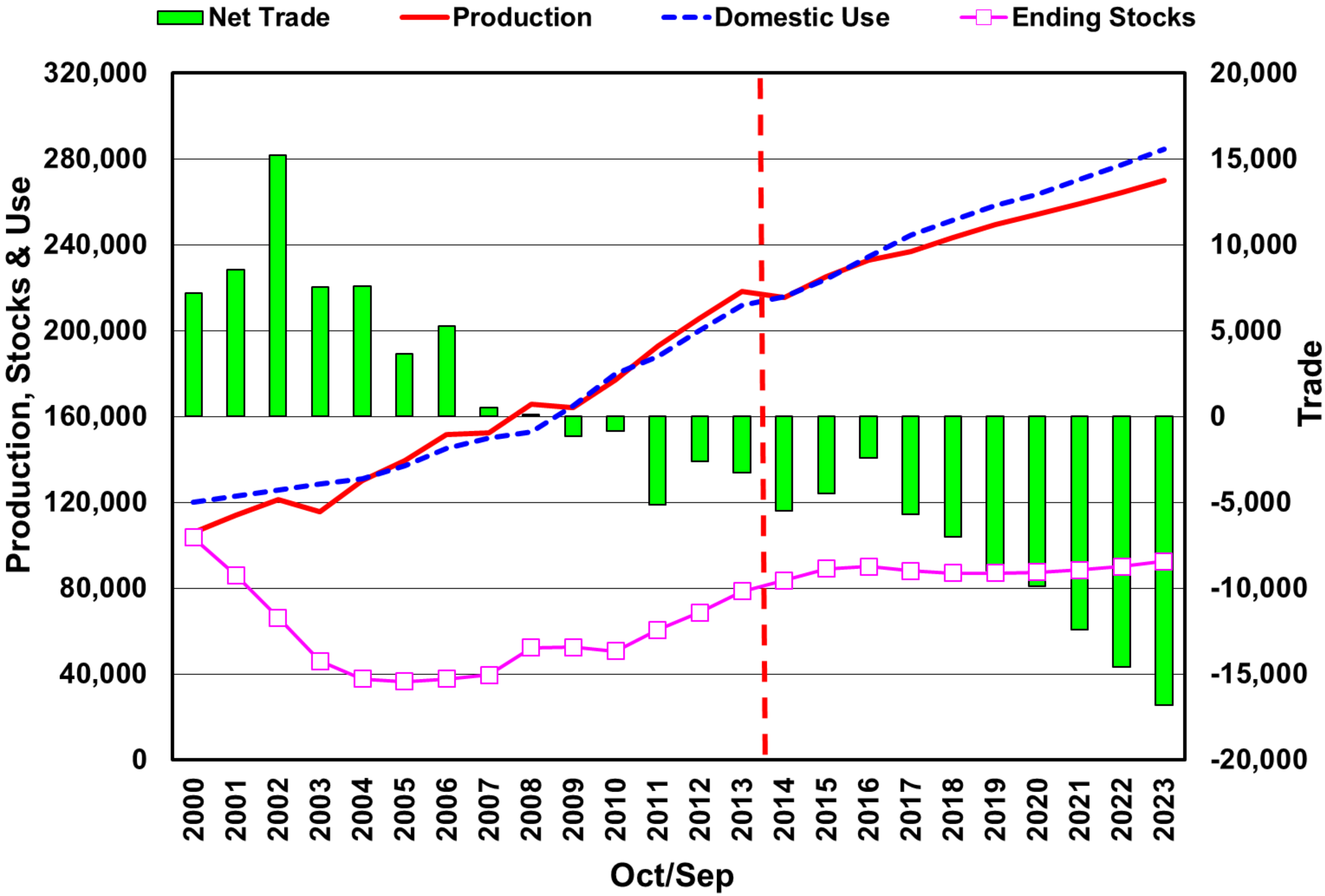


- U.S. soybean meal exports are largely shipped to Canada and Mexico.

- China corn acreage is expected to increase 5 million hectares at the expense of other crops, mostly cotton, in an attempt to remain grain self-sufficient.

- China domestic consumption of corn is continuing to increase as the population becomes wealthier and in turn, consumes more meat and processed products.
    - Pork is the main dish in China and the increasing price of pork is a major area of concern for the Chinese government.
        - China has chosen to grow the domestic pork industry, which requires an increase in corn imports. With more countries able to supply China with corn, China is becoming more aggressive in importing corn. China does not want to be dependent on the U.S. for domestic food needs.
            - Historically, China's policy was to develop markets to create jobs. For example, China imports soybeans and crushes them domestically instead of importing soybean products.

Figure 23: China Corn Supply and Demand (thousand metric tons)



Source: USDA and Informa

- China's soybean acreage is expected to remain steady.

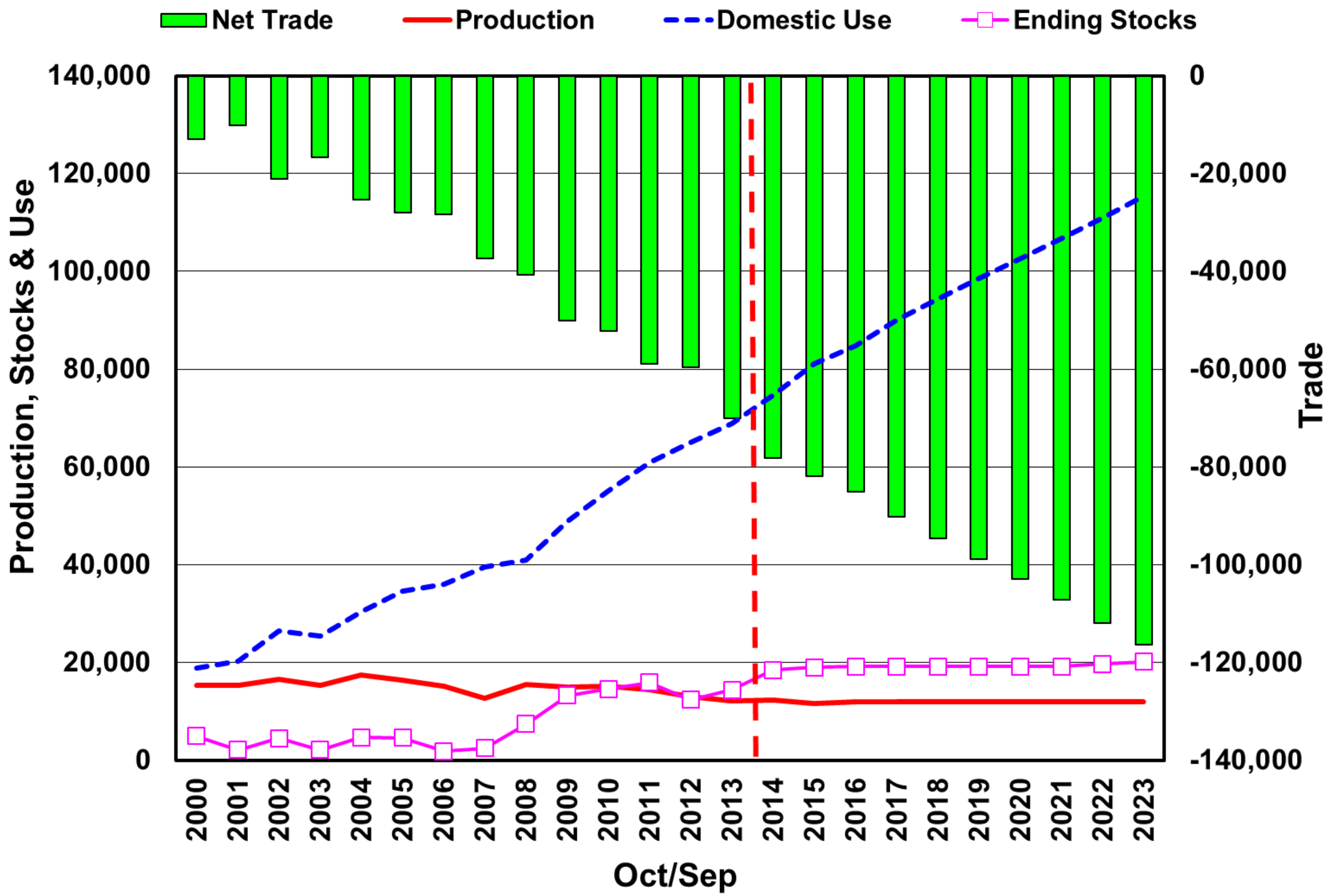
- Due to China's large population, selling cooking oil locally has not been a problem. So, the level of crush is determined by soybean meal demand.

- As China's domestic consumption of meat increases and animal production switches from "back yard" to modern commercial animal operations, the demand for soybean meal has increased.

- The government has enacted policies that made importing the soybeans and crushing more attractive than importing soybean products.

- China's annual soybean net imports have increased by 24 million MT from 2006 through 2010. From 2010 through 2023, soybean annual net imports are expected to increase an additional 74 million MT to 126 million MT in 2023.

Figure 24: China Soybean Supply and Demand (thousand metric tons)



Source: USDA and Informa

C. U.S. Animal Outlook

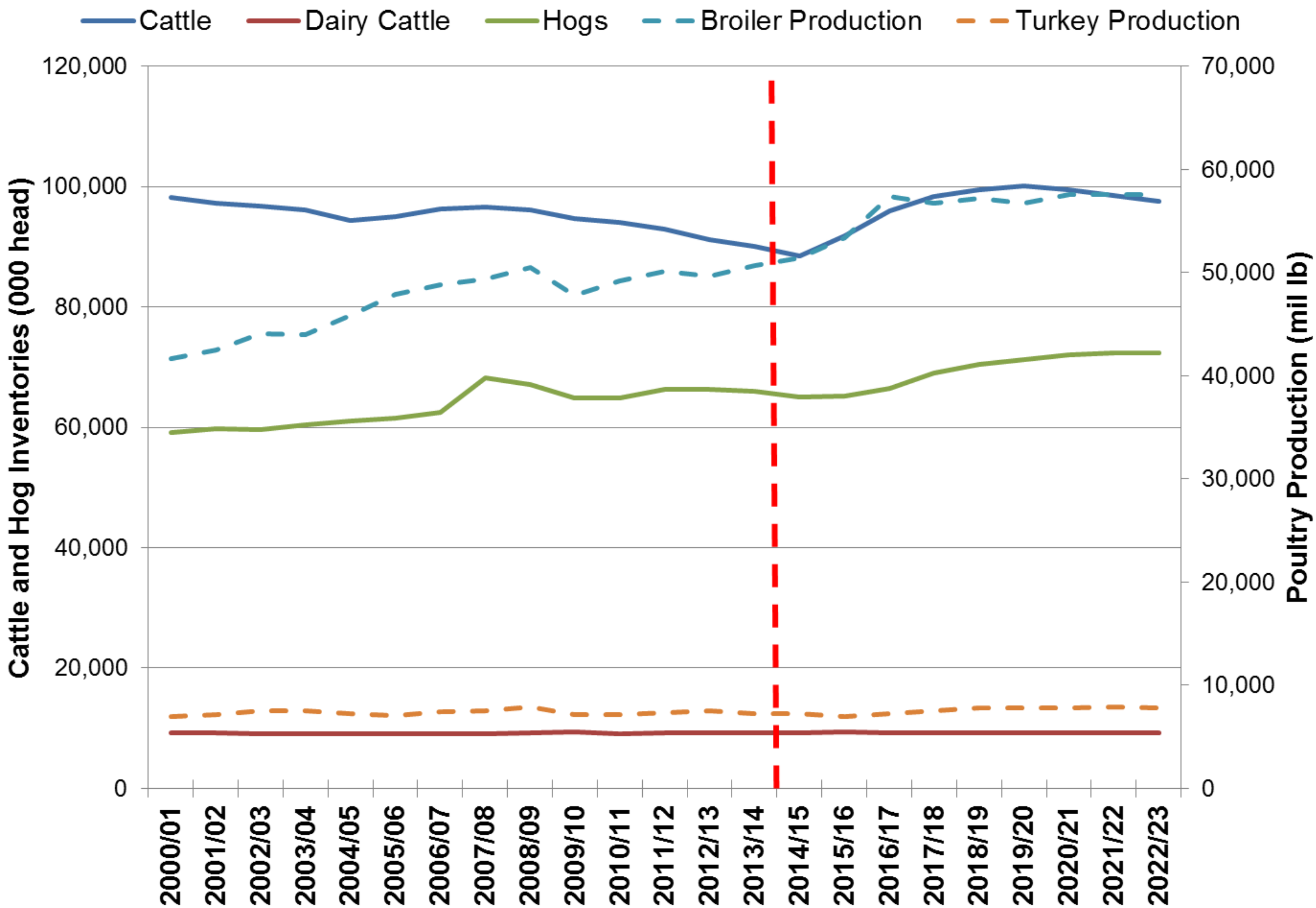
U.S. meat production is expected to increase on the strength of foreign demand (see Figure 25). For example, Chinese beef consumption is expected to grow by 1.5 million metric tons over the next decade, with Chinese imports fostering growth. The increase in beef consumption is a result of China's strengthening economy, increasing incomes, and continued urbanization.[1]

- The locations of the different species are shown in Figure 26.

- Livestock outlook is projected to be mixed with growth driven by export demand and not domestic consumption.
  - Free Trade Agreement rules are being finalized for implementation between the U.S. and South Korea, Panama and Colombia, to the benefit of U.S. meat exports.
  - Poultry production will increase through 2016/17, and then slight shrink for 2017/18 and expand to 57.5 billion pounds or 26.0 million metric tons in 2022/23.
  - Hogs are projected to increase about 7.3 million head from the 2014/15 low point to 72.3 million in 2022/23 and remain steady from there.
    - Hog production will expand more rapidly within the Corn Belt, while essentially shrinking in other areas.
    - Even though head count will flatten out, hog productivity gains will expand total pork production.
  - Cattle head counts are forecast to increase up to 2019/20 before declining through 2022/23, with no significant shift in geographic distribution.
    - South Korea experienced a severe outbreak of foot-and-mouth disease, which has reduced the size of its herd, and increases the prospect of increased imports from the U.S., especially with the newly established Free Trade Agreement.
  - Dairy cattle head count will remain relatively stable, but annual productivity gains of 1.6% will increase total milk production.
    - The size of the U.S. dairy herd is dependent on exports of milk and associated products, especially to Asia and more specifically to China.
    - There will be no significant geographic redistribution.

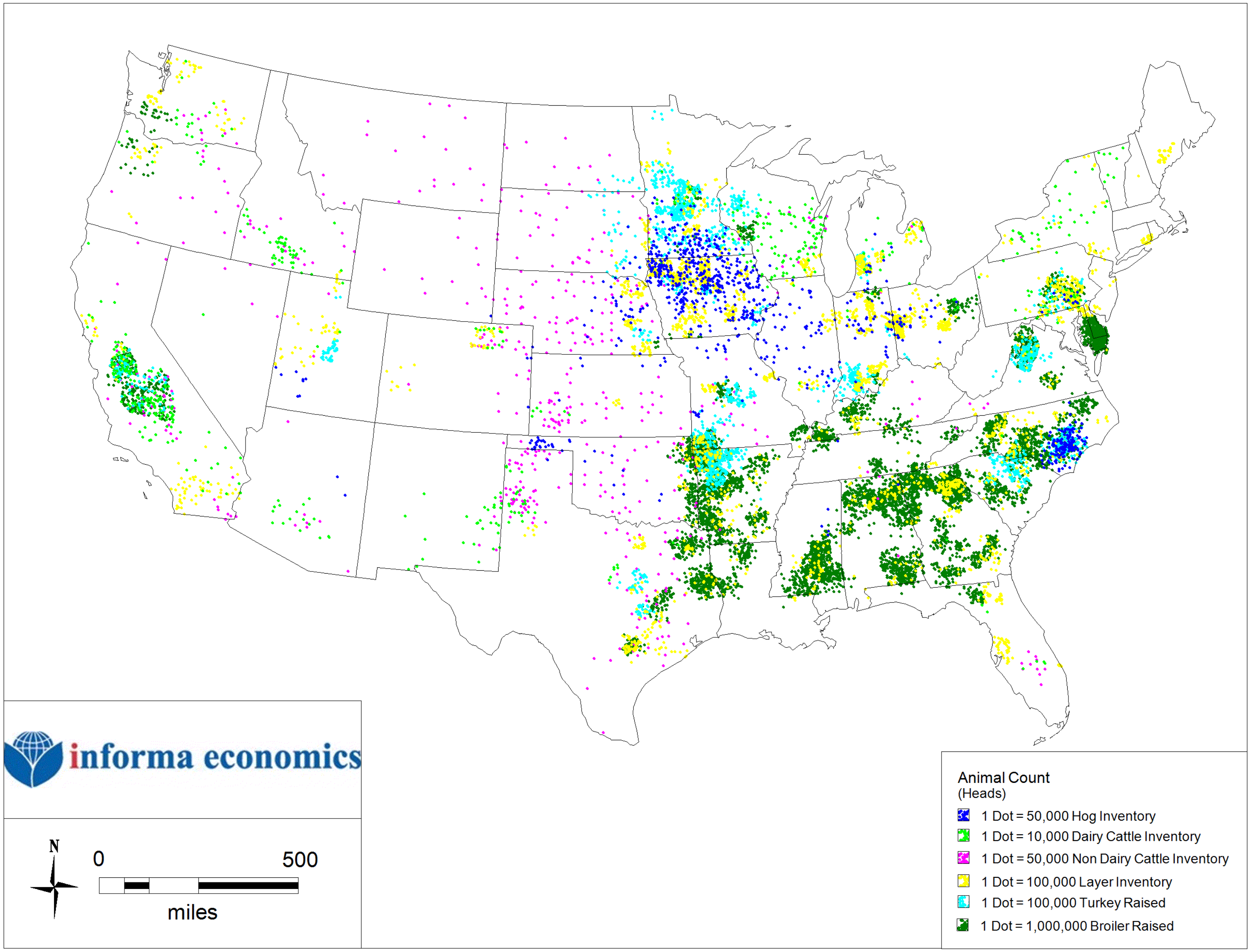
[1] Hong Kong Business. (2010). "China Meat Demand to Soar in Coming Decade." Retrieved from http://www.chinadaily.com.cn/hkedition/2010-05/07/content_9819611.htm.

Figure 25: U.S. Livestock Inventories and Poultry Production



Source: Informa (Forecast), USDA (History)

Figure 26: Livestock and Poultry Inventory Map by Species



3. Beef and Dairy Cattle

- The 2013/14 U.S. cattle herd size totaled 90.1 million head.
  - With the biological lags inherent in the cattle industry, and the time it takes to rebuild herd stock, beef production expected declined during 2012 and 2013.
  - After bottoming in 2014, the U.S. beef cattle herd size continuing growth in the total inventory, a larger beef cow herd, more heifers being held as herd replacements and prospects for a larger calf crop.

- Record global dairy demand is resulting in record supply.
  - Import growth by China slowed in 2011 after surging since 2008.
  - Slower economic growth, rebounding domestic supply, and high prices slowed demand in China.
  - The earthquake in Japan, continued economic growth in developing countries, and foot-and-mouth disease in South Korea all contributed to an 8.3% increase in global imports in 2011.
  - Global demand is expected to continue growing, but it is sensitive to changes in economic conditions.

- Cattle are the least geographically concentrated of the species.
  - Cattle are primarily located in the Southern and Northern Plains States.

- The size of the U.S. dairy herd depends on the export market.
  - Domestic demand has generally been growing by 1.0% per year since 2002.
  - Production per cow has been growing by 1.6%. So without export growth, the herd will decline by an average of 0.6% per year.

- Dairy operations tend to have areas of concentration.
  - The three largest areas for dairy are California, Minnesota/Wisconsin, and west Texas/New Mexico.

Figure 27: Cattle Inventory Map

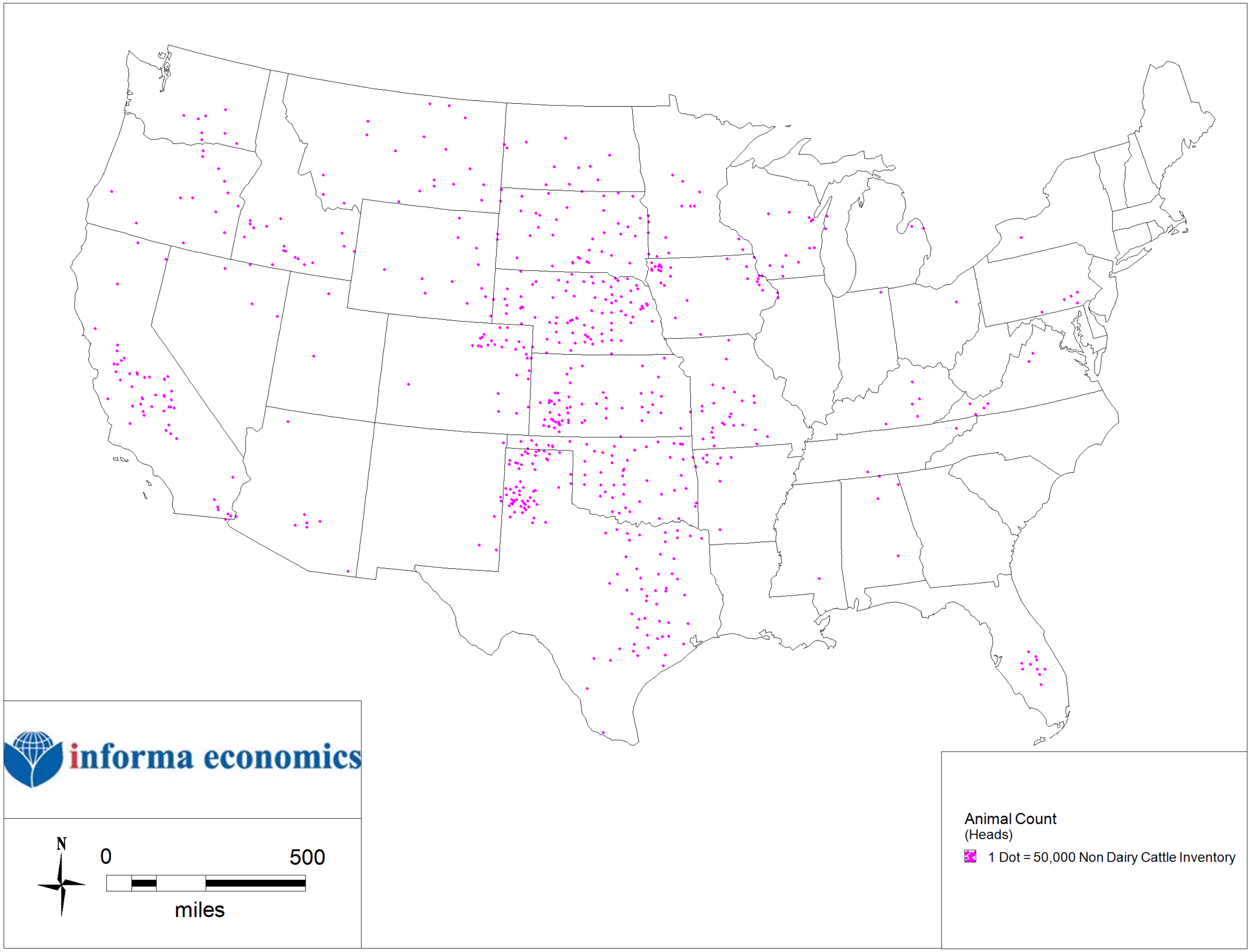


Figure 28: Dairy Inventory Map

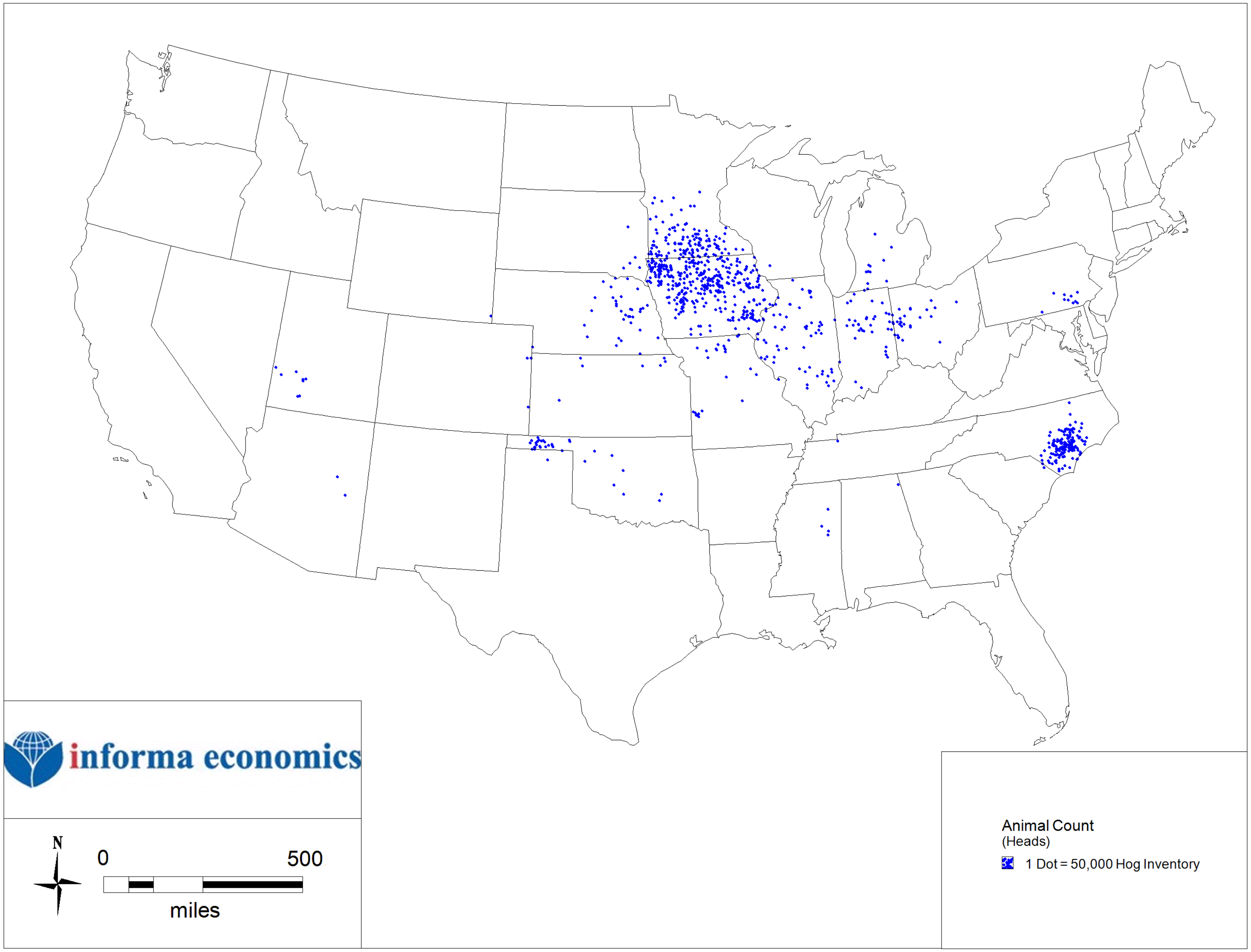
4. Hogs

- The U.S. hog herd size in 2013/14 was 65.9 million head.
    - U.S. hog inventory levels are projected to show modest expansion over the next decade.
    - PEDv (Porcine Epidemic Diarrhea Virus) led to a reductions in inventory levels in 2014.

- The breeding herd should expand only slightly during the next few years.
    - Productivity gains account for most of the expansion in pork production.
    - Producers are expected to remain cautious in terms of expanding the breeding herd due to the dependence on export markets.

- Hog production is highly concentrated across the Corn Belt and North Carolina as shown in Figure 29.

Figure 29: Hog Inventory Map



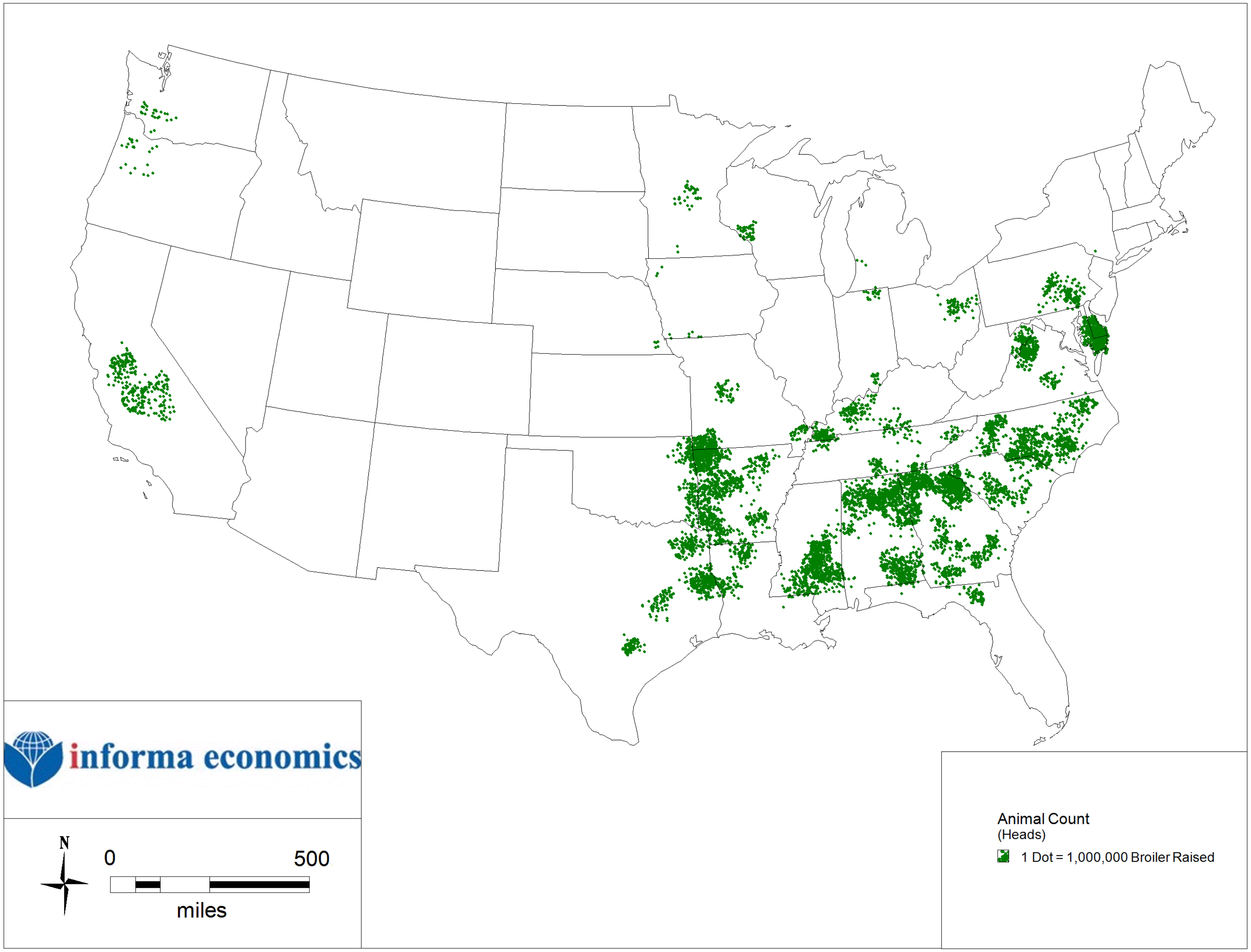
5. Broilers

- The baseline U.S. broiler production in 2013/14 was 50.7 billion pounds.

- Throughout the forecast period, U.S. broiler production is anticipated to expand modestly from 50.7 billion pounds in 2013/14 to 57.5 billion pounds in 2022/23.

- Broiler production is predominantly located in the Southeast, which requires feed to be shipped into the area from the Corn Belt.

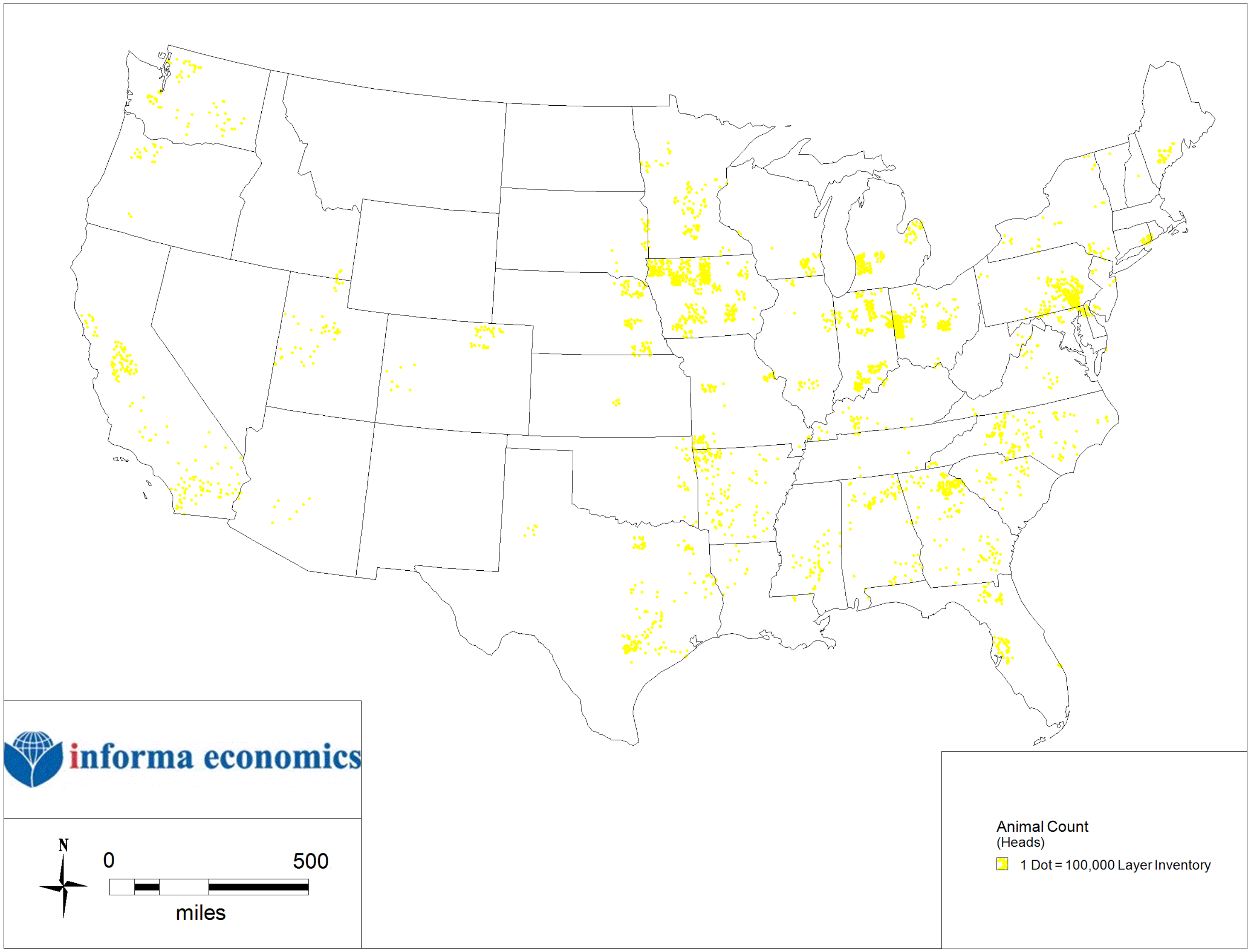
Figure 30: Broiler Inventory Map



6. Layers

- Over the forecast period, the layer flock is expected to remain stagnant due to pending legislation.
  - The United Egg Producers and U.S. Humane Society have agreed to legislation that changes animal husbandry laws.
  - The uncertainty in production costs and corresponding consumer reaction to higher prices is limiting expansion plans.

Figure 31: Layers Inventory Map

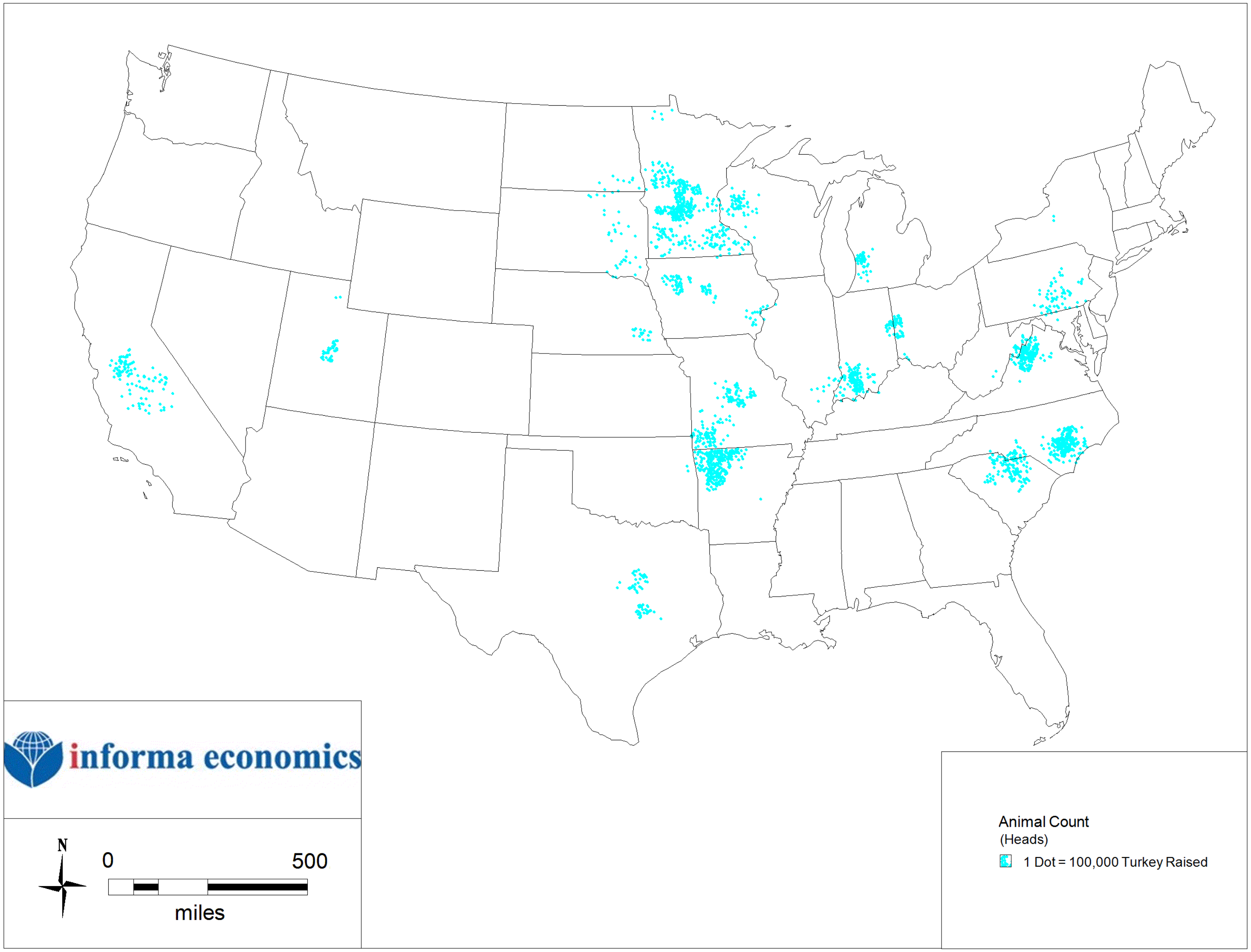


7. Turkey

- U.S. baseline turkey production in 2013/14 was 7.3 billion pounds.
  - Domestic turkey production declined slightly in consecutive years in 2013 and 2014 from 7.3 billion pounds to 7.2 billion pounds.
  - Throughout the forecast period, domestic turkey production is expected to expand by nearly 8% from baseline levels, as export demand continues to grow.

- Despite strong profitability across the industry, turkey producers are cautious with regard to expanding their operations because of volatile feed input prices and economic uncertainty.
  - These concerns are expected to play a part in producer expansion decisions throughout the remainder of the forecast period.

Figure 32: Turkey Inventory Map



D. State Animal Outlook

1. ALABAMA

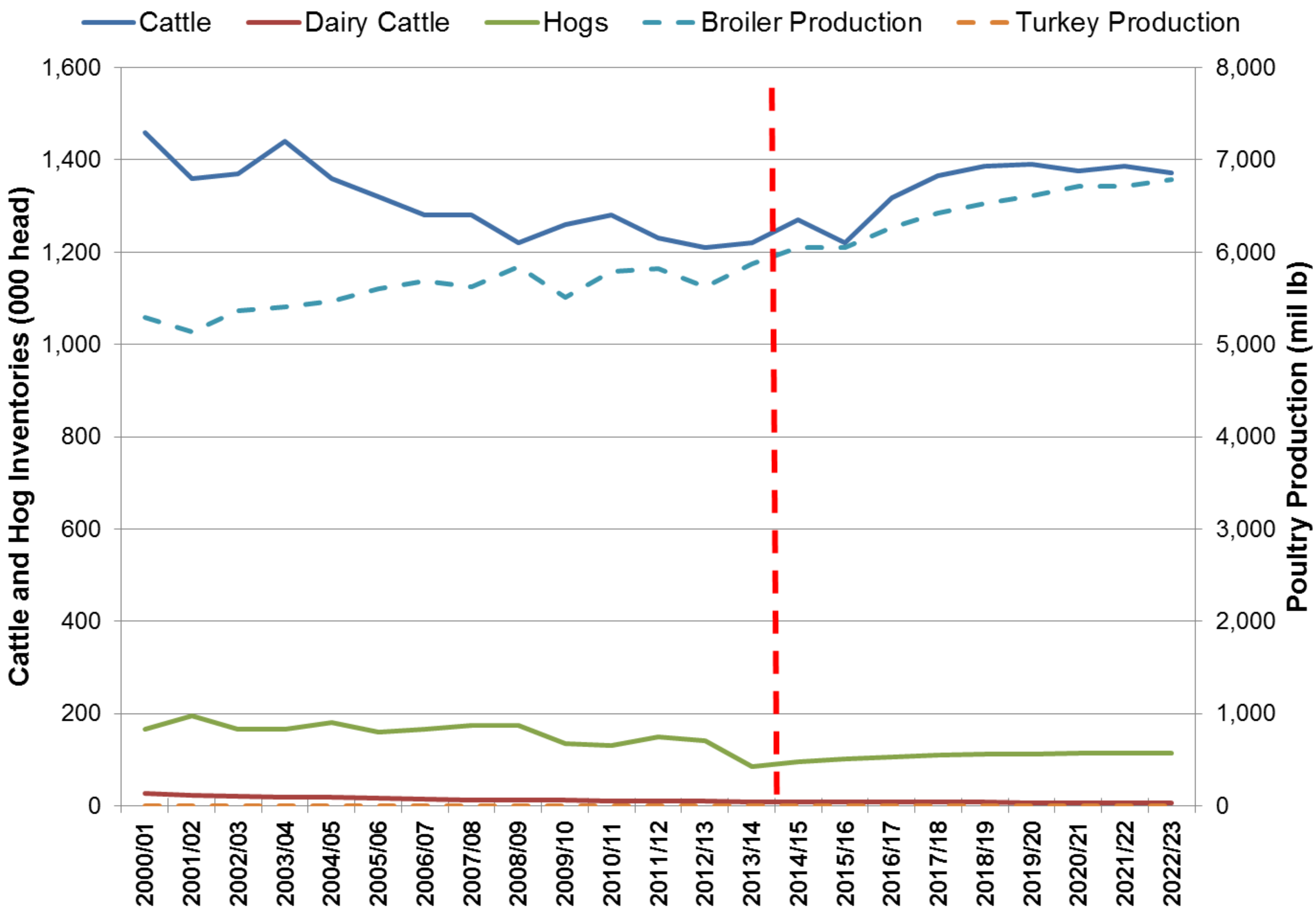
- Alabama is a large producer of poultry, and is expected to increase production through 2022/23. In 2013/14, Alabama's poultry production accounted for 12% of U.S. production levels.

- Alabama's poultry production primarily consists of broiler production. Broiler production is anticipated to grow by 16% over 2013/14 levels in 2022/23, from 5.9 billion pounds to 6.8 billion pounds.

- Cattle inventories in Alabama will increase by 12%, while dairy cattle herds will decrease by 22% from 9 thousand head in 2013/14 to 7 thousand in 2022/23.

- In 2013/14, Alabama's hog inventory will increase by 33%, from 85 thousand head to 113 thousand in 2022/23.

Figure 33: Alabama Livestock Inventories and Poultry Production



Source: Informa (Forecast), USDA (History)

2. ARKANSAS

- Arkansas is a large producer of poultry, and is expected to increase production through 2022/23. In 2013/14, Arkansas' poultry production accounted for 12% of U.S. production levels.

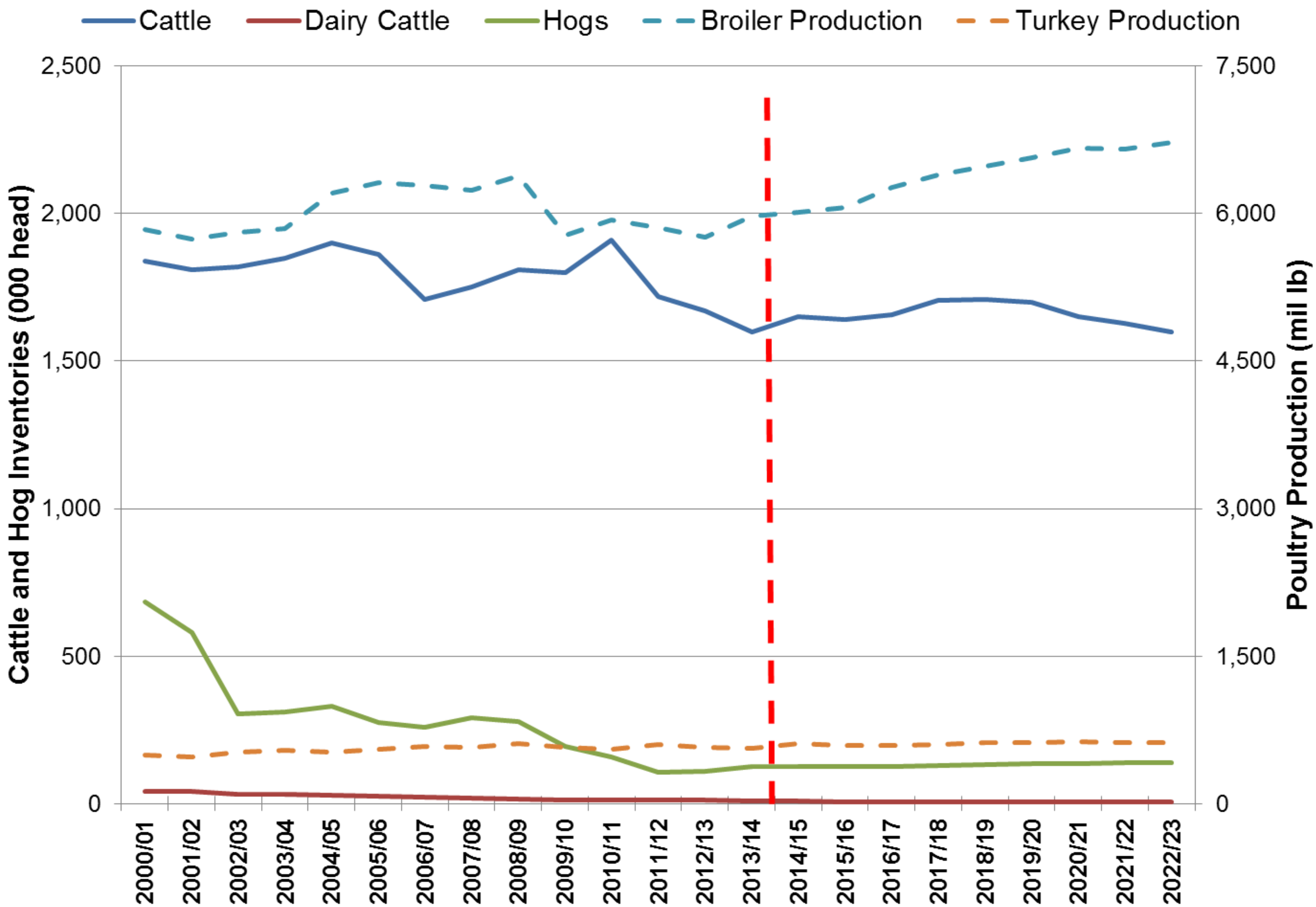
- Broiler production in Arkansas is anticipated to grow by 12% over 2013/14 levels in 2022/23, from 6 billion pounds to 6.7 billion.

- In 2013/14, turkey production in the state reached 560 million pounds. Production is expected to expand by 11% to 622 million pounds in 2022/23. Arkansas is also a large producer for turkeys.

- Arkansas' cattle herds will remain the same from 2013/14 to 2022/23 with 1.6 million head, while dairy cattle herds will decrease by 44% from 9 thousand head in 2013/14 to 5 thousand in 2022/23.

- Arkansas' hog inventory will increase by 10%, from 2013/14 levels of 125 thousand head to 138 thousand in 2022/23.

Figure 34: Arkansas Livestock Inventories and Poultry Production



Source: Informa (Forecast), USDA (History)

3. GEORGIA

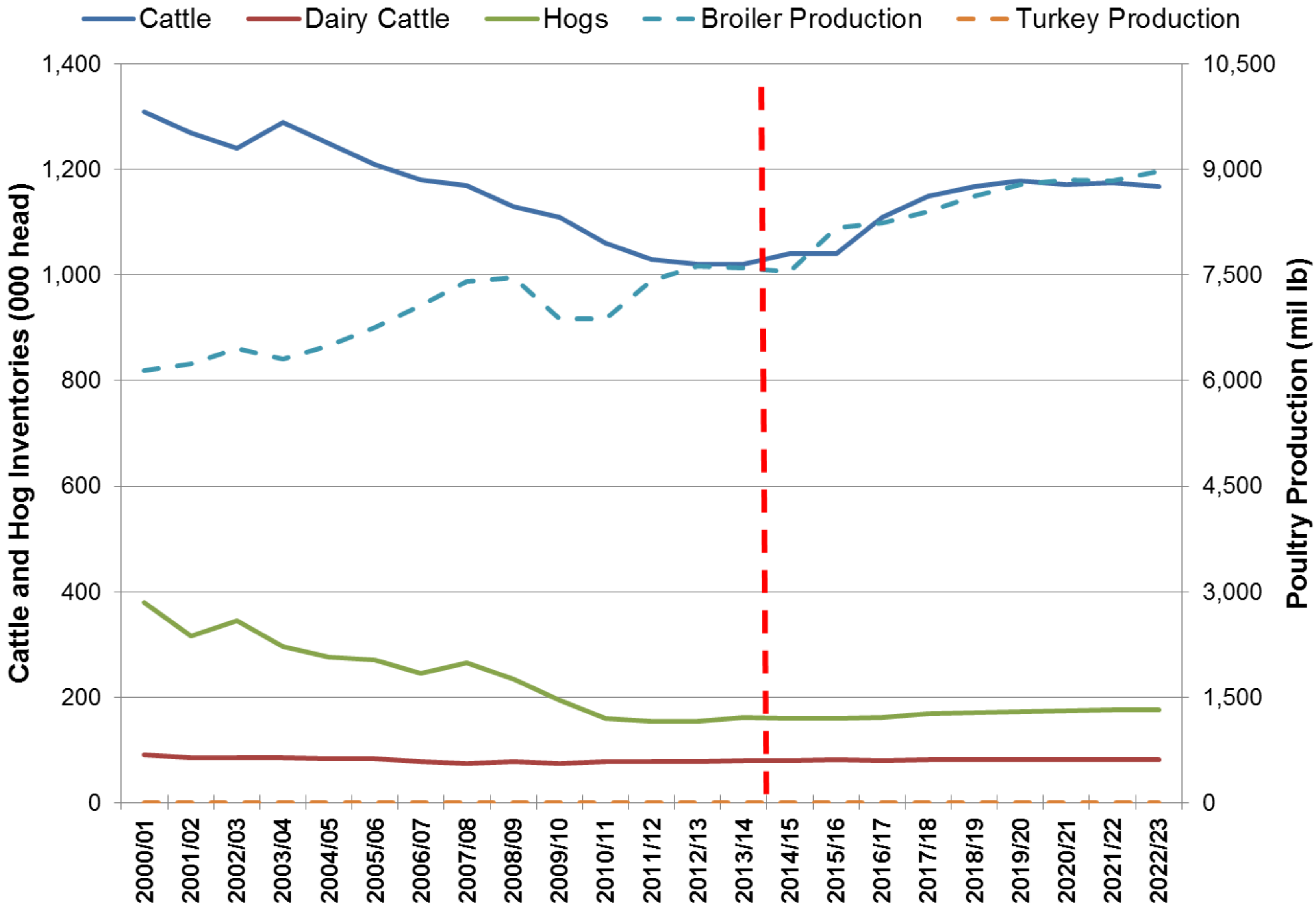
- Georgia is the largest producer of poultry within the selected states, and is expected to increase production through 2022/23. In 2013/14, Georgia's poultry production accounted for 15% of U.S. production levels.

- Broiler production in Georgia is anticipated to grow by 18% over 2013/14 levels in 2022/23, from 7.6 billion pounds to nearly 9 billion.

- Georgia's cattle herds will increase by 14%, and dairy cattle herds will slightly increase from at 80 thousand head in 2013/14 to 81 thousand head in 2022/23.

- In 2012/13, Georgia's hog inventory will increase by 9%, from levels of 161 thousand head to 176 thousand in 2022/23.

Figure 35: Georgia Livestock Inventories and Poultry Production



Source: Informa (Forecast), USDA (History)

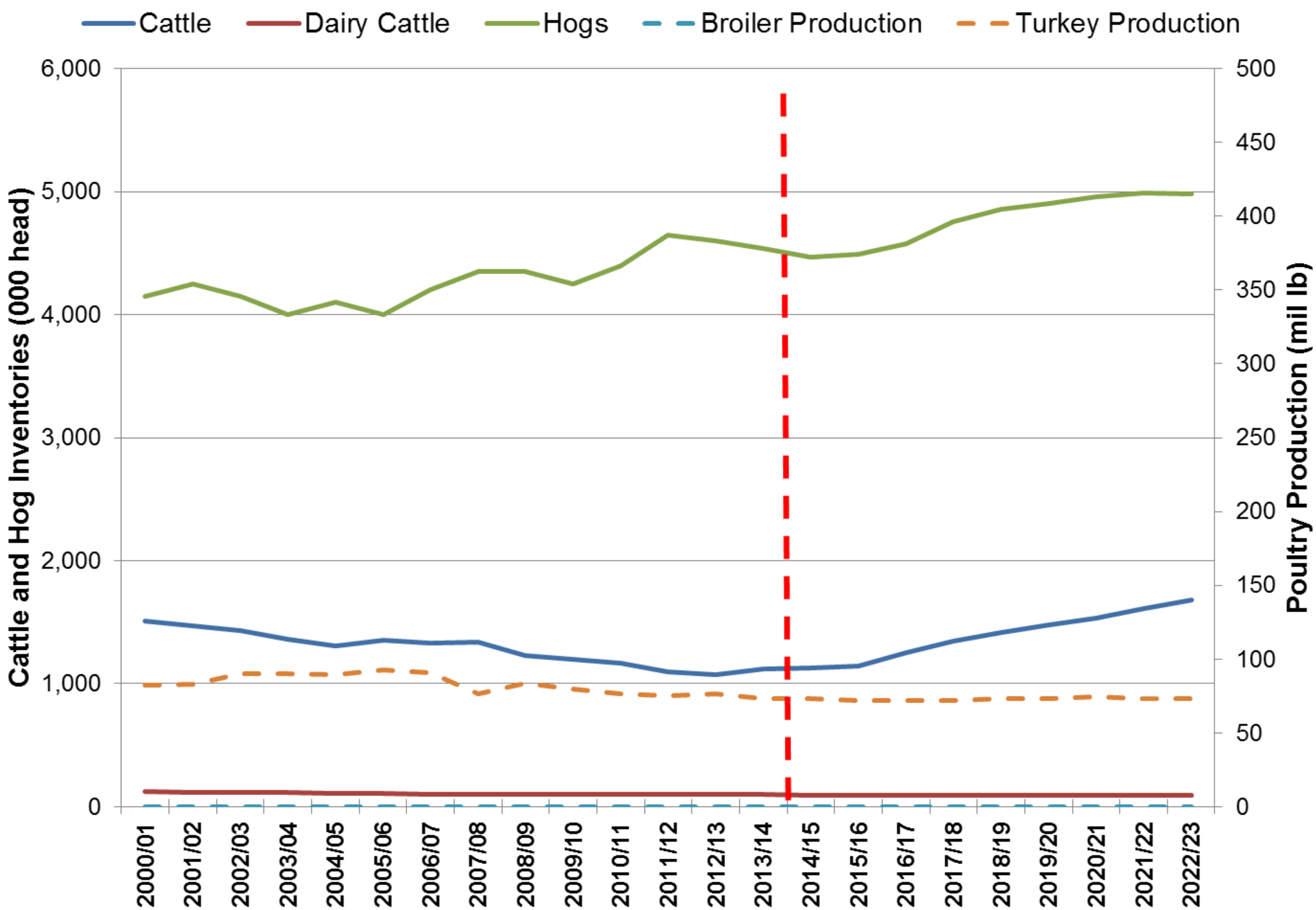
4. ILLINOIS

- Illinois' hog herds are the highest of its livestock inventories. These inventories are anticipated to increase by 10%, from 4.5 million head in 2013/14 to 5 million in 2022/23. This state accounts for 7% of U.S. hog inventories.

- Cattle inventories in Illinois are anticipated to increase by 50%, from 1.1 million head in 2013/14 to 1.7 million head in 2022/23. The dairy cattle herd will decrease by 7%, from 98 thousand head in the baseline to 91 thousand head in 2022/23.

- Illinois' poultry production primarily consists of turkey production. Production levels for turkey totaled 73 million pounds in 2013/14, and these levels are expected to remain the same in 2022/23.

Figure 36: Illinois Livestock Inventories and Poultry Production

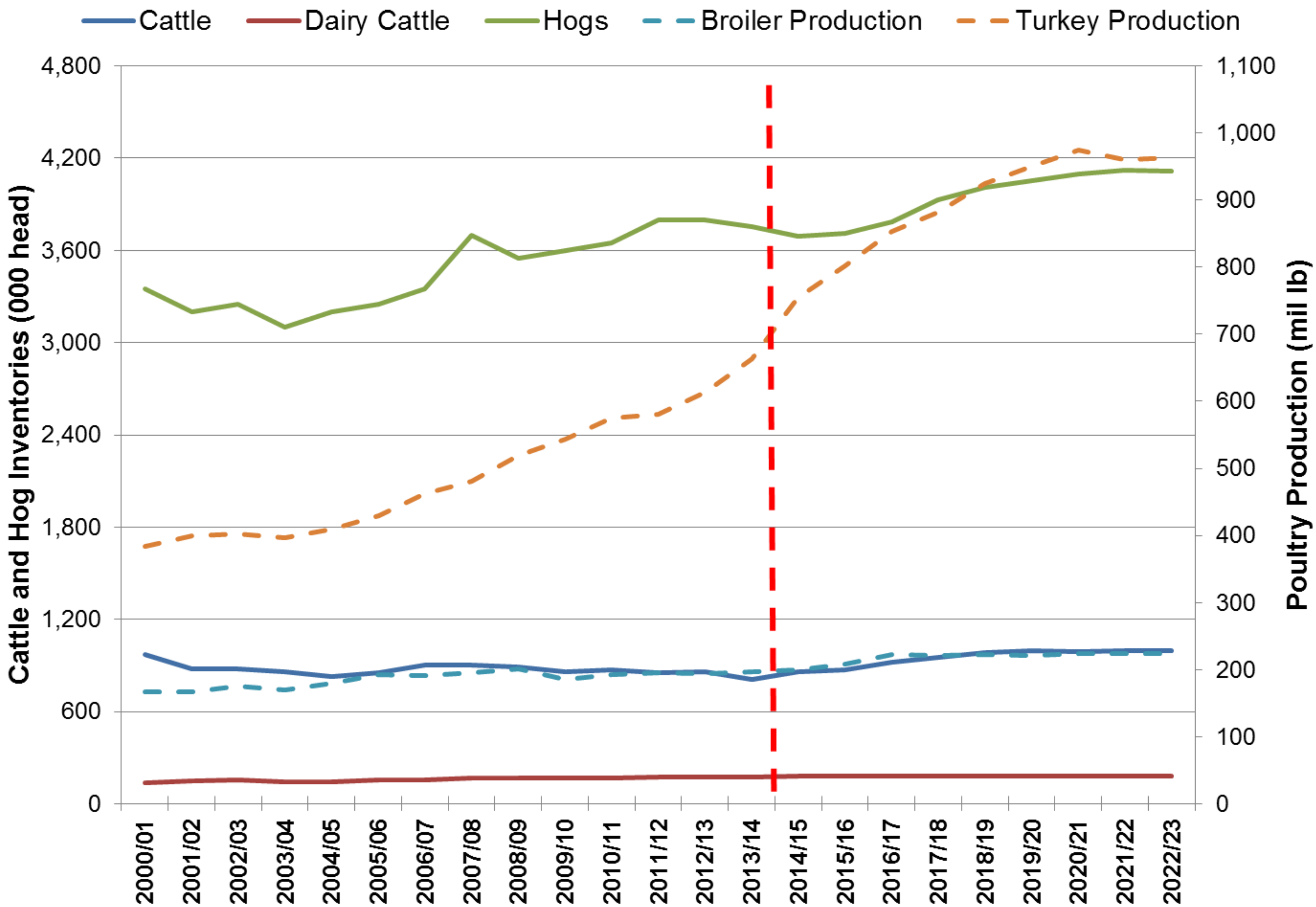


Source: Informa (Forecast), USDA (History)

5. INDIANA

- Indiana's hog inventories reached 3.8 million head in 2013/14, and are anticipated to increase by 10%, to 4.1 million in 2022/23. The hog herd accounts for approximately 6% of U.S. total herd.
- Indiana's turkey production reached 663 million pounds in 2013/14, and is expected to increase to 963 million (45%) in 2022/23.
- Broiler production in Indiana is moderate at 197 million pounds, but will grow by approximately 14% to 224 million in 2022/23.
- Cattle inventories in Indiana will rise by 23%, from 810 thousand head in 2013/14 to 997 thousand in 2022/23. However, dairy cattle inventories are anticipated to also increase by 5% to 182 thousand head in 2022/23.

Figure 37: Indiana Livestock Inventories and Poultry Production



Source: Informa (Forecast), USDA (History)

6. IOWA

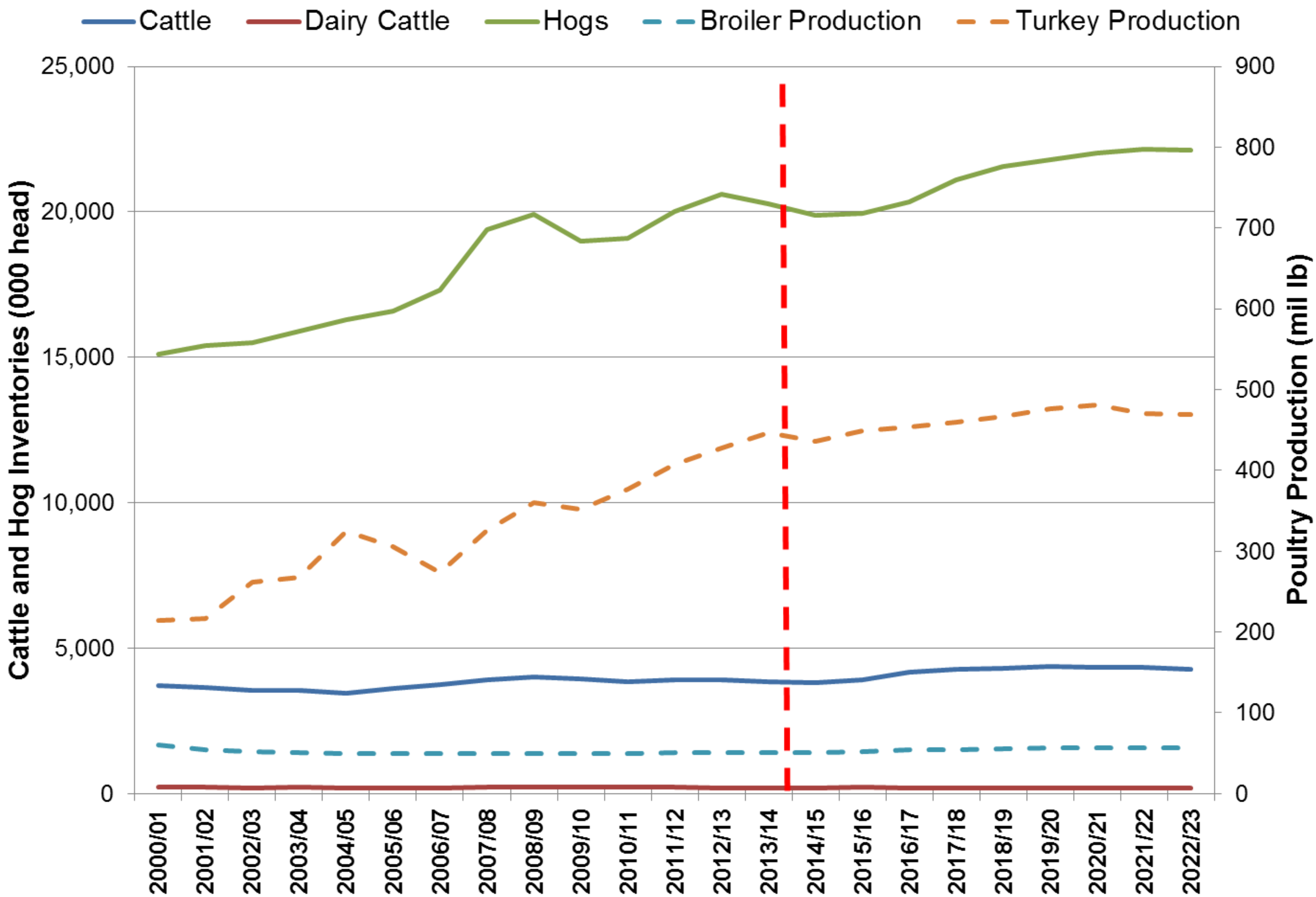
- Iowa is the largest producer of hogs within the selected states, with inventories totaling 20.3 million head in 2013/14, 31% of total U.S. inventories. Iowa's hog inventories are expected to increase by 9% to 22.1 million head in 2022/23.

- Cattle inventories in Iowa are expected to increase 11%, from 3.9 million head in 2013/14 to 4.3 million in 2022/23. However, dairy cattle inventories, 205 thousand head in 2013/14, are anticipated to remain stagnant through 2022/23.

- Iowa's turkey production reached 447 million pounds in 2013/14 and is expected to increase by 5% to 469 million pounds in 2022/23.

- Broiler production in Iowa is expected to increase by 12%, from 51 million pounds in 2013/14 to 57 million in 2022/23.

Figure 38: Iowa Livestock Inventories and Poultry Production



Source: Informa (Forecast), USDA (History)

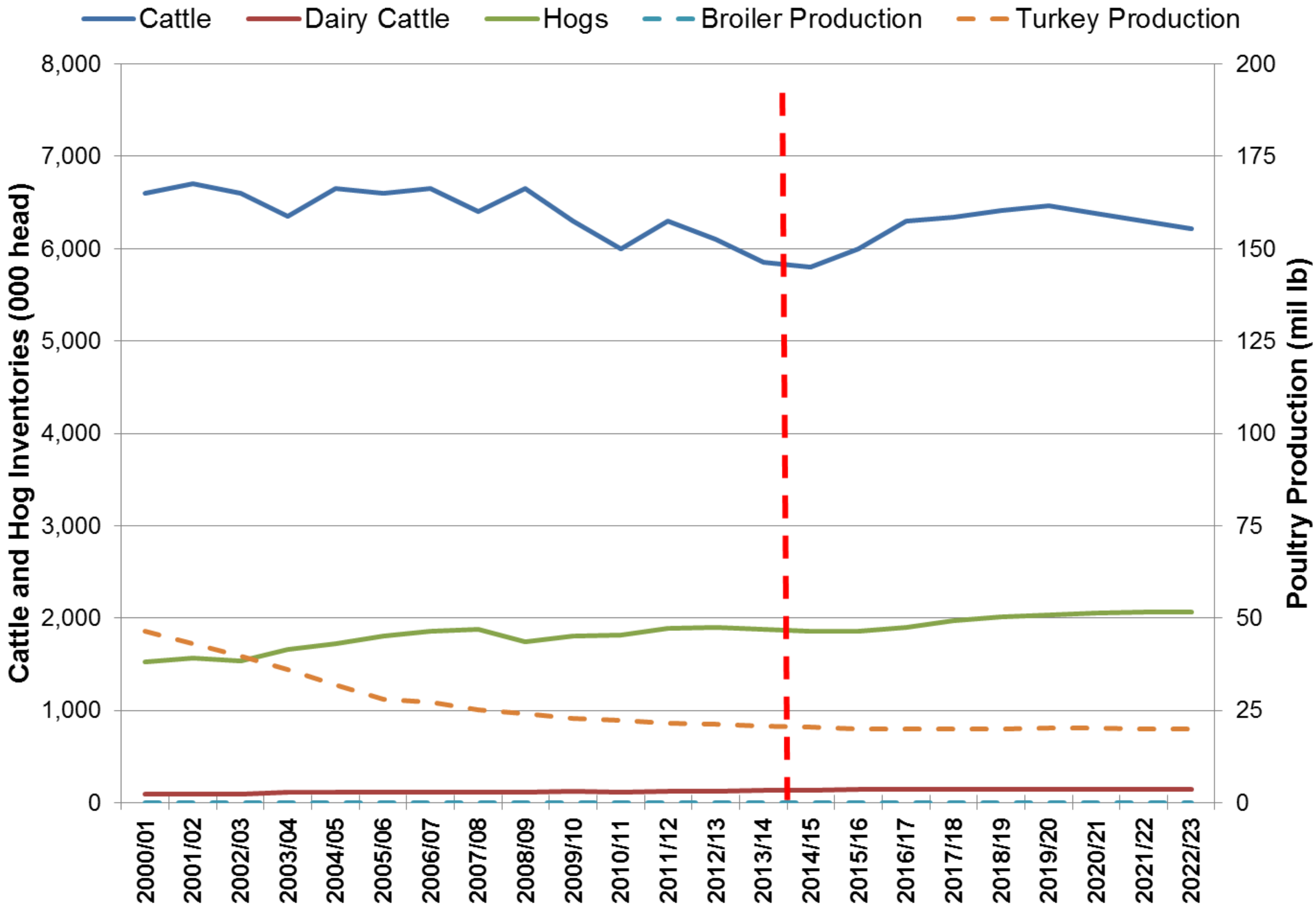
7. KANSAS

- Kansas is a large producer of beef, with cattle inventories reaching 5.9 million head in 2013/14, approximately 6% of U.S. total cattle inventories. Throughout the upcoming years, until 2022/23 cattle inventories in the state are expected to increase by 6% to 6.2 million head in 2022/23. The dairy cattle herd in Kansas is expected to rise 13% to 149 thousand head throughout 2022/23.

- Hog inventories in Kansas for 2013/14 were 1.9 million head. Through 2022/23, these inventories are expected to increase by 9% to 2 million head.

- Turkey production in Kansas totaled 21 million pounds for 2013/14. Production is expected to decline by 4% to 20 million pounds in 2022/23.

Figure 39: Kansas Livestock Inventories and Poultry Production



Source: Informa (Forecast), USDA (History)

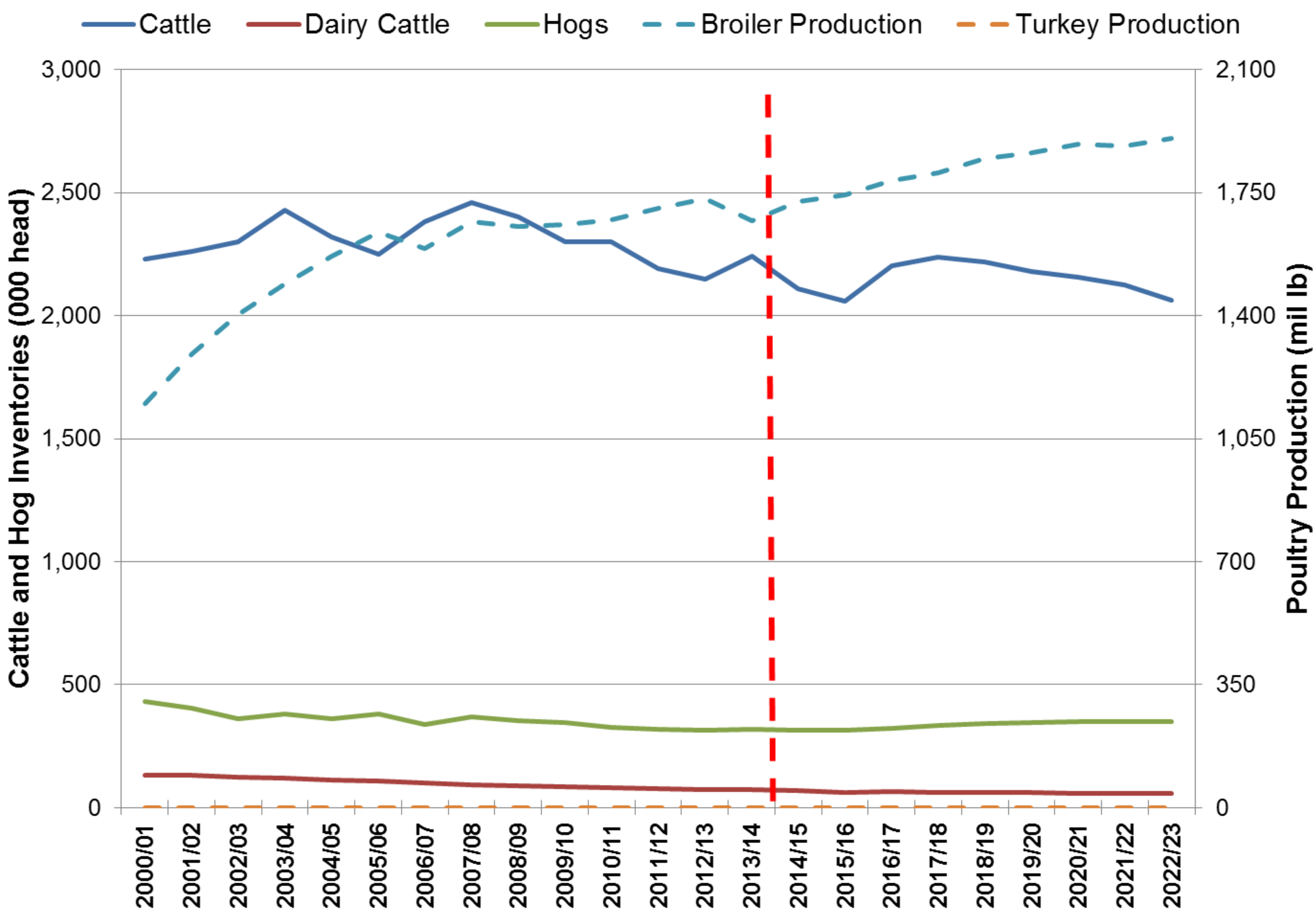
8. KENTUCKY

- Kentucky cattle inventories reached 2.2 million head in 2013/14, 2% of total U.S. cattle inventories. By 2022/23, cattle inventories are expected to contract by 8% to 2.1 million head. Dairy cattle inventories are anticipated to decrease by 19%, from 72 thousand head in 2013/14 to 58 thousand in 2022/23.

- Broiler production in Kentucky totaled 1.7 billion pounds in 2013/14, approximately 3% of U.S. broiler production levels. Kentucky's broiler production is expected to expand by 14%, to 1.9 billion pounds in 2022/23.

- Hog inventories are expected to increase by 10%, from 2013/14 levels of 318 thousand head to 350 thousand in 2022/23.

Figure 40: Kentucky Livestock Inventories and Poultry Production



Source: Informa (Forecast), USDA (History)

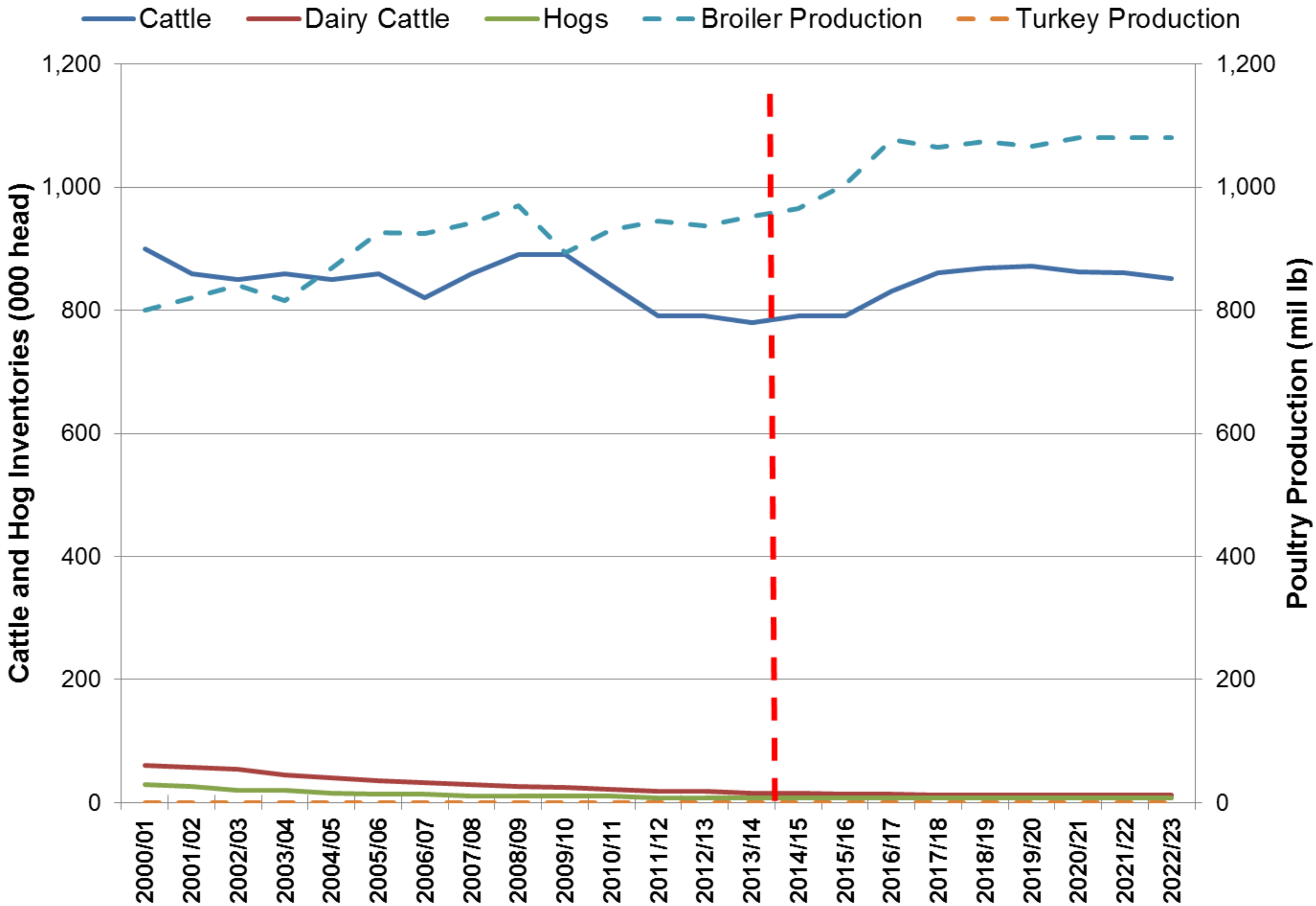
9. LOUISIANA

- Broiler production in Louisiana totaled 953 million pounds in 2013/14, approximately 2% of U.S. broiler production levels. Louisiana's broiler production is expected to expand by 13%, to 1.1 billion pounds in 2022/23.

- Cattle inventories in Louisiana reached 780 thousand head in 2013/14, and expected to expand by 9%, through 2022/23 to 852 thousand head. However, dairy cattle inventories in the state are expected to decrease by 25% from 16 thousand head in 2013/14 to 12 thousand in 2022/23.

- Louisiana's hog inventories are anticipated to increase by 14% through 2022/23, from 7 thousand head in 2013/14 to 8 thousand head in 2022/23.

Figure 41: Louisiana Livestock Inventories and Poultry Production



Source: Informa (Forecast), USDA (History)

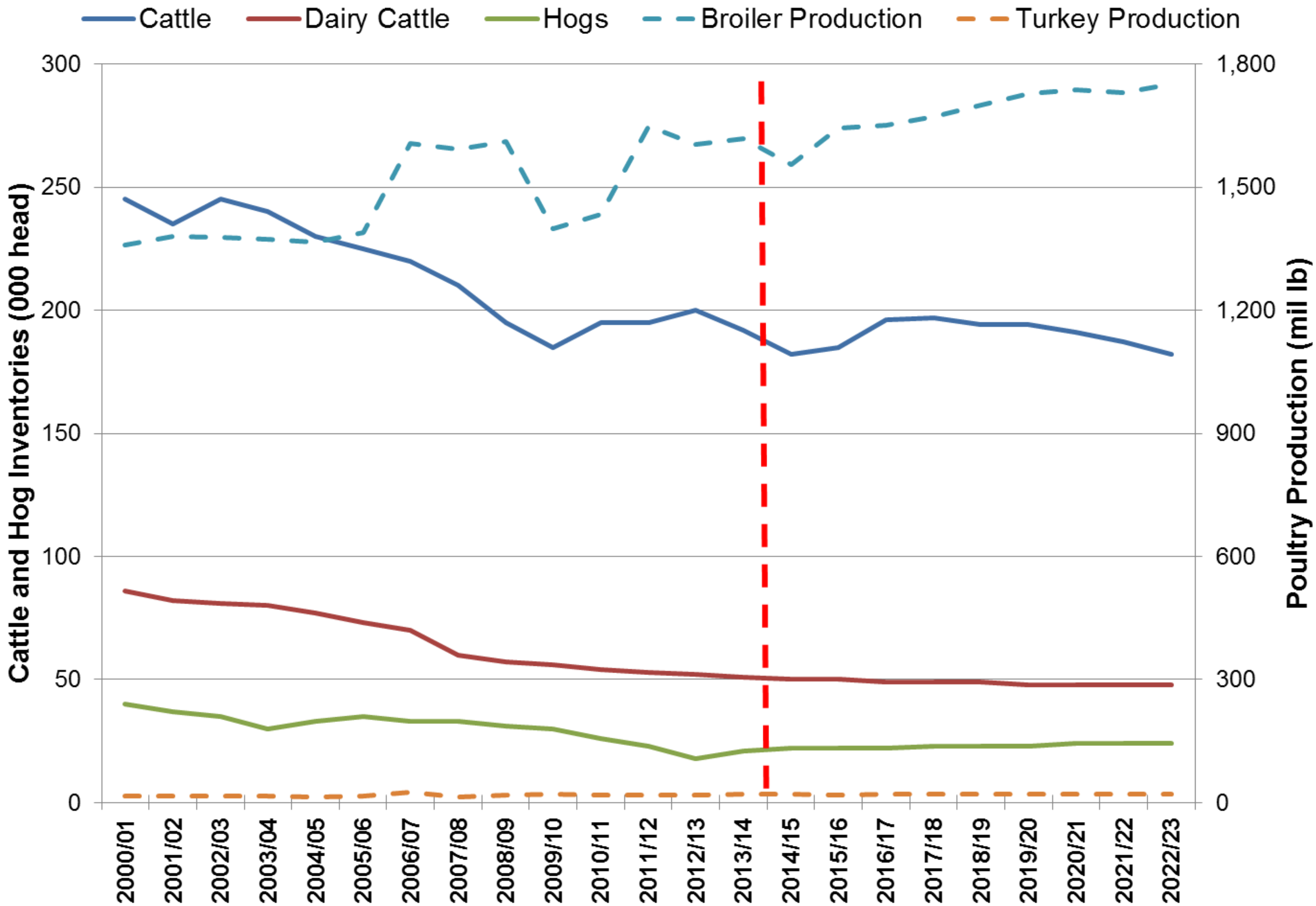
10. MARYLAND

- Maryland's broilers are the highest of its livestock inventories. The state's production levels are expected to increase 8%, from 1.6 billion pounds in 2013/14 to 1.8 billion pounds in 2022/23.

- Cattle inventories in Maryland reached 192 thousand head in 2013/14, and expected to decline, by 5%, through 2022/23 to 182 thousand head. Dairy cattle inventories in the state are expected to decrease by 6%, from 51 thousand head in 2013/14 to 48 thousand in 2022/23.

- Maryland's hog inventories are anticipated to increase by 14% through 2022/23, from 21 thousand head in 2013/14 to 24 thousand head in 2022/23.

Figure 42: Maryland Livestock Inventories and Poultry Production



Source: Informa (Forecast), USDA (History)

11. MICHIGAN

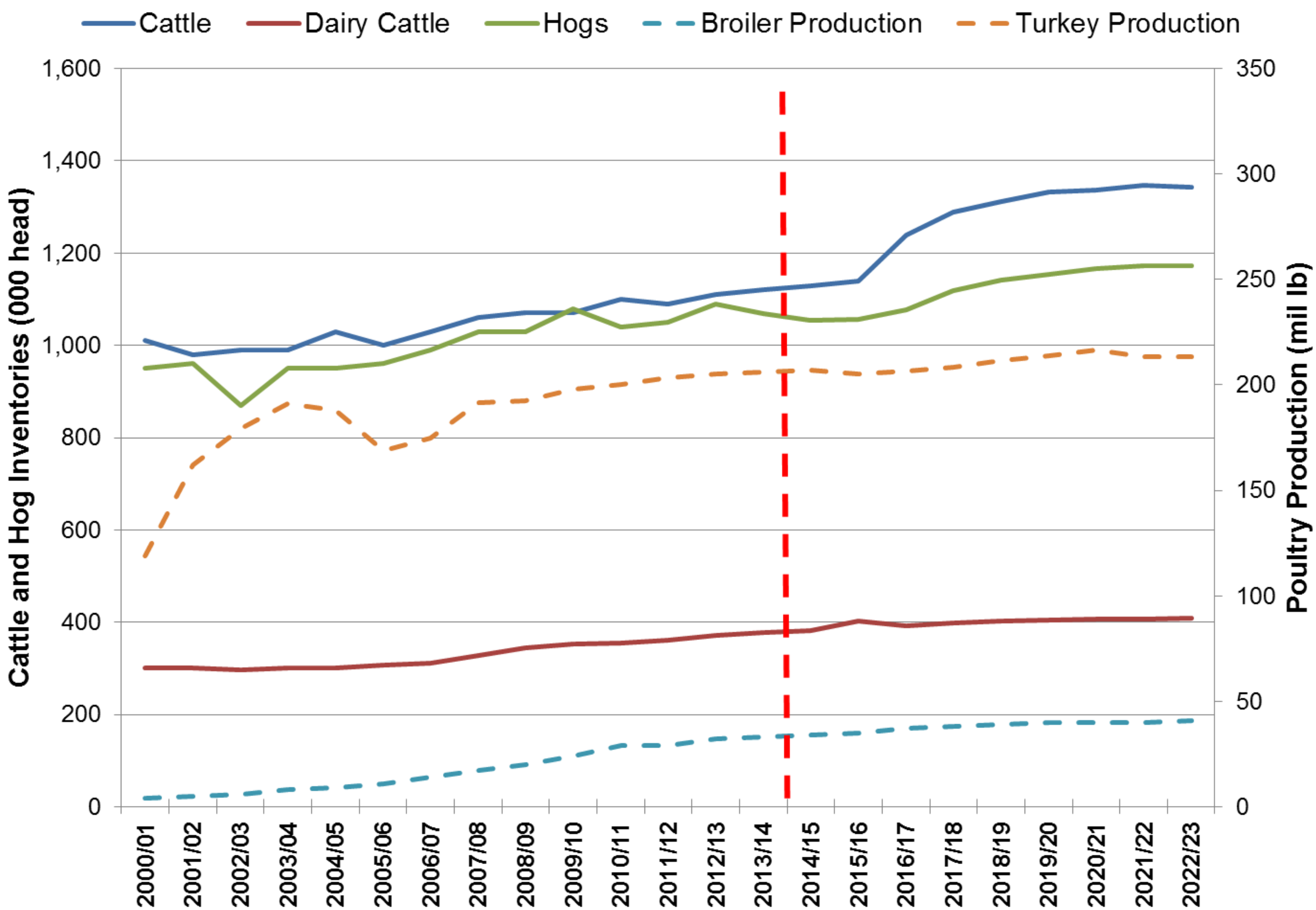
- Michigan cattle inventories reached 1.1 million head in 2013/14, and are expected to increase by 20% to 1.3 million by 2022/23. Dairy cattle inventories are expected to increase by 8%, from 377 thousand head in 2013/14 to 408 thousand in 2022/23. This inventory level represents 4% of total U.S. dairy cattle inventories.

- Hog inventories in Michigan are expected to increase by 10%, from 1.1 million head in 2013/14 to 1.2 million by 2022/23. Michigan's hog inventories represent approximately 2% of total U.S. hog inventories.

- Turkey production in Michigan reached 206 million pounds in 2013/14 and is anticipated to increase 4% by 2022/23, reaching 213 million.

- Broiler production in Michigan is expected to increase by 24%, from 33 million pounds in 2013/14 to 41 million in 2022/23.

Figure 43: Michigan Livestock Inventories and Poultry Production



Source: Informa (Forecast), USDA (History)

12. MINNESOTA

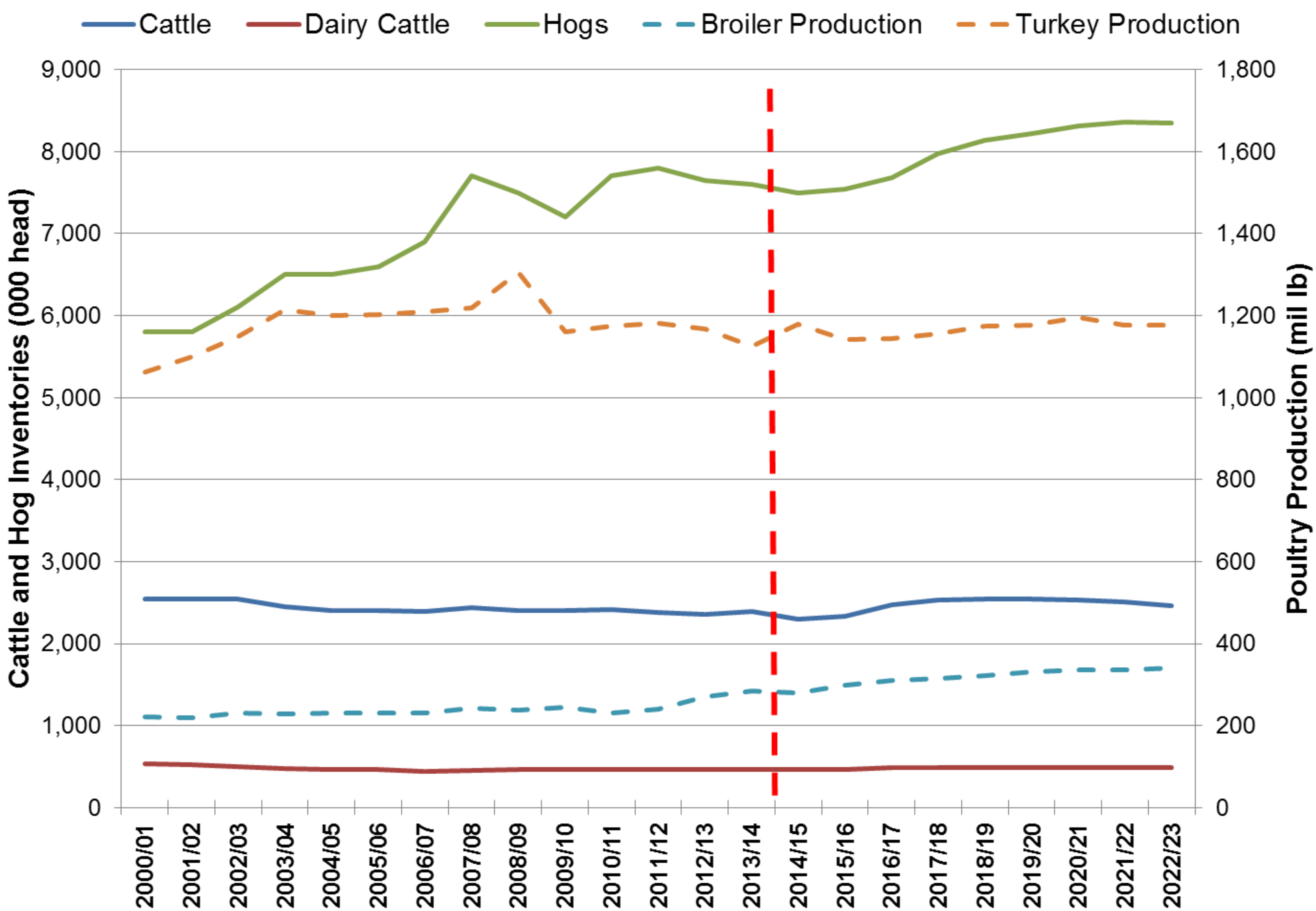
- Minnesota is the largest producer of turkeys within the selected states, and accounts for 12% of total U.S. inventories, with state herd size at 7.6 million head in 2013/14. Turkey production is expected to increase by 10% through 2022/23, reaching 8.4 million head in 2022/23.

- Hogs are Minnesota's second largest livestock, and accounts for 12% of total U.S. inventories. Hog inventories are anticipated to increase by 10% through 2022/23, from 7.6 million head in 2013/14 to 8.4 million head in 2022/23.

- Cattle inventories in Minnesota reached 2.4 million head in 2013/14, and are expected to increase by 3%, to 2.5 million head in 2022/23. Dairy cattle herd size is also expected to increase by nearly 6%, from 465 thousand head in 2013/14 to 491 thousand head in 2022/23.

- Broiler production is expected to increase by 20%, from 284 million pounds in 2013/14 to 340 million pounds in 2022/23. This number represents only a small percentage (1%) of total U.S. broiler production.

Figure 44: Minnesota Livestock Inventories and Poultry Production



Source: Informa (Forecast), USDA (History)

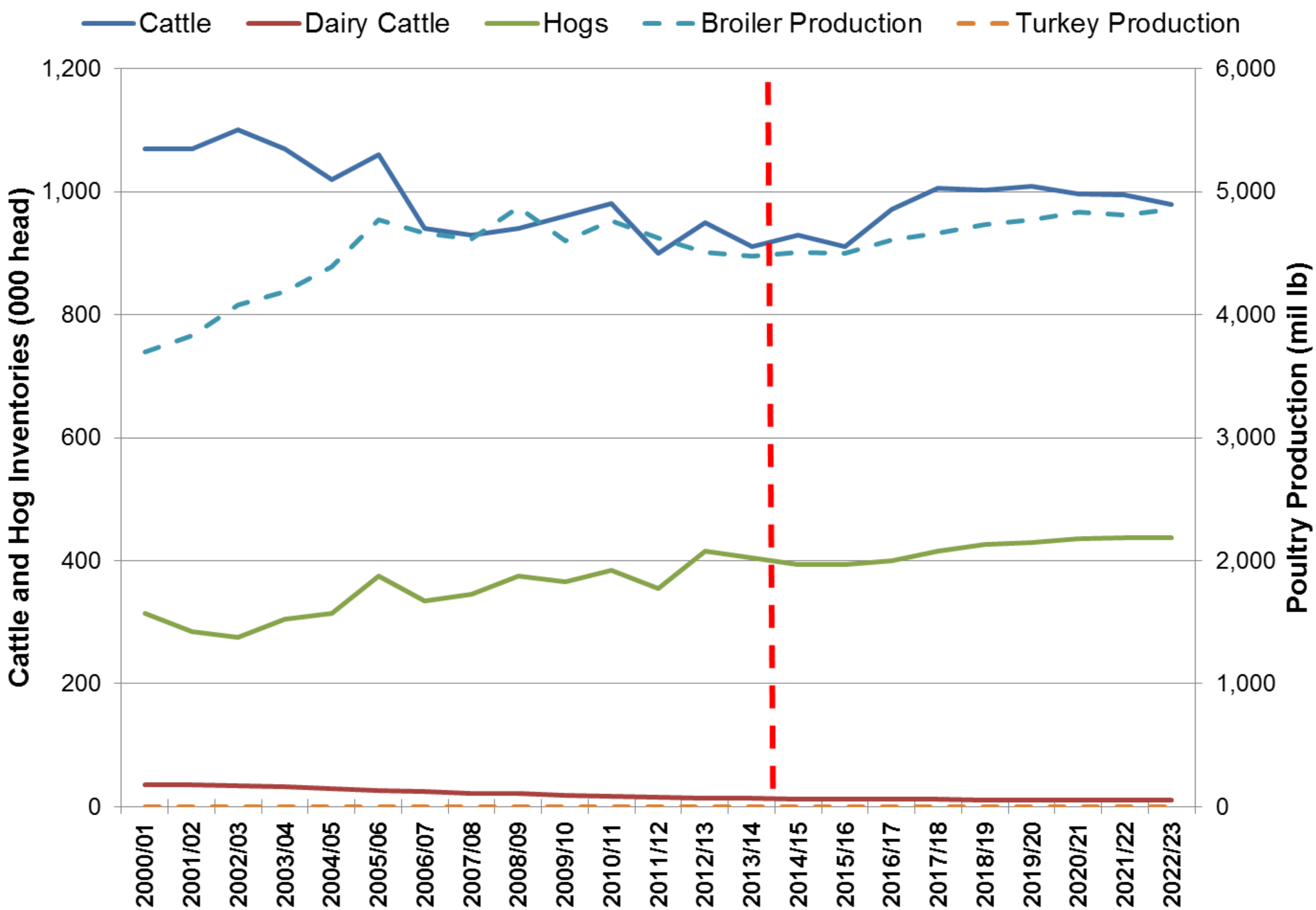
13. MISSISSIPPI

- Broiler production in Mississippi represents 9% of total U.S. broiler production. The state's production levels are expected to increase 9%, from 4.5 billion pounds in 2013/14 to 4.9 billion pounds in 2022/23.

- Cattle inventories in Mississippi reached 910 thousand head in 2013/14, and expected to expand, by 8%, through 2022/23 to 979 thousand head. Dairy cattle inventories in the state are expected to decrease by 21%, from 14 thousand head in 2013/14 to 11 thousand in 2022/23.

- Mississippi's hog inventories are anticipated to increase by 8% through 2022/23, from 404 thousand head in 2013/14 to 437 thousand head.

Figure 45: Mississippi Livestock Inventories and Poultry Production



Source: Informa (Forecast), USDA (History)

14. MISSOURI

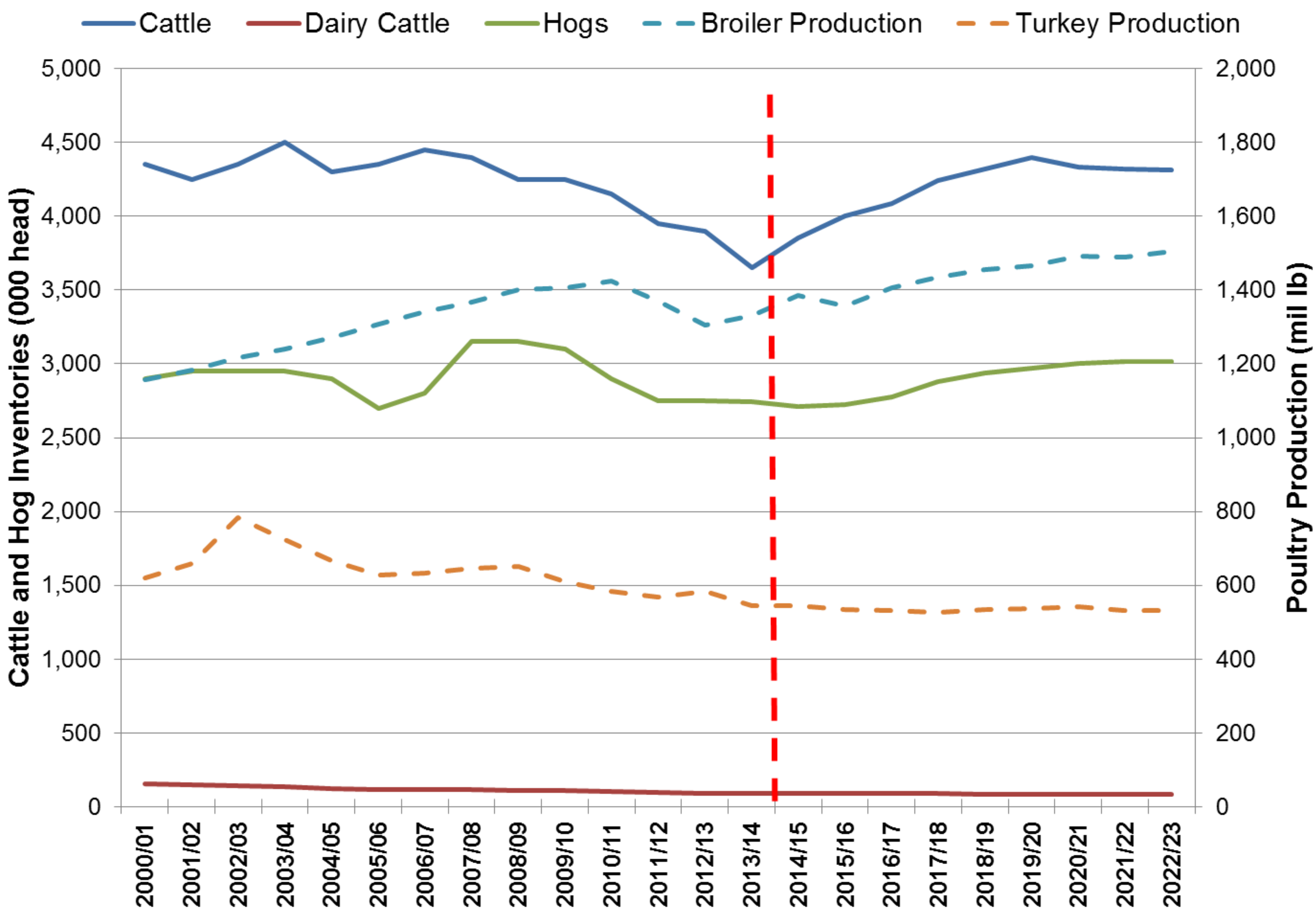
- Cattle inventories in Missouri totaled 3.7 million head in 2013/14, and are expected to increase 18% to 4.3 million head in 2022/23. Missouri's total cattle inventories represent approximately 4% of total U.S. cattle inventories. Dairy cattle inventories in the state are anticipated to decrease by 9%, from 93 thousand head in 2013/14 to 85 thousand head in 2022/23.

- In 2013/14, broiler production reached 1.3 billion pounds, and is expected to increase 13% to 1.5 billion in 2022/23. Broiler production in Missouri represents 3% of total U.S. broiler production.

- Missouri's turkey production represents 7% of total U.S. turkey production. In 2013/14, production reached 544 million pounds. By 2022/23, production is anticipated to decrease 2%, to 531 million pounds.

- Hog inventories in Missouri are anticipated to increase 10%, from 2.7 million head in 2013/14 to 3 million head in 2022/23. Missouri hog inventories represent 4% of total U.S. hog inventories.

Figure 46: Missouri Livestock Inventories and Poultry Production



Source: Informa (Forecast), USDA (History)

15. NEBRASKA

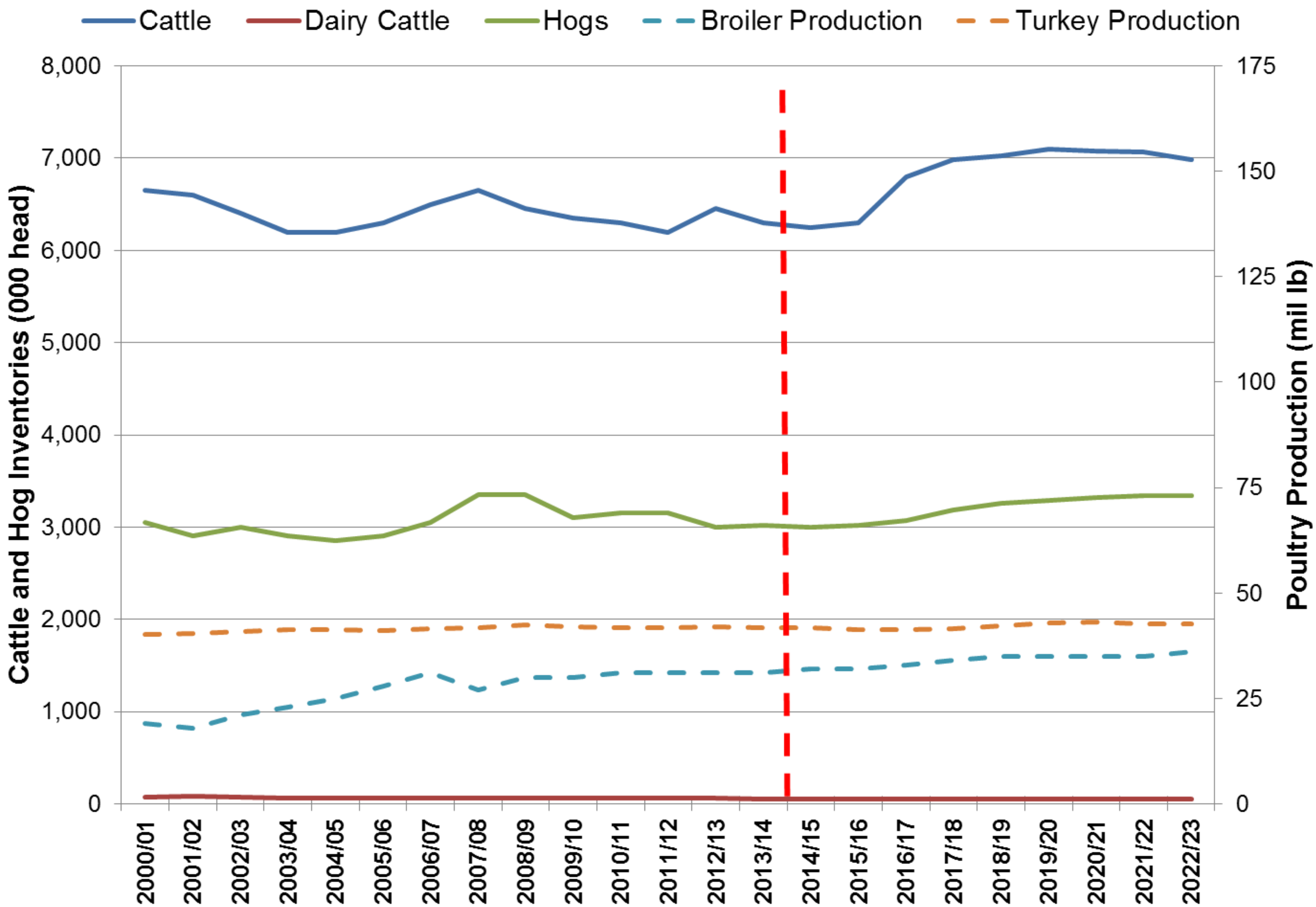
- Nebraska is the largest producer out of the selected states for cattle, and accounts for 7% of total U.S. inventories. In 2013/14, the Nebraska herd totaled 6.3 million head. The herd size is expected to increase 11% to nearly 7 million head in 2022/23. Dairy cattle inventories are expected to contract 7%, from 55 thousand head in 2013/14 to 51 thousand in 2022/23.

- Hog inventories in Nebraska are anticipated to increase by 10%, from 3 million head in 2013/14 to 3.3 million by 2022/23. Nebraska's hog inventories represent 5% of total U.S. hog herd size.

- Nebraska's turkey production is anticipated to grow by 2%, from 42 million pounds in 2013/14 to 43 million pounds in 2022/23. Production of turkey in Nebraska represents 1% of U.S. turkey production.

- Broiler production in Nebraska was 31 million pounds in 2013/14 and is anticipated to increase 16% to 36 million pounds in 2022/23. Nebraska's broiler production represents less than 1% of total U.S. broiler production.

Figure 47: Nebraska Livestock Inventories and Poultry Production



Source: Informa (Forecast), USDA (History)

16. NEW YORK

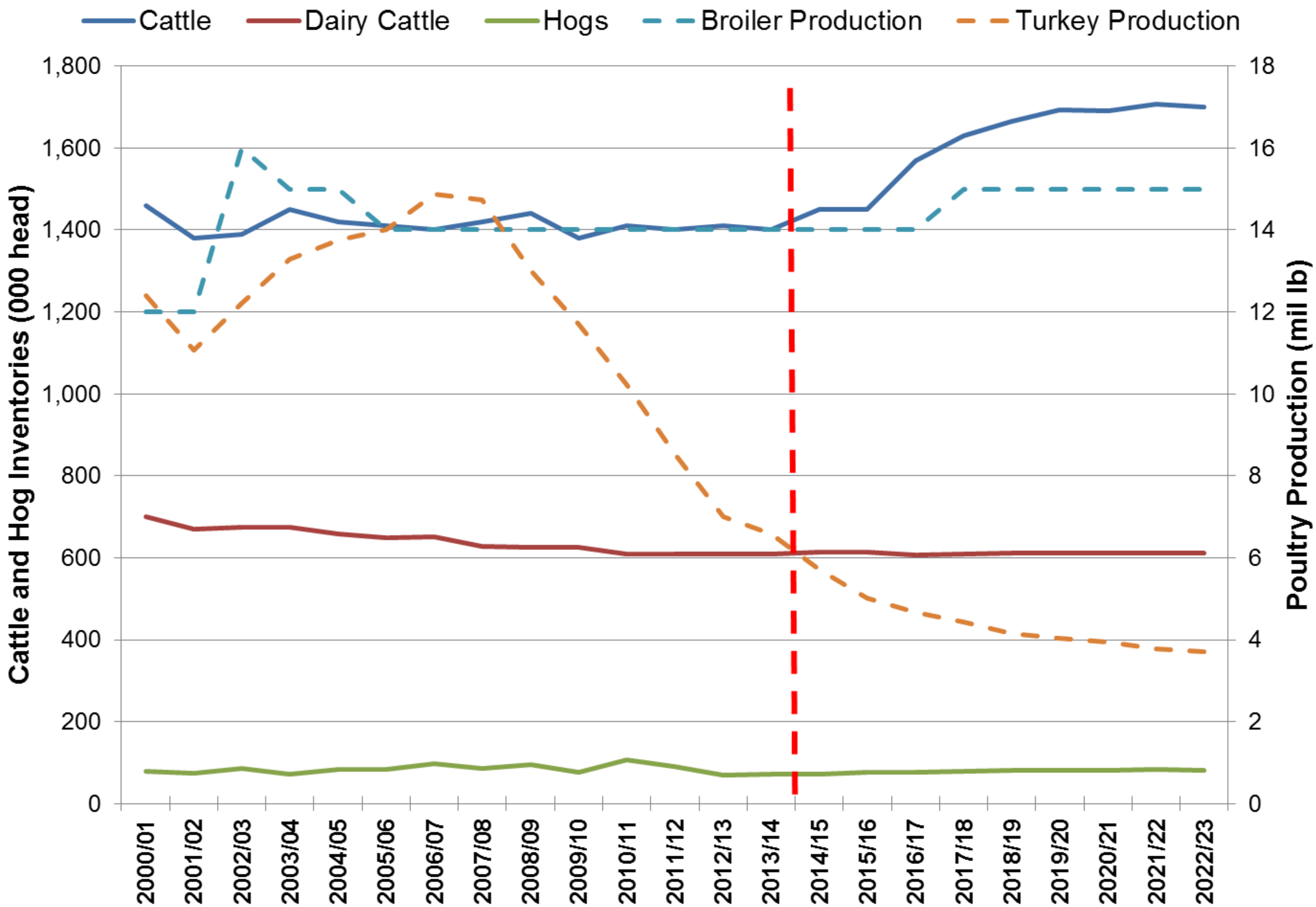
- New York is a large producer of dairy cattle, and accounts for 7% of total U.S. inventories. Dairy cattle inventories in the state are expected to slightly increase from 610 thousand head in 2013/14 to 611 thousand in 2022/23.Cattle inventories in New York reached 1.4 million head in 2013/14, and expected to expand by 22% through 2022/23 to 1.7 million head.

- Hog inventories are anticipated to increase by 15% through 2022/23, from 71 thousand head in 2013/14 to 82 thousand head. These levels represent less than 1% of total U.S. hog inventories.

- New York's turkey production totaled 4 million pounds in 2013/14, representing approximately less than 1% of total U.S. turkey production. Through 2022/23, production is anticipated to decrease by 44%, reaching 4 million pounds.

- Broiler production in New York represents 10% of total U.S. broiler production. The state's production levels are expected to increase 12%, from 4.6 billion pounds in 2013/14 to 5.2 billion pounds in 2022/23.

Figure 48: New York Livestock Inventories and Poultry Production



Source: Informa (Forecast), USDA (History)

17. NORTH CAROLINA

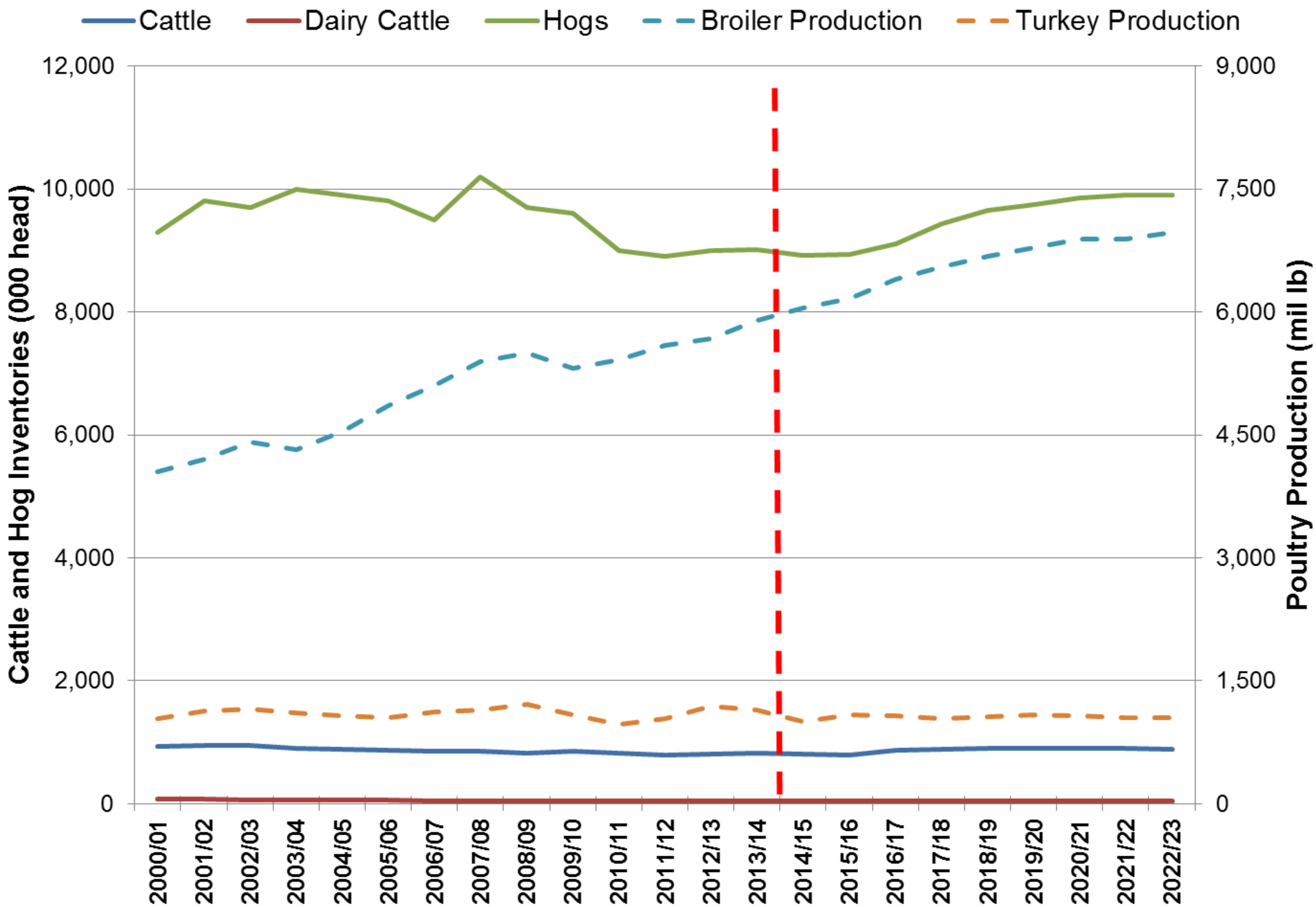
- North Carolina is a large producer of poultry, and is expected to increase production through 2022/23. In 2013/14, North Carolina's poultry production accounted for 12% of U.S. production levels. Broiler production is expected to experience growth, increasing 18% from 5.9 billion pounds in 2013/14 to 7 billion in 2022/23.

- Turkey production in North Carolina is expected to experience a decline (7%) throughout the forecast period, going from 1.1 billion pounds in 2013/14 to 1.0 billion in 2022/23. North Carolina turkey production represents 16% of total U.S. turkey production.

- North Carolina is also a large producer of hogs, and represents approximately 14% of total U.S. hog inventories. Inventories are expected to increase by 10%, from 9 million head in 2013/14 to nearly 10 million in 2022/23.

- Cattle inventories in North Carolina are expected to increase 8%, from 820 thousand head in 2013/14 to 886 thousand in 2022/23. Dairy cattle inventories are expected to slightly increase 2%, from 46 thousand head in 2013/14 to 47 thousand in 2022/23. Cattle inventories in North Carolina represent only a minor share (approximately 1%) of total U.S. inventories.

Figure 49: North Carolina Livestock Inventories and Poultry Production



Source: Informa (Forecast), USDA (History)

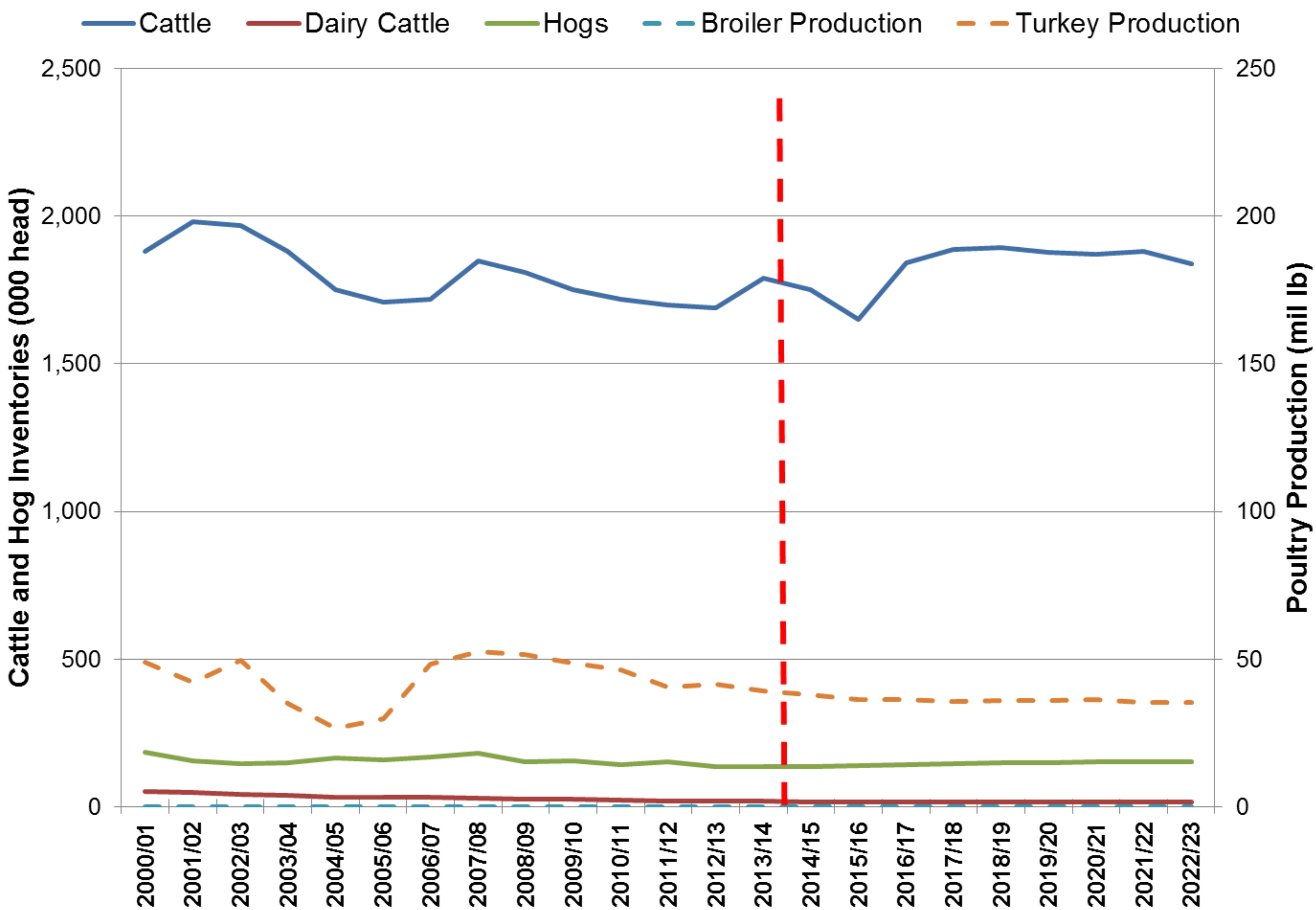
18. NORTH DAKOTA

- Cattle inventories in North Dakota are expected to increase 3%, from 1.7 million head in 2013/14 to 1.8 million in 2022/23. Dairy cattle inventories are expected to decrease 17%, from 18 thousand head in 2013/14 to 15 thousand in 2022/23. Cattle inventories in North Dakota represent approximately 2% of total U.S. inventories.

- Turkey production is expected to experience a decline within the state by 10%, from 39 million pounds in 2013/14 to 35 million pounds in 2022/23. North Dakota's turkey production amounts to merely 1% of total U.S. turkey production.

- North Dakota's hog inventories are anticipated to increase in upcoming years by 12%, from 137 thousand head in 2013/14 to 153 thousand in 2022/23. This number accounts for less than 1% of total U.S. hog inventories.

Figure 50: North Dakota Livestock Inventories and Poultry Production



Source: Informa (Forecast), USDA (History)

19. OHIO

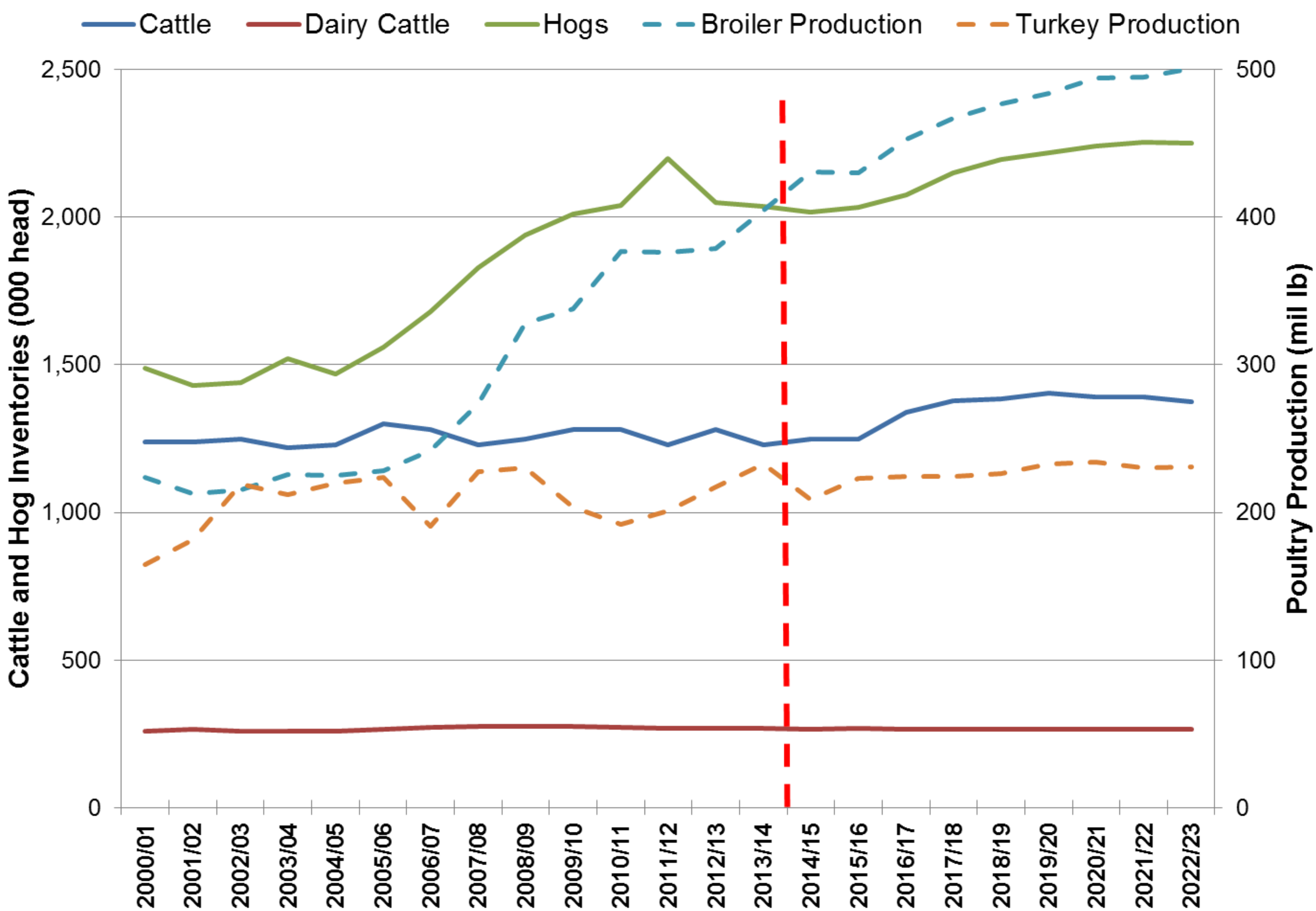
- Hog inventories are expected to increase 11%, from 2 million head in 2013/14 to 2.3 million head in 2022/23. Currently, the Ohio hog herd represents 3% of total U.S. hog inventories.

- Cattle inventories in Ohio are expected to expand 12% in upcoming years, from 1.2 million head in 2013/14 to 1.4 million by 2022/23. Dairy cattle inventories, on the other hand, are expected to contract 2%, from 270 thousand head in 2013/14 to 264 thousand in 2022/23. The Ohio dairy cattle herd represents approximately 3% of total U.S. inventories, while the cattle inventory represents 1% of total U.S. cattle inventories.

- In 2013/14, turkey production in Ohio totaled 233 million pounds. Production is expected to decline by 1% to 231 million pounds in 2022/23. This accounts for 3% of U.S. turkey production.

- Broiler production is expected to increase 24%, from 405 million pounds in 2013/14 to 501 million in 2022/23. Ohio's broiler production makes up 1% of total U.S. broiler production.

Figure 51: Ohio Livestock Inventories and Poultry Production



Source: Informa (Forecast), USDA (History)

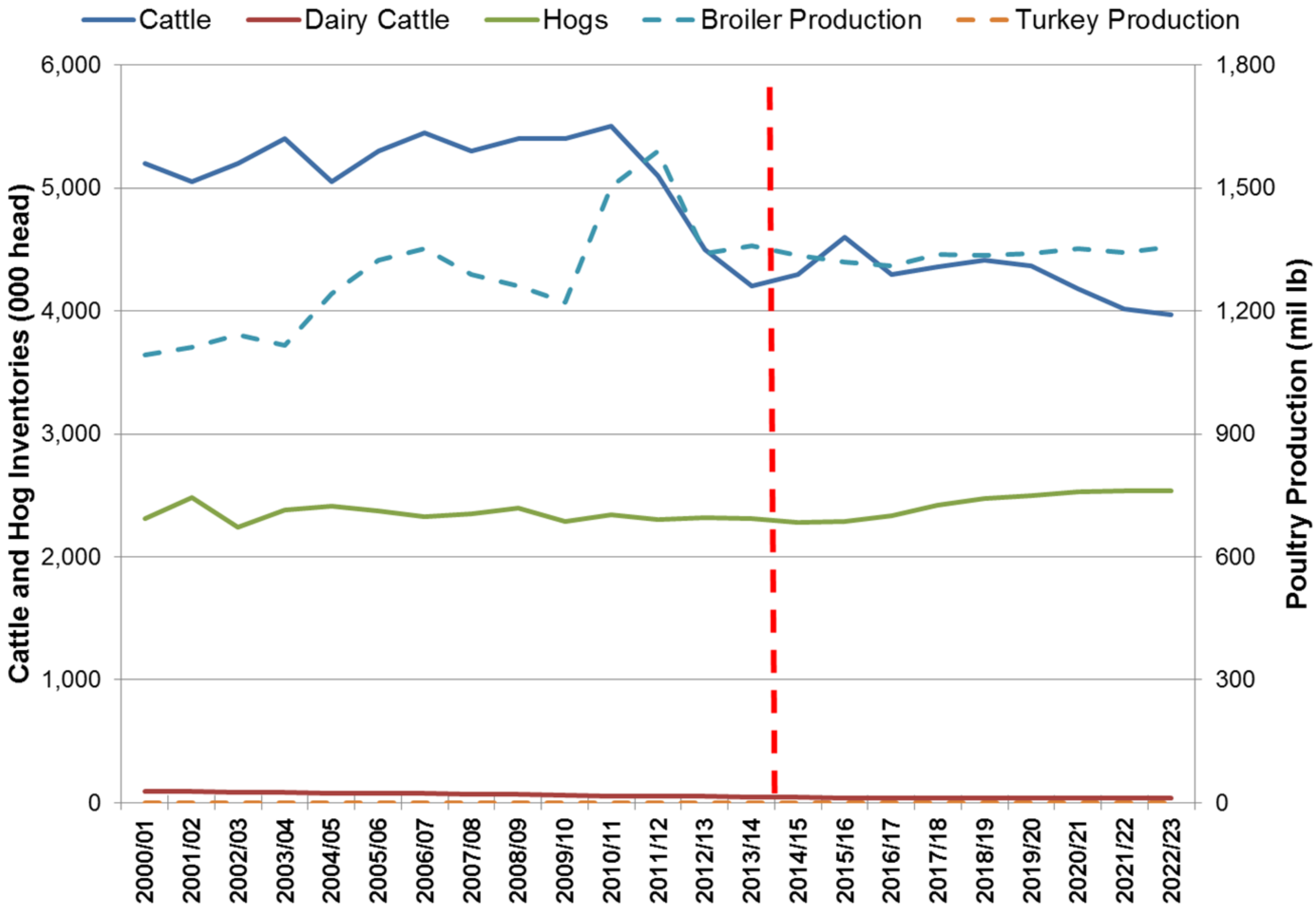
20. OKLAHOMA

- Oklahoma is a large producer of beef, with cattle inventories reaching 4.2 million head in 2013/14, approximately 5% of U.S. total cattle inventories. Throughout the upcoming years, until 2022/23 cattle inventories in the state are expected to decrease by 6% to 4 million head in 2022/23. The dairy cattle herd in Oklahoma is expected to decline to 35 thousand head throughout 2022/23.

- Hog inventories in Oklahoma for 2013/14 were 2.3 million head, 4% of U.S. total hog herds. Through 2022/23, these inventories are expected to increase by 10% to 2.5 million head.

- Broiler production in Oklahoma totaled 1.4 billion pounds for 2013/14. Production is expected to remain the same throughout 2022/23, approximately 3% of U.S. total broiler production.

Figure 52: Oklahoma Livestock Inventories and Poultry Production



Source: Informa (Forecast), USDA (History)

21. PENNSYLVANIA

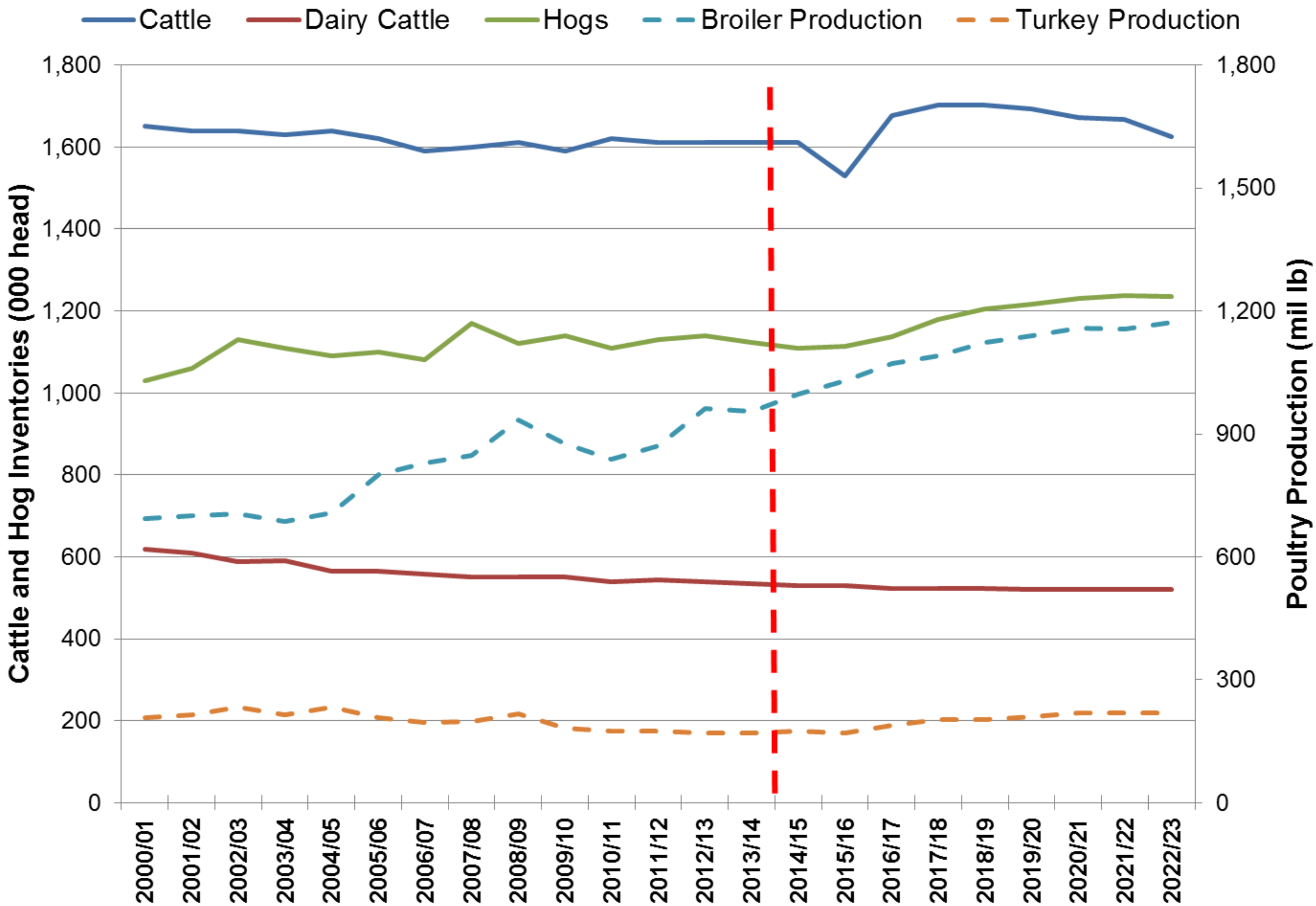
- Cattle inventories in Pennsylvania reached 1.6 million head in 2013/14, and expected to expand slightly by 1%, through 2022/23. Dairy cattle inventories in the state are expected to decrease by 3%, from 535 thousand head in 2013/14 to 520 thousand in 2022/23.These levels represents 6% of total U. S. dairy herds.

- Broiler production in Pennsylvania represents 2% of total U.S. broiler production. The state's production levels are expected to increase 23%, from 956 million pounds in 2013/14 to 1.2 billion pounds in 2022/23.

- Pennsylvania's turkey production is expected to experience major growth (28%) throughout the forecast period, increasing from 171 million pounds in 2013/14 to 219 million in 2022/23. Pennsylvania's turkey production represents 2% of total U.S. production.

- Pennsylvania's hog inventories are anticipated to increase by 10% through 2022/23, from 1.1 million head in 2013/14 to 1.2 million head. These levels represent 2% of total U.S. hog inventories.

Figure 53: Pennsylvania Livestock Inventories and Poultry Production



Source: Informa (Forecast), USDA (History)

22. SOUTH CAROLINA

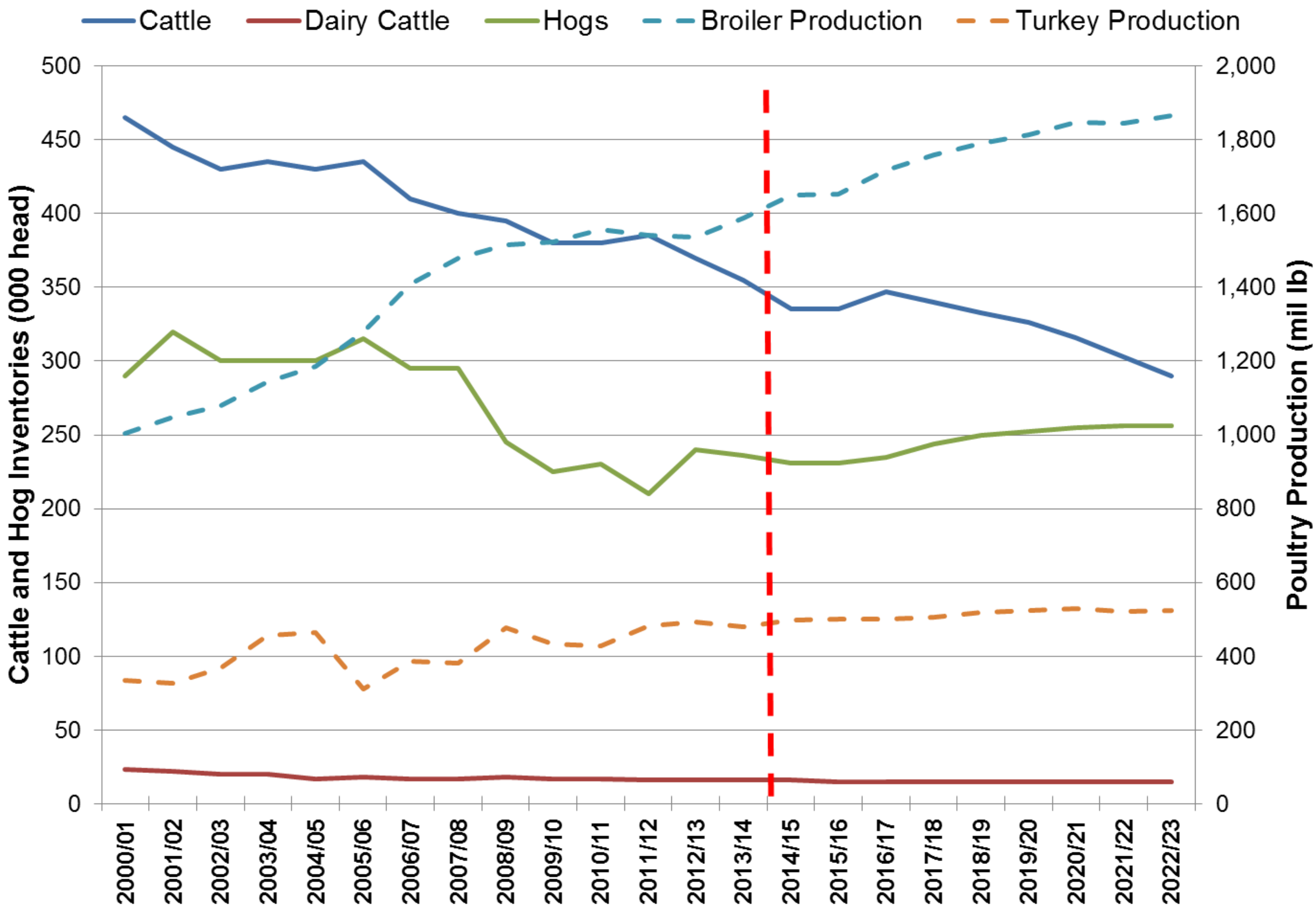
- Turkey production in South Carolina is expected to experience growth (9%) throughout the forecast period, increasing from 479 million pounds in 2013/14 to 524 million in 2022/23. South Carolina's turkey production represents 7% of total U.S. turkey production.

- Broiler production is expected to experience growth by 18%, from 1.6 billion pounds in 2013/14 to 1.9 billion in 2022/23. South Carolina's broiler production represents 3% of total U.S. broiler production.

- South Carolina's hog herd is expected to rise by 8%, from 236 thousand head in 2013/14 to 256 thousand in 2022/23.

- Cattle inventories in South Carolina are expected to contract 18%, from 355 thousand head in 2013/14 to 290 thousand in 2022/23. Dairy cattle inventories are expected to contract 6%, from 16 thousand head in 2013/14 to 15 thousand in 2022/23. Cattle inventories in South Carolina represent only a minor share (less than 1%) of total U.S. inventories.

Figure 54: South Carolina Livestock Inventories and Poultry Production



Source: Informa (Forecast), USDA (History)

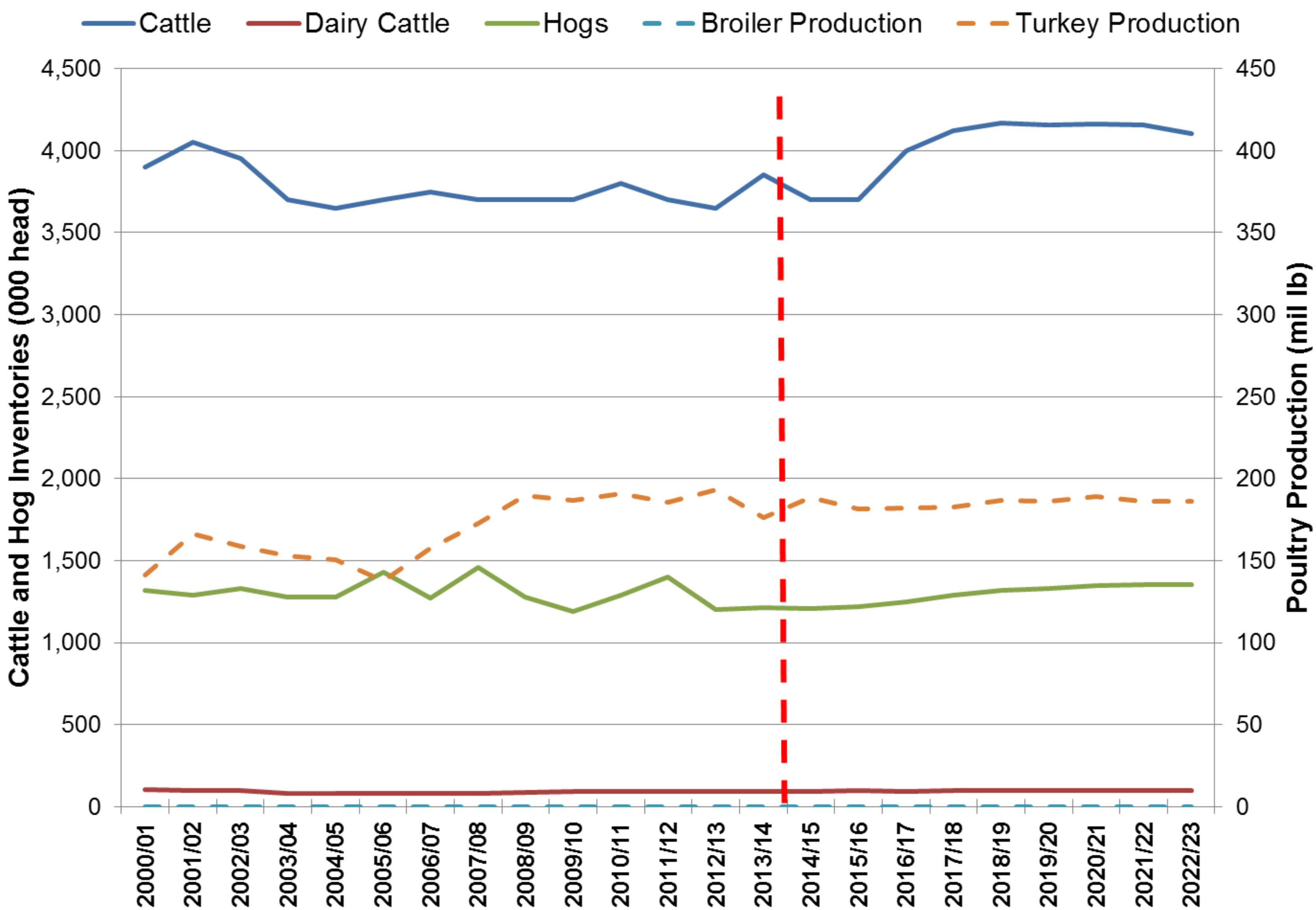
23. SOUTH DAKOTA

- South Dakota cattle inventories are expected to increase by approximately 7%, from 3.9 million head in 2013/14 to 4.1 million in 2022/23. The South Dakota herd represents 4% of total U.S. cattle inventories. Dairy cattle inventories are also expected to increase by 8%, from 92 thousand head in 2013/14 to nearly 1 million in 2022/23.

- Hog inventories are anticipated to expand 11%, increasing from 1.2 million head in 2013/14 to 1.4 million in 2022/23. These inventory levels account for 2% of total U.S. hog inventories.

- In 2013/14, turkey production in South Dakota was 176 million pounds, and is expected to increase 6% to 186 million pounds in 2022/23.

Figure 55: South Dakota Livestock Inventories and Poultry Production



Source: Informa (Forecast), USDA (History)

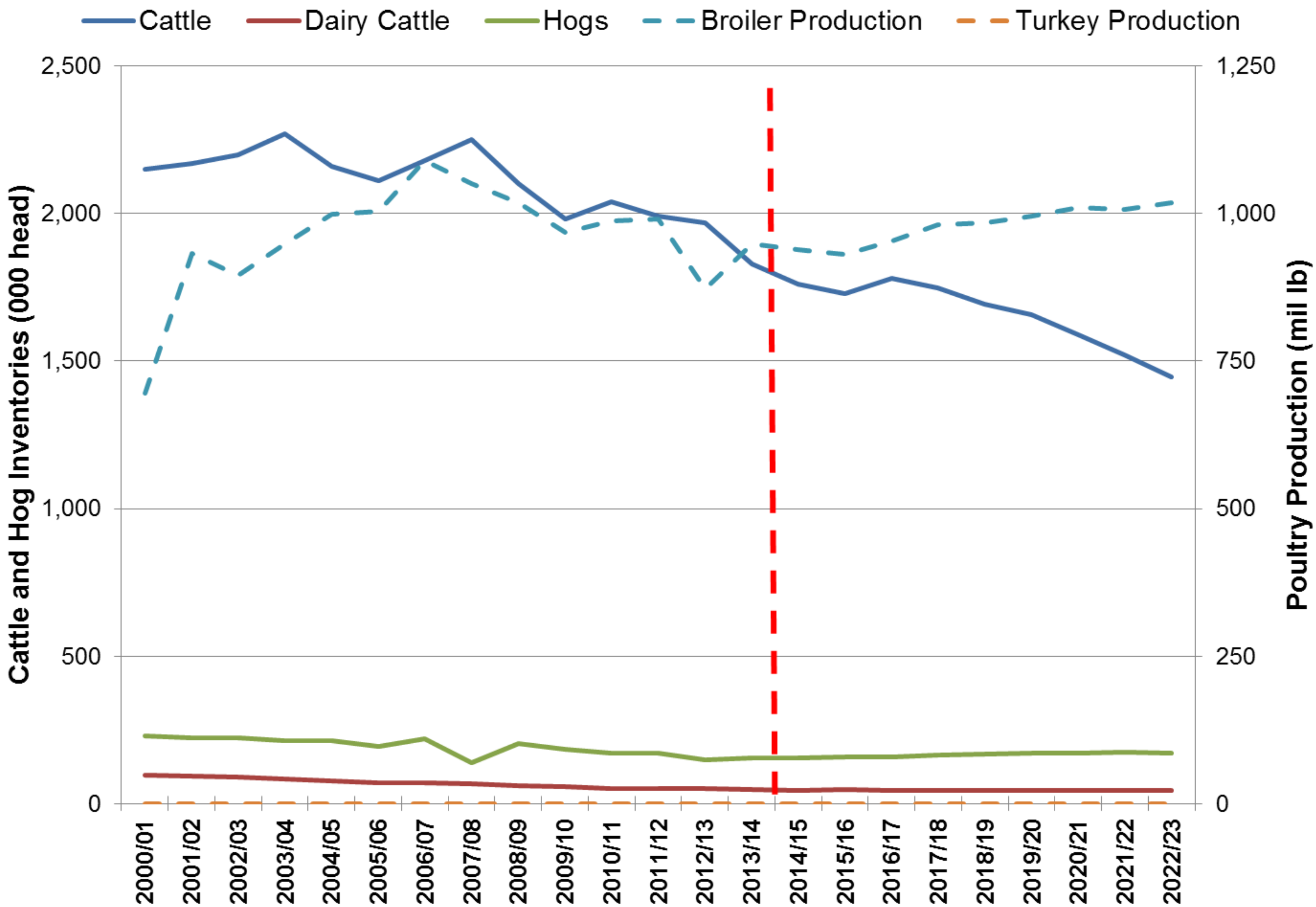
24. TENNESSEE

- Cattle inventories in Tennessee are anticipated to contract 21%, from nearly 1.8 million head in 2013/14 to 1.4 million in 2022/23. The Tennessee herd represents 2% of total U.S. cattle inventories. The dairy cattle herd is also expected to contract 8% dropping from 48 thousand head in 2013/14 to 44 thousand in 2022/23. However, the dairy cattle herd in Tennessee represents less than 1% of total U.S. dairy inventories.

- Tennessee's broiler production is expected to increase 7%, from 949 million pounds in 2013/14 to over 1.0 billion in 2022/23. These broiler production levels represent 2% of U.S. production.

- The hog herd in Tennessee is expected to increase 11%, from 156 thousand head in 2013/14 to 173 thousand head in 2022/23. However, the hog herd in Tennessee represents only a minor portion (less than 1%) of U.S. production.

Figure 56: Tennessee Livestock Inventories and Poultry Production



Source: Informa (Forecast), USDA (History)

25. VIRGINIA

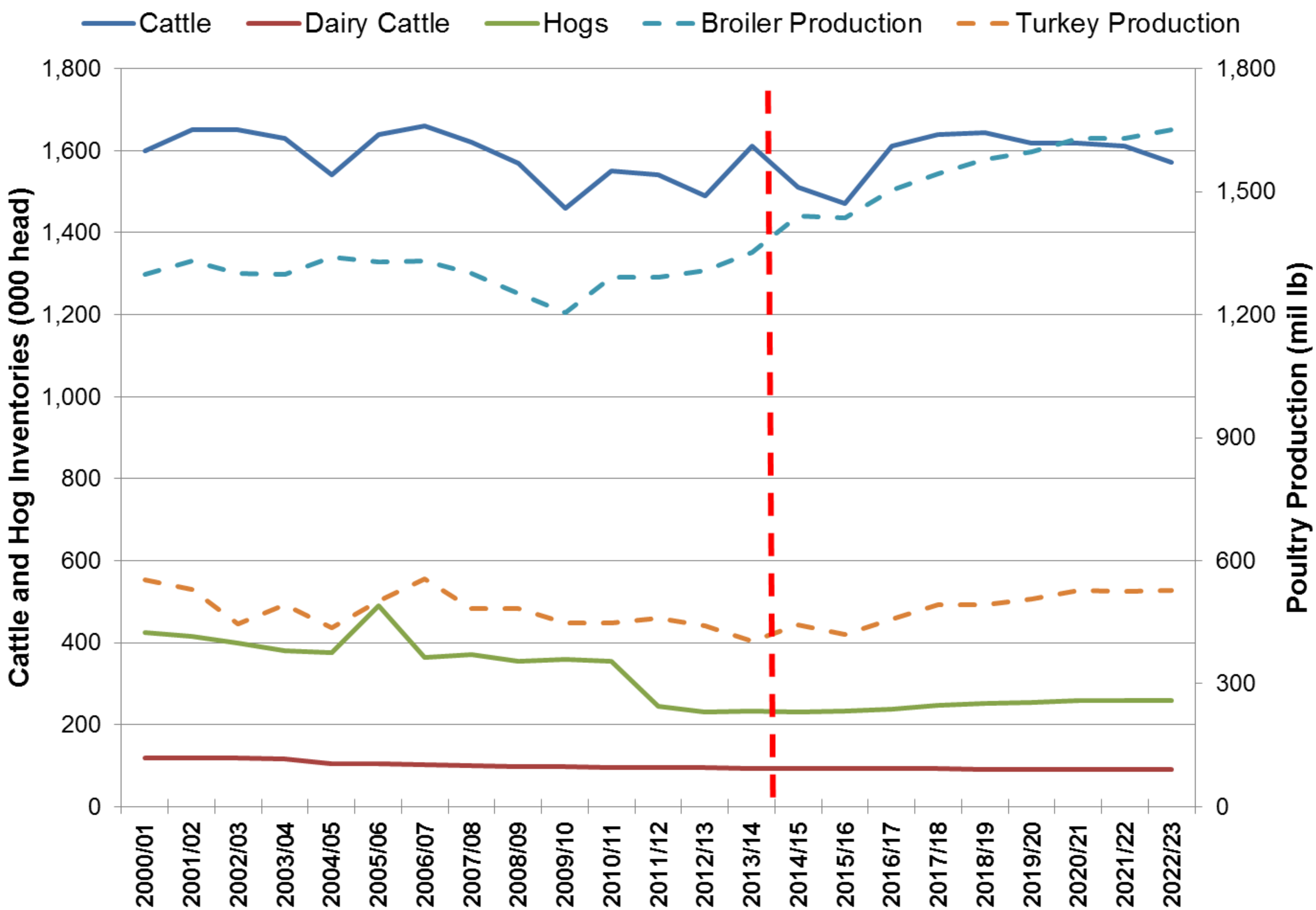
- Turkey production in Virginia is expected to experience growth (31%) throughout the forecast period, going from 403 million pounds in 2013/14 to 527 million in 2022/23. Virginia's turkey production represents 6% of total U.S. turkey production.

- Broiler production is expected to experience growth by 22%, from 1.4 billion pounds in 2013/14 to 1.7 billion in 2022/23. These broiler production levels represent 3% of total U.S. broiler production.

- Cattle inventories in Virginia are expected to contract 2%, from 1.6 million head in 2013/14 to 1.5 million in 2022/23. Dairy cattle inventories are expected to contract 3%, from 94 thousand head in 2013/14 to 91 thousand in 2022/23. Cattle inventories in Virginia represent only a minor share (approximately 2%) of total U.S. inventories.

- Virginia's hog inventories are expected to increase 11%, from 233 thousand head in 2013/14 to 259 thousand in 2022/23.

Figure 57: Virginia Livestock Inventories and Poultry Production



Source: Informa (Forecast), USDA (History)

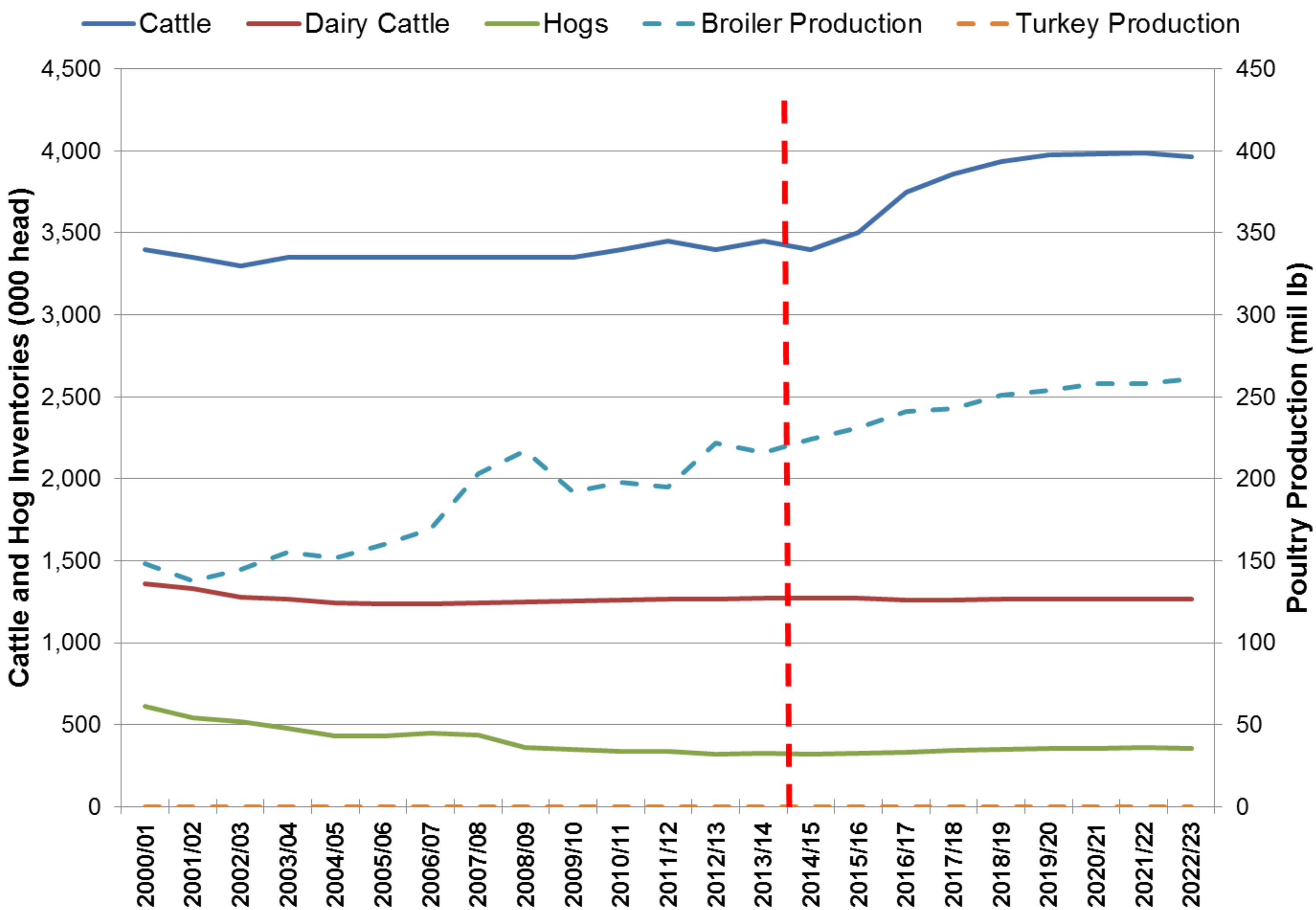
26. WISCONSIN

- Wisconsin is the largest producer of dairy cattle within the selected states. Dairy cattle inventories are anticipated to remain the same, through 2022/23 with 1.3 million head. The dairy cattle inventory represents approximately 14% of total U.S. dairy inventories. Cattle inventories are expected to expand 15%, from 3.5 million head in 2013/14 to nearly 4 million in 2022/23.

- Broiler production is anticipated to increase 21%, from 216 million pounds in 2013/14 to 261 million in 2022/23. However, Wisconsin's broiler production represents less than 1% of total U.S. broiler production.

- Hog inventories in Wisconsin are anticipated to increase 10%, from 324 thousand head in 2013/14, to 358 thousand in 2022/23. This brings Wisconsin's total share of U.S. hog production to less than 1%.

Figure 58: Wisconsin Livestock Inventories and Poultry Production



Source: Informa (Forecast), USDA (History)

IV. State Level Surplus and Deficit Outlook

This section of the report analyzes the soybean surplus and deficit outlook for the 26 focus states. Macro level discussion of drivers impacting grain flows and the specific factors of soybeans for the states are presented. Each state's soybean net shipment is shown to indicate grain leaving the state as long haul moves by barge, rail or container. Truck movements are short haul in nature, occurring within a state, and from state to state and are considered in this analysis as an offset among nearby states. The net shipment level is the amount of surplus (how many soybeans are shipped out of the state) or deficit (how many soybeans are shipped into a state) grain and soybeans by state, depending if a state has more than enough grain and soybeans to fulfill state demand and inventories and processing capacity. A surplus state has more than enough grain and soybeans that are outshipments while a deficit state does not have enough grain and soybeans requiring inshipments.

A. Methodology for Calculating Net Shipments and Volume by Mode

For each agricultural producing state the movement of grains, oilseeds and meal were calculated from origin to destination. Net shipments, indicating a surplus or deficit for a state, were quantified by subtracting total use and carryout from total supply for each state. After calculating net shipments, the amount flowing by mode was estimated.

For rail moves, Informa utilized the Public Use Waybill (PUWB) of the Surface Transportation Board of the Department of Transportation. The PUWB is a compilation of waybills reported by the railroads. The railroads report many parameters for each carloading such as car type, tons, commodity, origin and termination market, revenue, etc. For this study, Informa prepared key analysis using the 2013 PUWB through crop year 2012/13 for agricultural commodities to establish base line values.

Geographic information in the PUWB is by Bureau Economic Areas (BEA). In most cases, BEAs overlap state boundaries but the counties in each BEA are known. In order to accurately calculate rail volume from origin states, Informa took the crop production of each county and assigned a percentage from each state to a particular BEA. This was done for corn, soybeans, sorghum, wheat, barley and oats. In order to calculate byproduct origin states, Informa used its database of soybean crushers and ethanol facilities to pinpoint soybean meal, soybean oil and DDGS origination. Since destinations in the PUWB are reported the same way originations are reported, Informa used its knowledge of export, processing and feeding locations to determine the exact state of destination.

Barge volume on the Mississippi River System from state to state was estimated by using the Army Corps of Engineers Lock Performance Monitoring System and the Waterborne Commerce of the United States data. Pool level volume was calculated for downbound commodity movements. This was prepared by subtracting the volume of a lock with the lock directly upriver in order to establish the volume entering the river between the two locks. To establish which state originated the specific grains, because in most cases two states share the same river, the static grain elevator capacity of each state within the specific pools was used to form the share of grain from each state. Most barge volume moving on the river system is destined for export position in Louisiana. There are some state to state movements as domestic shipments.

Barge level forecast was based on Informa's long term export forecast out of the Center Gulf. This forecast takes into account the expansion of the Panama Canal, which was completed on June 26, 2016.

Base year container volume was obtained using data available through the Department of Agriculture and other sources. The volume of grain and byproducts exported in containers was estimated for each state and export position. This allowed Informa to establish the origin state and destination state for container movements.

The forecast for container volume was based on the projected long term crop outlook and Informa's understanding of potential growth in domestic and international container demand.

B. Net Shipments by Region and Drivers Impacting Grain Transportation Flows

- Utilizing Informa's Transportation Model, these production volumes are translated into net shipments by region (as shown in Figure 59), accounting for regional production and domestic use (feed demand, ethanol grind, soybean meal crush) to arrive at net shipments (surplus or deficit) by region.

- By 2023, net shipments are forecast to increase by almost 44 million tons to 196 million tons. Assuming 110 tons per railcar and 120 car unit trains, the increase equates to an additional 3,333 unit trains or 64 unit trains per week. Assuming 70 percent of volume moves from September through February, 90 additional unit trains are required during peak shipment period.

Figure 59: Transportation Model Regions Map

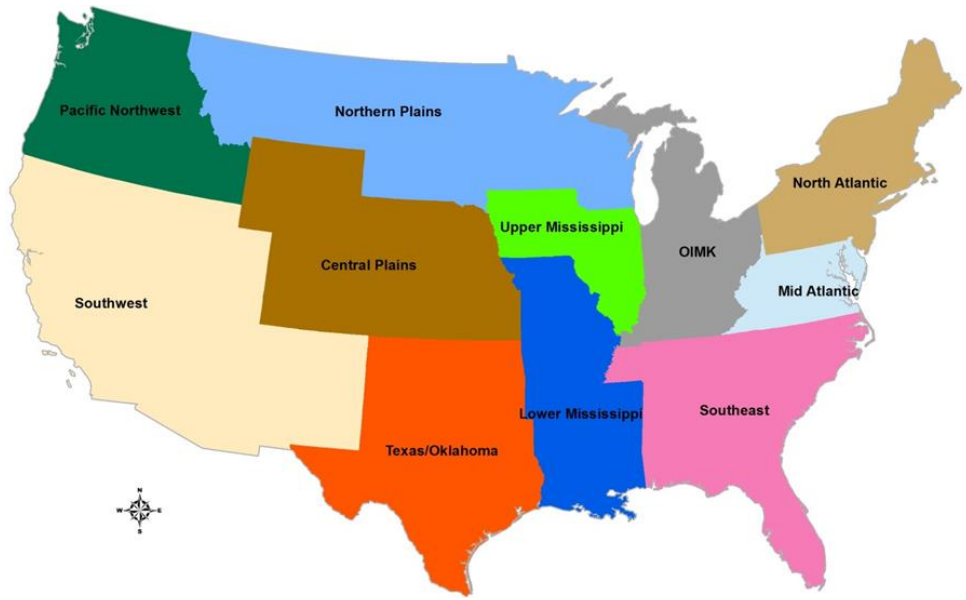
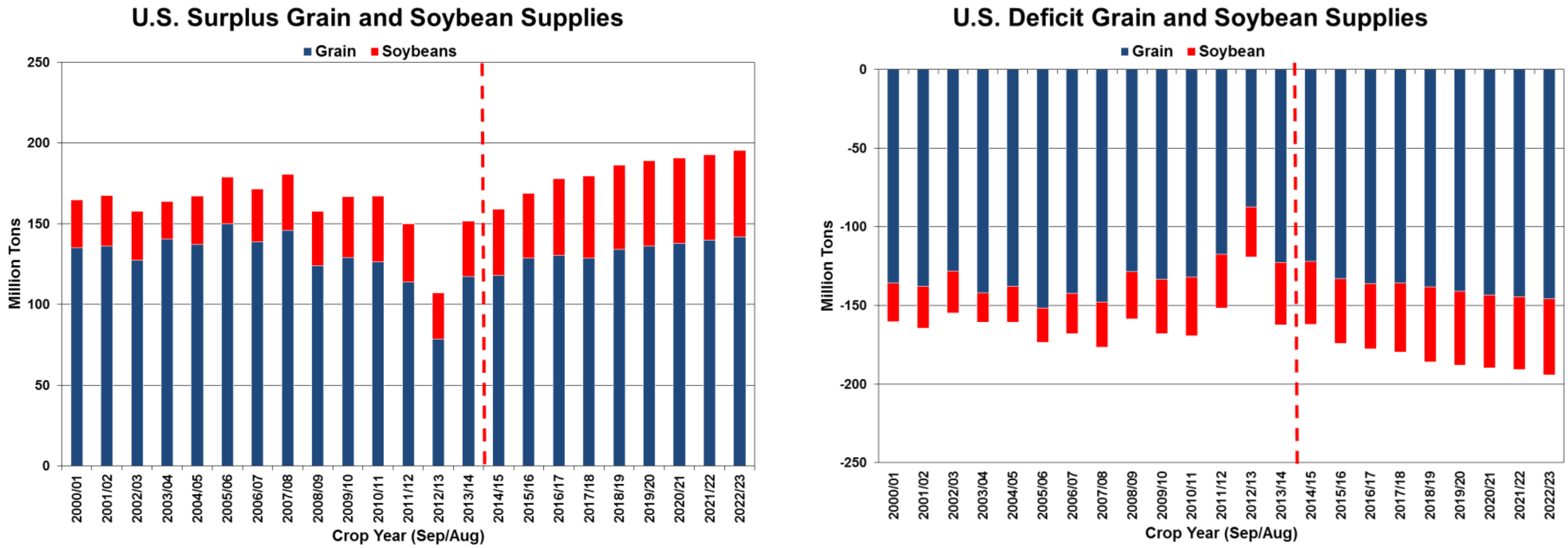


Figure 60: U.S. Grain and Soybean Net Shipments



Source: USDA and Informa

- The record 2014/15 total grain production of 21 billion bushels has been achieved from a combination of improved production practices, improved seed technology and for soybeans in particular, an increase in producing acres from land previously devoted to cotton production in the Southern Delta.
  - Since the early 1980s, land dedicated to soybean production has increased by slightly more than 46 percent, increasing from 57 to 83 million acres and a large portion of this has been along the Mississippi River south of Memphis, TN.
  - Land dedicated to corn production has also increased from 69 to 87 million acres, a growth of 26 percent but of course one acre of corn produces 3.5 to 4.0 times the volume of soybeans.
    - Yields for both crops have increased at approximately the same percentage between 1980 and 2014, 39 percent for soybeans and 40 percent for corn, but in absolute volume terms the yield gain from corn translates into significantly more barges, grain cars and handling/storage facility capacity.
    - This is logically deduced given that corn production represents 68 percent of total grain production by volume (14.2 of the 21.0 billion bushels).

- But the interesting phenomenon is where the growth in producing acres is occurring, both for corn and soybeans, and it is not in the deficit regions (where grain demand exceeds grain supply). The growth has been predominately in the grain surplus regions, implying a greater need and reliance on transportation service and capacity in order to access both domestic and export markets, and further emphasized the need for investment in transportation infrastructure.

- The domestic grain production dedicated toward the feed markets is expected to grow in 2015/16 from both growth in animal numbers and feeding rates. The total grain consuming animal units (GCAU) increased 2.3 percent between 2013 and 2014 from 495.8 to 507.3 million units and are expected to increase another 1 percent into 2015/16 to 512.3 million units and by 2016/17 increase further to 518.3 million units.
  - Most of the increase is driven from rising broiler numbers which are expected to increase from 100.4 to 106.4 million units by next year, a 6.1 percent increase. Broiler numbers have been increasing since 2011 when broiler GCAUs were at 94.1 million units.
  - Cattle on feed numbers increased this past year going from 141.6 to 143.1 million units and are expected to recede slightly back to 141.3 million units in 2015/16, before rising again in 2016/17 to 144.4 million units.
  - The end result is that total grain and protein feeding is expected to increase in grain and protein deficit areas. The result is a need for more grain and oilseeds to be transported from surplus areas to deficit areas.

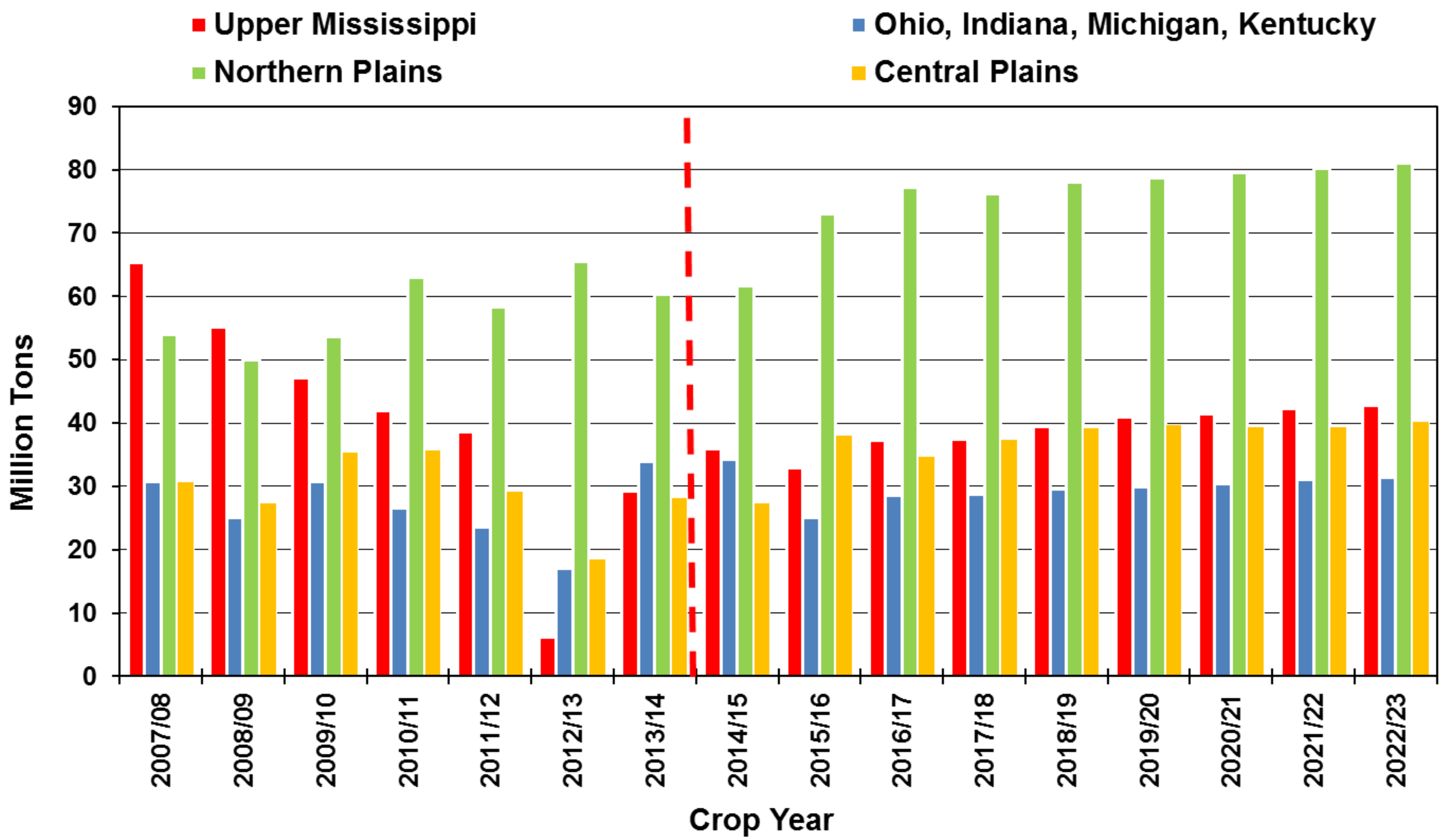
- Transportation fuel demand continues to be strong and U.S. ethanol production is exceeding the blend wall. Total corn used for ethanol production completed 2014/15 at 5.21 billion bushels and is expected to remain at 5.2 billion bushels over the next two years.
  - In aggregate, approximately 36 percent of domestic U.S. corn production goes to produce ethanol (2014/15) and the state of Iowa accounts for 29 percent of the 5.2 billion bushels of corn going into ethanol production. Other states significantly contributing include Nebraska (13 percent), Illinois (10 percent), South Dakota (7.6 percent) and Minnesota (7.4 percent).
  - The ethanol production regions are grain surplus will be become more so without major growth in ethanol production. Informa believes ethanol production growth is limited by the Renewable Fuel Standard and technical rules concerning importing fuel products.

1. Surplus Regions

- The four net surplus regions (Upper Mississippi, OIMK, Northern Plains, Central Plains) increase in expected net shipment in 2015/16 by 8.1 million tons, increasing from 159.9 to 168.0 million tons between 2014/15 and 2015/16.
  - Longer-term, without an increase in the corn ethanol mandate, the surplus availability of grain and soybeans is expected to continue to increase.

- The Northern Plains and Central Plains regions typically export through the Pacific Northwest while the Upper Mississippi and Ohio, Indiana, Michigan, Kentucky (OIMK) regions primarily use the river to export and rail to feeding regions in the Southeast.
  - By 2023, railing soybeans from the Northern Plains and Central Plains to the river for export is likely during September to February.

Figure 61: Grain and Soybean Surplus Net Shipment Position by Transportation Region (million tons)



Source: USDA and Informa

a) Upper Mississippi (Illinois and Iowa)

- Total grain production in the Upper Mississippi region increased significantly between 2012/13 and 2014/15, going from 4,031 to 5,811 million bushels.
  - Longer-term, from 2013/2014 to 2022/2023, the net shipments from the Upper Mississippi region is forecast to increase by 14 million tons as yields increase and local consumption remains level.

b) Ohio, Indiana, Michigan and Kentucky (OIMK)

- This region predominately supplies grain flows to the North Atlantic, Mid-Atlantic and Southeast transport regions, and sends surplus supplies down the Ohio and Mississippi River Systems to the Lower Mississippi region.
  - Over the forecast period, the surplus is expected to decrease by 3 million tons. The reason is the region expects an acreage switch from corn to soybeans, which are lower yielding.

c) Northern Plains (Minnesota, Montana, North Dakota, South Dakota and Wisconsin)

- The Northern Plains region has a wider variety of crop supply as compared to the other surplus states and produce significant quantities of corn, soybeans, wheat, barley and oats. Total net shipments from the Northern Plains are expected to increase from 62.1 to 71.3 million tons between 2014/15 and 2015/16.
  - This region is heavily dependent on rail transport, primarily accessing PNW ports and improved rail capacity and service should favor the Northern Plains this year.
  - Longer-term, the region's surplus is predicted to increase by 21 million tons or by one-third through 2022/23.

d) Central Plains (Colorado, Kansas, Nebraska and Wyoming)

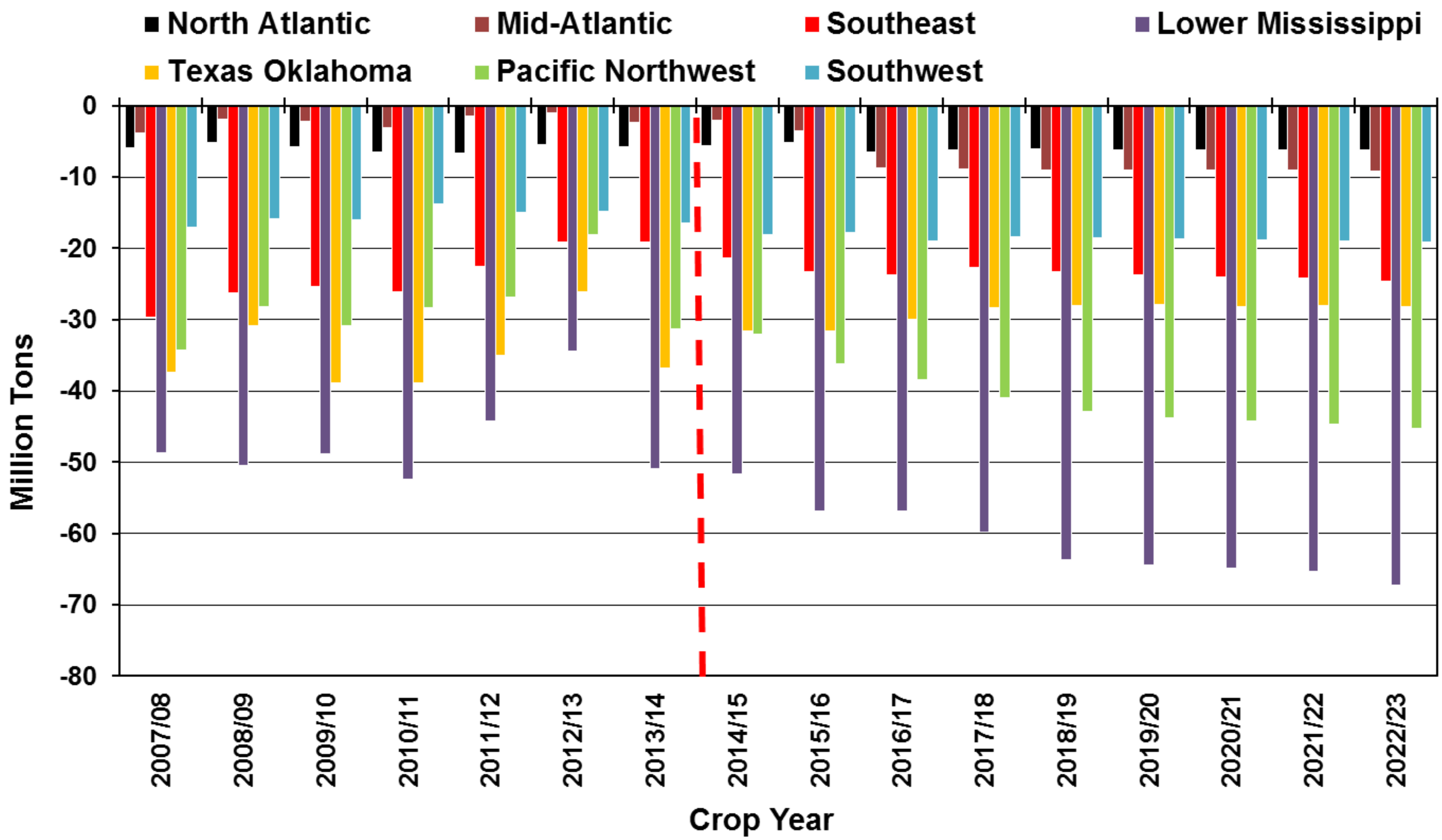
- Similar to the Northern Plains, the Central Plains grows a wide variety of grains and accesses export markets through the PNW, Texas Gulf and Southwest feed markets. Total crop production and total grain supply is expected to increase from 5,038 to 5,412 million bushels between 2014/15 and 2015/16.
  - Corn production is expected to increase slightly from 2,324 to 2,370 million bushels, while soybean production is expected to increase from 432 to 434 million bushels.
  - Both wheat and sorghum production will also increase significantly. Net shipments from the region should also increase, going from 28.6 to 37.3 million tons into 2015/16 before falling back to 31.6 million tons in 2016/17.
  - By 2023, the net surplus is expected to increase 12 million tons. The combined Central Plains and Northern Plains surplus of 33 million tons will challenge rail movements to market position.

- Some pressure can be alleviated by pushing Upper Mississippi outshipments to the Mississippi River versus the PNW. If the rail routes to the PNW hit peak capacity capabilities, grain and soybeans from the Central and Northern Plains could be railed to St. Louis to be transloaded to barge for a lower Mississippi River move.

2. Deficit Regions

- The seven deficit regions (North Atlantic, Mid-Atlantic, Southeast, Lower Mississippi, Texas/Oklahoma, Pacific Northwest, Southwest) become even more deficit by increasing net inbound shipments by 11.0 million tons, going from –162.3 to –173.3 million tons between 2014/15 and 2015/16.

Exhibit 1: Grain and Soybean Deficit Net Shipment Position by Transportation Region (million tons)



Source: USDA and Informa

a) Lower Mississippi (Arkansas, Louisiana, Missouri and Mississippi)

- This region receives most of its grain and soybeans by barge from upriver locations such as the Upper Mississippi and OIMK regions and is heavily influenced by domestic ethanol grind usage which has kept corn up river.

- The total grain supply from the Lower Mississippi region is expected to decrease substantially between 2014/15 and 2015/16, going from 1,967 to 1,750 million bushels, primarily from decreased corn yields going from 185.8 to 159.3 bushels per acre.
- Soybean supply also decreases in the region from 623 to 537 million bushels. Total net shipments into the region are expected to increase from 51.9 to 55.4 million tons this year.
- By 2023, net inshipments are expected to increase 16 million tons on the strength of increased barge volume.

b) Southeast (Alabama, Florida, Georgia, North Carolina, South Carolina and Tennessee)

- The Southeast region is a key hog and poultry broiler production region. As a deficit region it sources much of its grain and soybeans from the OIMK. Net shipments into this region are expected to increase from 20.9 to 23.9 million tons between 2014/15 and 2015/16.
  - Longer-term, increased feeding will drive net inshipments to 6 million tons higher. Inshipments are primarily rail moves, but imports from Brazil are becoming more common, which effectively pushes volume back to the Ohio River.

c) Pacific Northwest (Idaho, Oregon and Washington)

- The PNW produces some corn and barley, but is primarily one of the dominant wheat producing areas in the U.S., particularly for white wheat in the Palouse region in eastern Washington State. The total grain supply is expected to increase from 767 to 851 million bushels between 2014/15 and 2015/16, with increases being driven from higher wheat yields and production.
  - Net inshipments are expected to increase as Chinese soybean exports continue to pull volume from the Upper Plains and Central Plains through export elevators located in the PNW.

d) Southwest (Arizona, California, New Mexico, Nevada and Utah)

- This region has a substantial feed market but due to a lack of water, it is a low producer of crops. Total net inshipments into this region are expected to decrease from 18.0 to 17.6 million tons in 2015/16.
  - The feed market is largely comprised of dairy and broilers.

e) Texas / Oklahoma (Texas and Oklahoma)

- This region is a large cattle feed market and historically a net deficit region for grains to satisfy feed demand. Total net inshipments are expected to increase from 31.3 million tons to 32.9 million tons in 2015/16.
  - The end of the renewable fuel expansion has increased availability of grain, which has led to a record expansion of the cattle herd.

f) Mid-Atlantic (Delaware, Maryland, Virginia, West Virginia)

- This region pulls significant volumes of soybeans from the OIKM region to satisfy crush plants and poultry feed demand in the area. Total grain production in this region increased from 255 to 265 million bushels between 2013/14 and 2014/15.
    - Total net inshipments into this region are expected to increase from 1.9 to 3.7 million tons in 2015/16. The feed market is largely comprised of broilers.

g) North Atlantic (Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont)

- Total production in this region is also expected to decline substantially, going from 355 to 325 million bushels, mostly from lower corn and soybean production. Total net inshipments into this region are expected to remain stable over the forecast period.

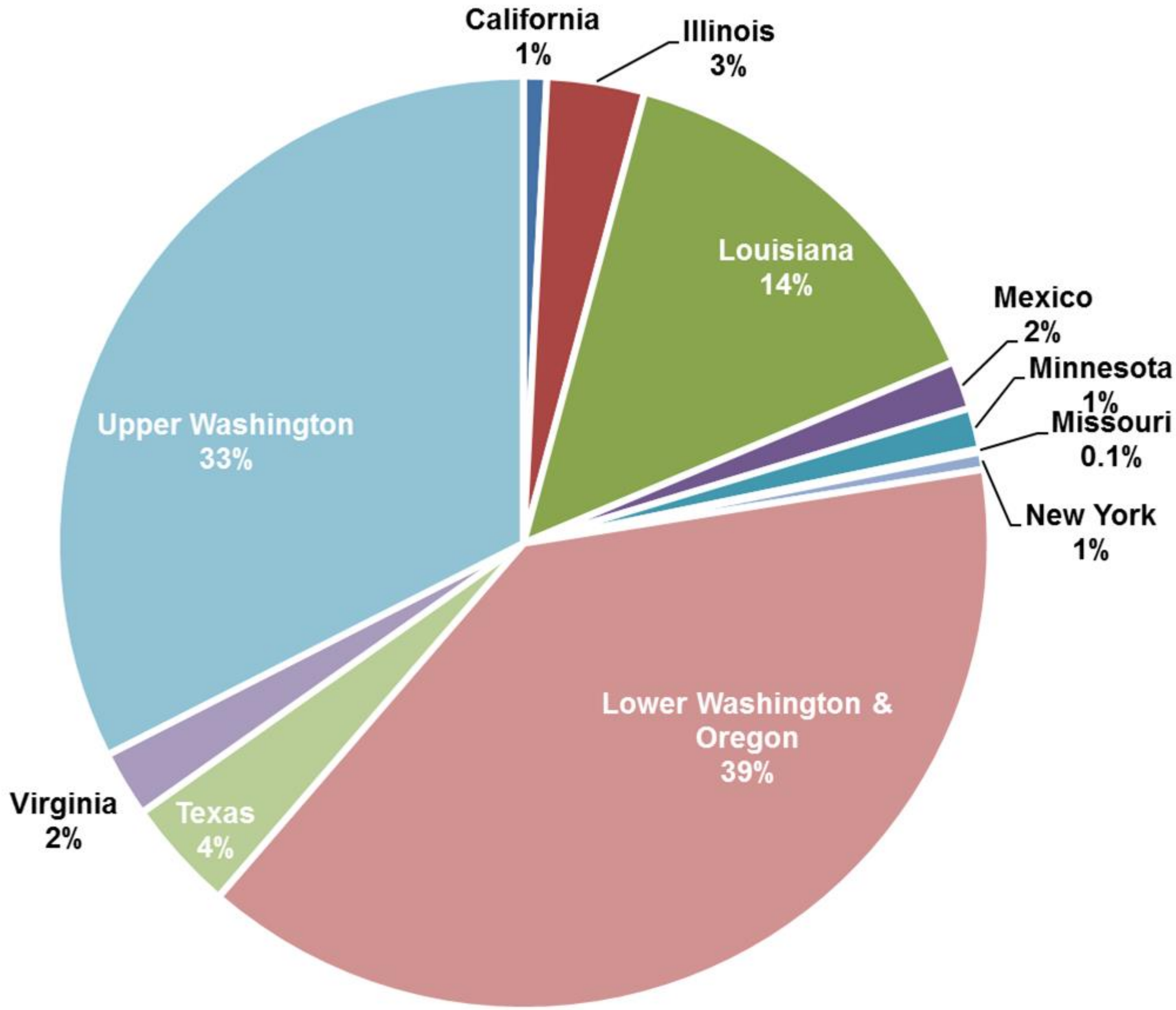
C. Soybean and Soybean By-Product Destinations

1. Soybeans

- Downbound soybeans moving by barge are destined for export positions in Louisiana.

- Soybeans moving by rail are destined for export position and to a certain extent domestic crushing.
    - In 2013/14, 72% of soybeans traveled to the PNW, followed by the Center Gulf (Louisiana) with 14%.

Figure 62: Rail Soybean Destinations 2013/14 (percent by state)



Source: Informa, USDOT-STB

2. Soybean Meal and Oil

- Due to multiple states for soybean meal destinations, grain flow regions were used instead.

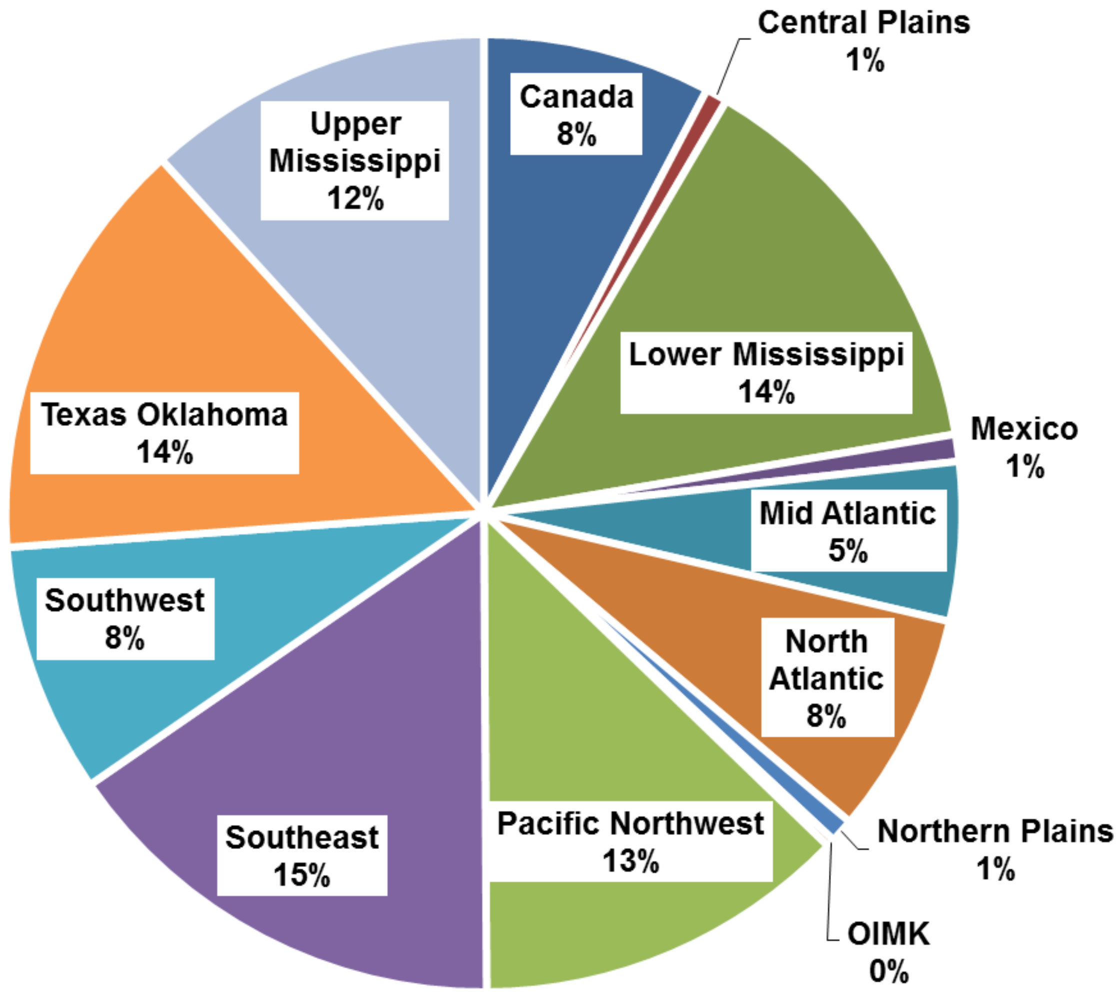
- Low volumes of soybean meal and oil move by barge.

- In 2013/14, the leading destination for soybean meal being transported by rail was to the Southeast (15%), Lower Mississippi (14%), Texas Oklahoma (14%), Pacific Northwest (13%) and Upper Mississippi (12%).

- In 2013/14, Texas was the leading destination for soybean meal with slightly almost 3 million tons followed by Illinois and Washington. The drop in feed costs has resulted in a rebound in animal numbers, which is driving soybean meal increases to the feed markets.

- In 2013/14, Illinois was the leading destination for soybean oil with over 2 million tons followed by California with nearly 1 million tons. Missouri and Texas are also over 800 thousand tons destinations.

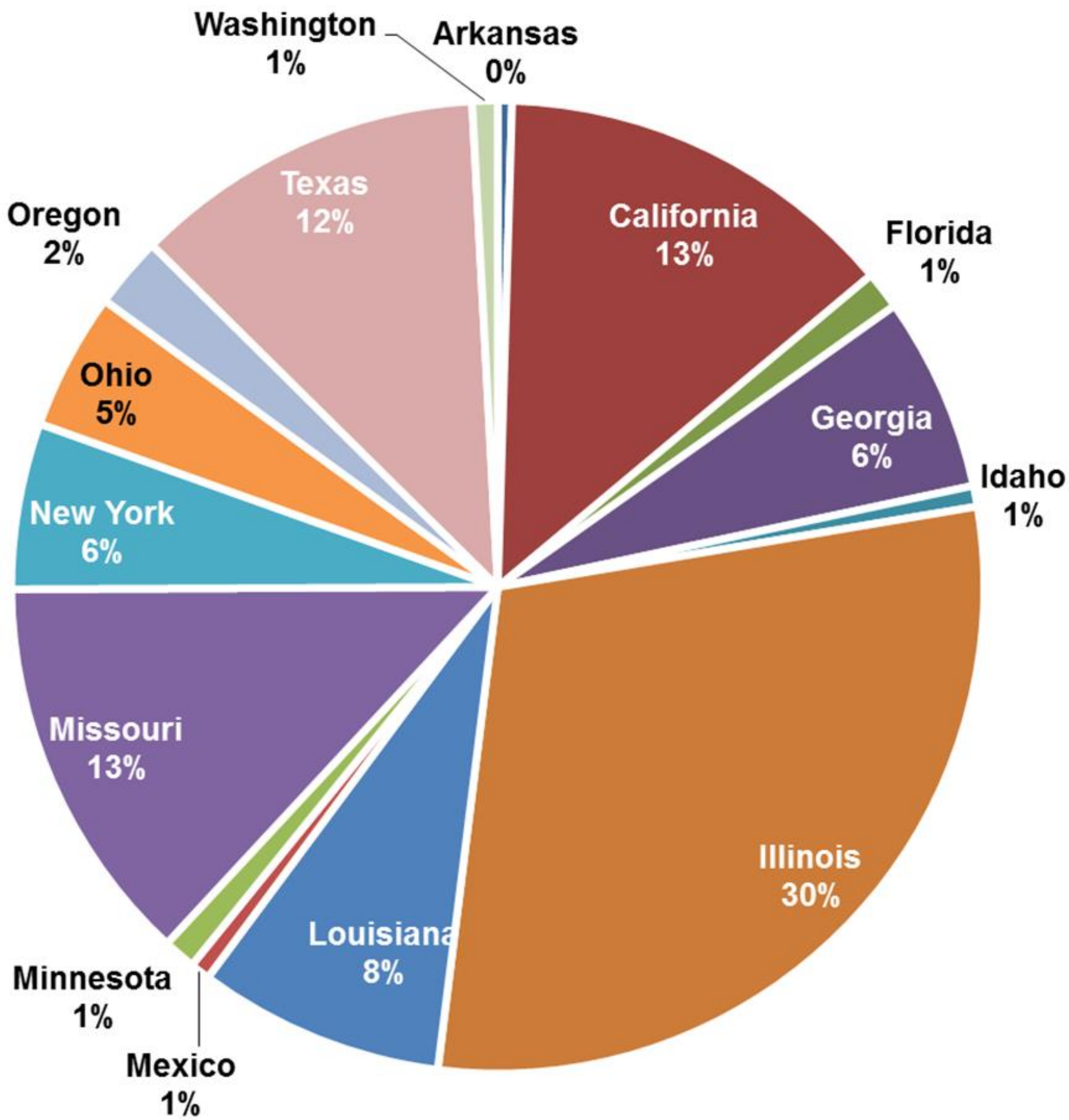
Figure 63: Rail Soybean Meal Destinations 2013/14 (percent by state)



Notes: OIMK equals Ohio, Indiana, Michigan, and Kentucky

Source: Informa, USDOT-STB

Figure 64: Rail Soybean Oil Destinations 2013/14 (percent by state)



Source: Informa, USDOT-STB

State Summaries

This section includes summarized long haul modal information for each of the 26 target states. The information includes a state map depicting soybean production density, agricultural facilities and key transportation infrastructure, followed by a summary of each state's surplus and deficit outlook, modal distribution for soybean movements and summarized information of its agricultural infrastructure.

The modal demand of each state's soybean volume indicates that total rail carloadings will increase 39% to almost 356 thousand and barge loadings will increase 71% to slightly over 18 thousand, as shown in Table 18. The 26 states currently represent 97% of the soybean carloadings in the U.S., while in 2022/23 it is expected they will represent 98%. Compared with barge movements, the 26 states represent 100% of the soybeans moving on the navigable waterways of the Mississippi River System. The low water event in 2012/13 resulted in below normal carloadings and above normal barge loading in 2013/14. When the water levels improved, a surge of soybeans were shipped. Without the low water event, over the forecast time period, barge loadings would increase more and carloadings less. The assumption that Asia soybean imports are driving U.S. soybean movements is pushing extra production volume into the export channels, which favors barge in river states.

The forecast for soybean rail carloadings is based on the trends in the historical percentage of soybean carloadings compared with total carloadings. In addition, the tons per carload were calculated using the same methodology. The tons per soybean carload are expected to increase from average of 101 tons in 2013/14 to more than 110 tons in 2022/23. The barge forecast is based on Informa's long term export forecast.

For loading data, destination areas were represented with a zero. For the pie graphs, net deficit areas are represented as negative.

Table 18: Current and Future Demand for Rail Carloadings and Barge Loadings of Soybeans in 26 Focus States

State	Rail Carloadings 2013/14	Rail Carloadings 2022/23	Barge Loadings 2013/14	Barge Loadings 2022/23
Alabama	-	-	-	-
Arkansas	1,051	1,136	2,099	2,962
Georgia	-	-	-	-
Illinois	7,264	16,319	2,675	3,698
Indiana	2,584	6,647	103	438
Iowa	4,507	17,423	300	2,279
Kansas	13,873	20,375	-	-
Kentucky	511	533	490	600
Louisiana	-	-	-	-
Maryland	-	-	-	-
Michigan	19,561	23,459	-	-
Minnesota	30,966	30,303	780	1,796
Mississippi	232	324	1,234	1,349
Missouri	1,960	3,469	504	1,225
Nebraska	41,221	59,750	-	-
New York	-	2,457	-	-
North Carolina	-	1,456	-	-
North Dakota	41,033	59,601	-	-
Ohio	9,791	12,181	422	808
Oklahoma	2,718	3,126	2	4
Pennsylvania	7,409	7,960	2	3
South Carolina	-	-	-	-
South Dakota	48,240	67,054	-	-
Tennessee	1,369	1,133	1,206	1,472
Virginia	6,543	7,023	-	-
Wisconsin	5,923	5,570	726	1,414
Sub Total	246,755	347,300	10,543	18,048
Others	8,636	8,682	-	-
U.S. Total	255,391	355,982	10,543	18,048

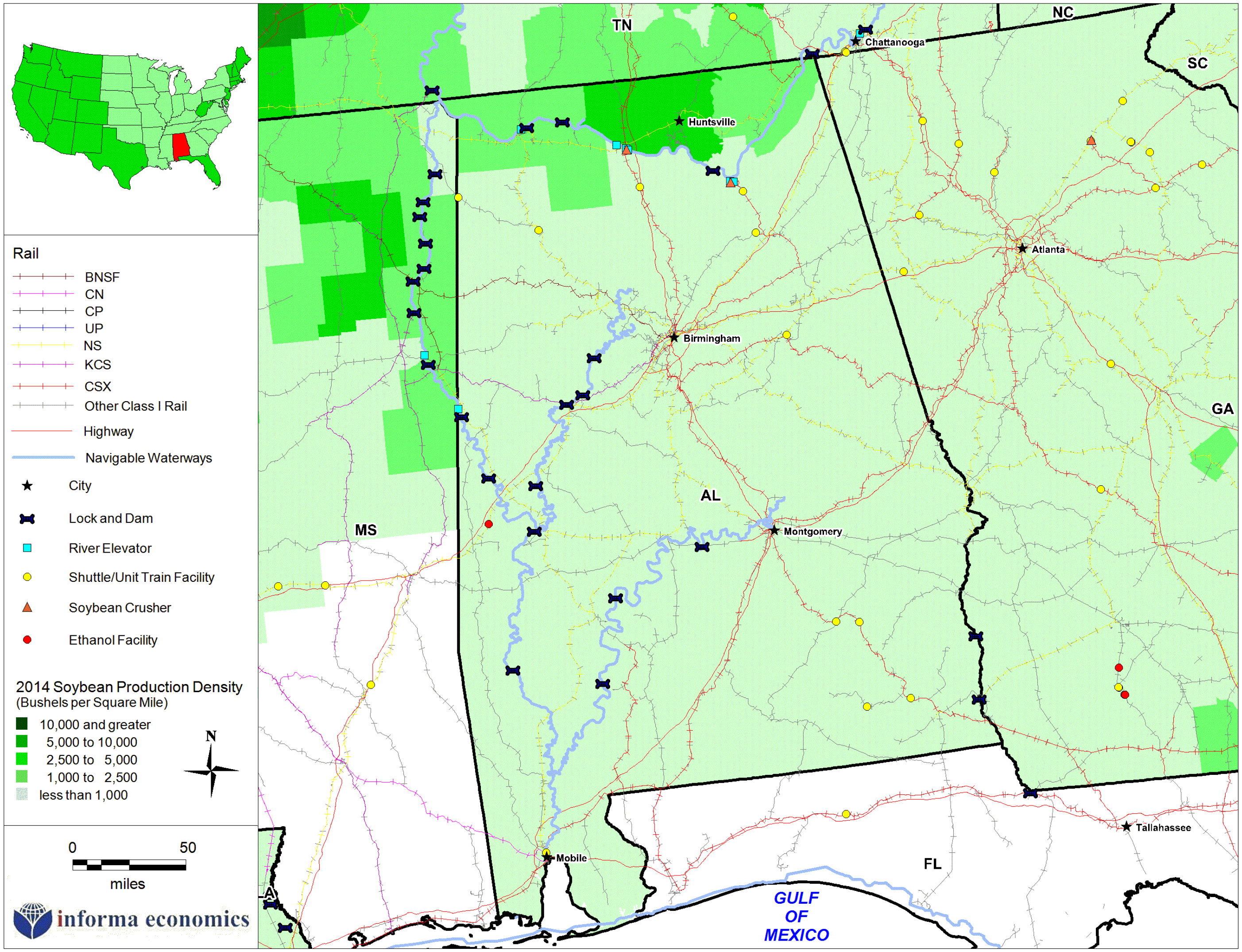
Source: Informa Economics

Table 19: Current and Future Soybean Volume (tons) by Mode in 26 Focus States

	Production		Net Shipments		Rail Volume		Barge Volume	
State	**2013/14**	**2022/23**	**2013/14**	**2022/23**	**2013/14**	**2022/23**	**2013/14**	**2022/23**
Alabama	561,150	695,117	(2,781,191)	(2,966,539)	-	-	-	-
Arkansas	4,228,200	5,646,623	3,464,692	4,864,413	106,103	124,930	3,358,589	4,739,483
Georgia	279,450	471,943	(1,680,605)	(1,607,582)	-	-	-	-
Illinois	14,220,000	17,692,221	5,013,294	7,711,249	733,687	1,795,137	4,279,607	5,916,112
Indiana	8,018,550	9,454,695	425,416	1,432,021	260,951	731,204	164,465	700,817
Iowa	12,626,250	17,319,366	934,844	5,563,314	455,163	1,916,492	479,681	3,646,822
Kansas	3,929,400	4,866,162	1,401,161	2,241,243	1,401,161	2,241,243	-	-
Kentucky	2,490,000	3,010,256	836,185	1,018,998	51,611	58,635	784,573	960,363
Louisiana	1,629,600	1,995,802	(27,199,757)	(29,583,129)	-	-	-	-
Maryland	568,800	733,904	(1,777,352)	(2,231,667)	-	-	-	-
Michigan	2,563,200	3,158,443	1,975,634	2,580,458	1,975,634	2,580,458	-	-
Minnesota	10,029,810	11,651,846	4,376,407	6,207,077	3,127,608	3,333,295	1,248,799	2,873,781
Mississippi	2,064,716	2,257,123	1,997,330	2,194,349	23,441	35,662	1,973,890	2,158,687
Missouri	6,058,800	7,666,130	1,004,616	2,342,311	197,912	381,629	806,704	1,960,682
Nebraska	7,655,850	9,933,367	4,163,337	6,572,539	4,163,337	6,572,539	-	-
New York	400,320	487,490	(199,470)	270,280	-	270,280	-	-
North Carolina	1,457,250	1,965,839	(199,470)	160,160	-	160,160	-	-
North Dakota	4,236,450	6,576,220	4,144,302	6,556,142	4,144,302	6,556,142	-	-
Ohio	6,667,650	7,967,360	1,663,701	2,633,092	988,899	1,339,909	674,802	1,293,184
Oklahoma	306,540	372,202	278,271	349,739	274,500	343,888	3,771	5,851
Pennsylvania	815,850	944,538	751,391	880,170	748,318	875,595	3,074	4,575
South Carolina	265,050	432,051	(214,479)	(98,515)	-	-	-	-
South Dakota	5,564,700	7,994,812	4,872,249	7,375,968	4,872,249	7,375,968	-	-
Tennessee	2,162,250	2,579,352	2,067,781	2,479,370	138,289	124,601	1,929,491	2,354,768
Virginia	693,000	808,396	660,816	772,551	660,816	772,551	-	-
Wisconsin	1,813,500	2,926,697	1,760,352	2,874,371	598,273	612,674	1,162,080	2,261,698
Sub Total	100,745,186	128,912,837	41,791,780	66,060,814	24,922,255	38,202,989	16,869,525	28,876,823
Others	(5,666)	(16,412,837)	N/A	N/A	4,666,673	3,385,437	N/A	N/A
U.S. Total	100,739,520	112,500,000	N/A	N/A	29,588,928	41,588,426	16,869,525	28,876,823

Source: Informa Economics

ALABAMA



Production

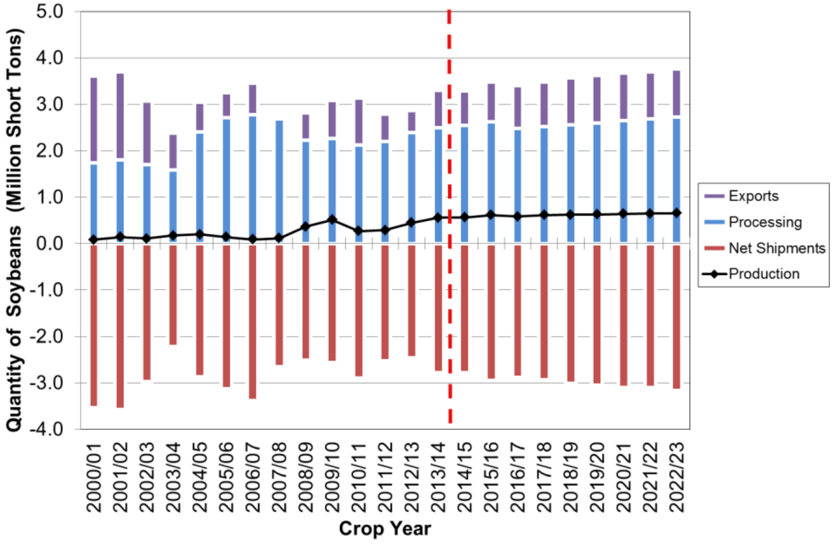
- Soybean production mostly along northern state border, along Tennessee River.
- Alabama is a significant producer of poultry, primarily broilers contributing 12% of U.S. production.

Infrastructure

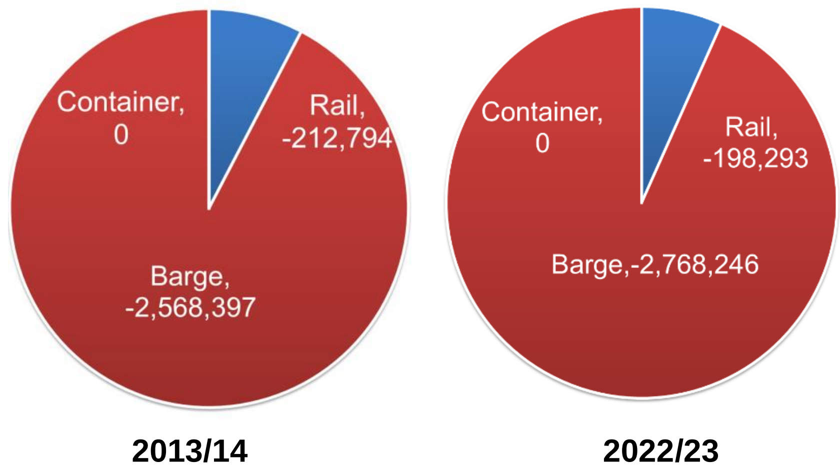
- Alabama has 3,194 miles of rail lines, 1,002 miles of interstate, and 101,837 total road miles.
- The state also has 11 shuttle facilities, 2 soybean crush facilities, 1 ethanol facility, 65 grain elevators, and 7 river elevators.

ALABAMA

Soybean Surplus and Deficit Outlook



Soybean Movements by Mode (Short Tons)



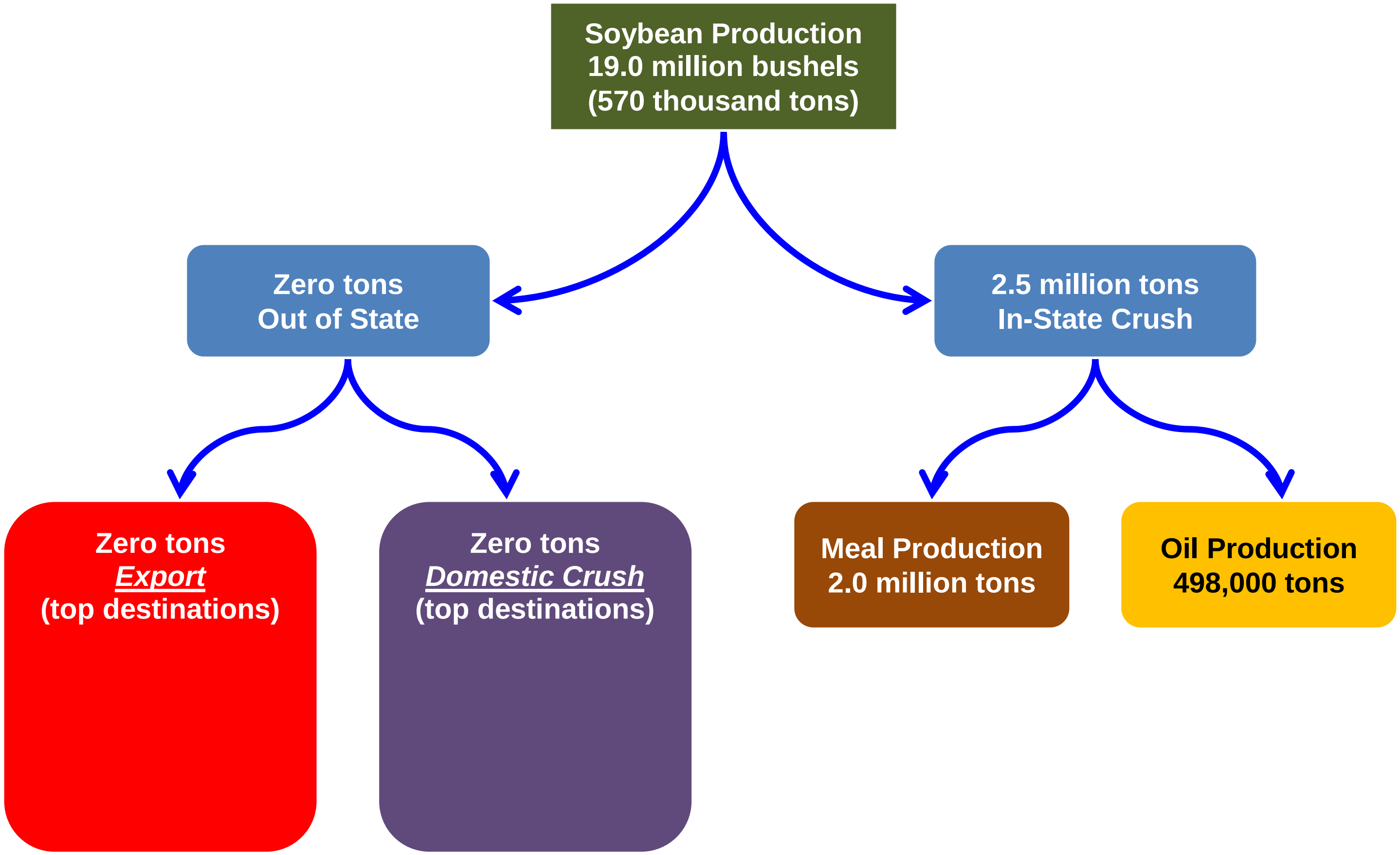
** A negative number indicates the state is a net inshipment*

Agricultural Infrastructure: Crush, Ethanol Facilities, Livestock Processing, and Grain Storage		
Facility Type	**# of Facilities**	**Capacity/Size**
Soybean Crushers	2	7,382 MT/Day
Ethanol Facility* (operating)	1	0.20 MGY
Federally Inspected Livestock Slaughter/Processing Facilities	47	n/a
State Inspected Livestock Slaughter/Processing Facilities	27	n/a
Grain Elevators**	65	20,698 Thous. Bu. Storage
Shuttle Elevators	11	7,245 Thous. Bu. Storage
River Elevators	7	7,542 Thous. Bu. Storage

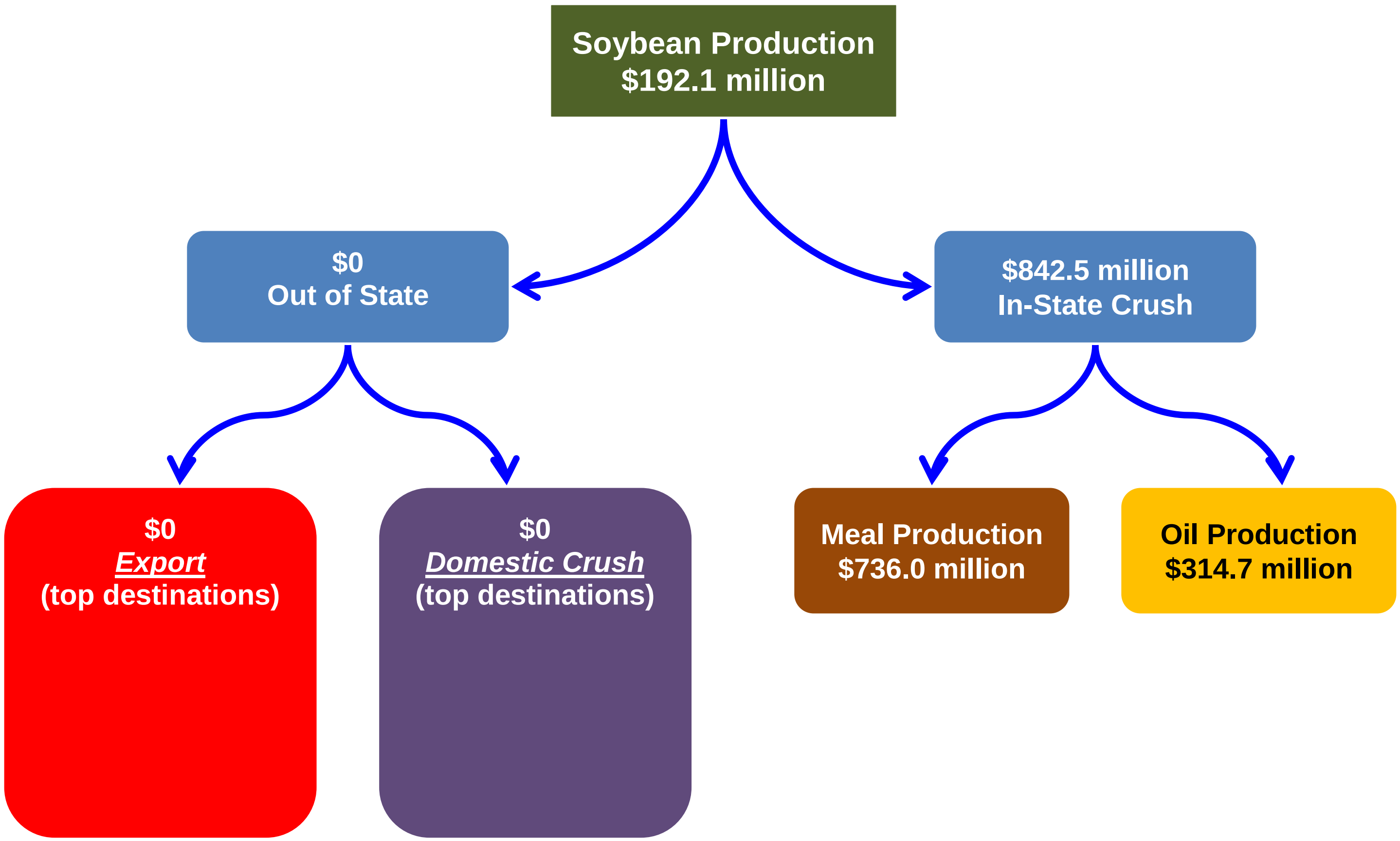
** 1 Cellulosic ethanol facility is included in ethanol facility database.*

*** Shuttle and river elevators are included in the list of grain elevators.*

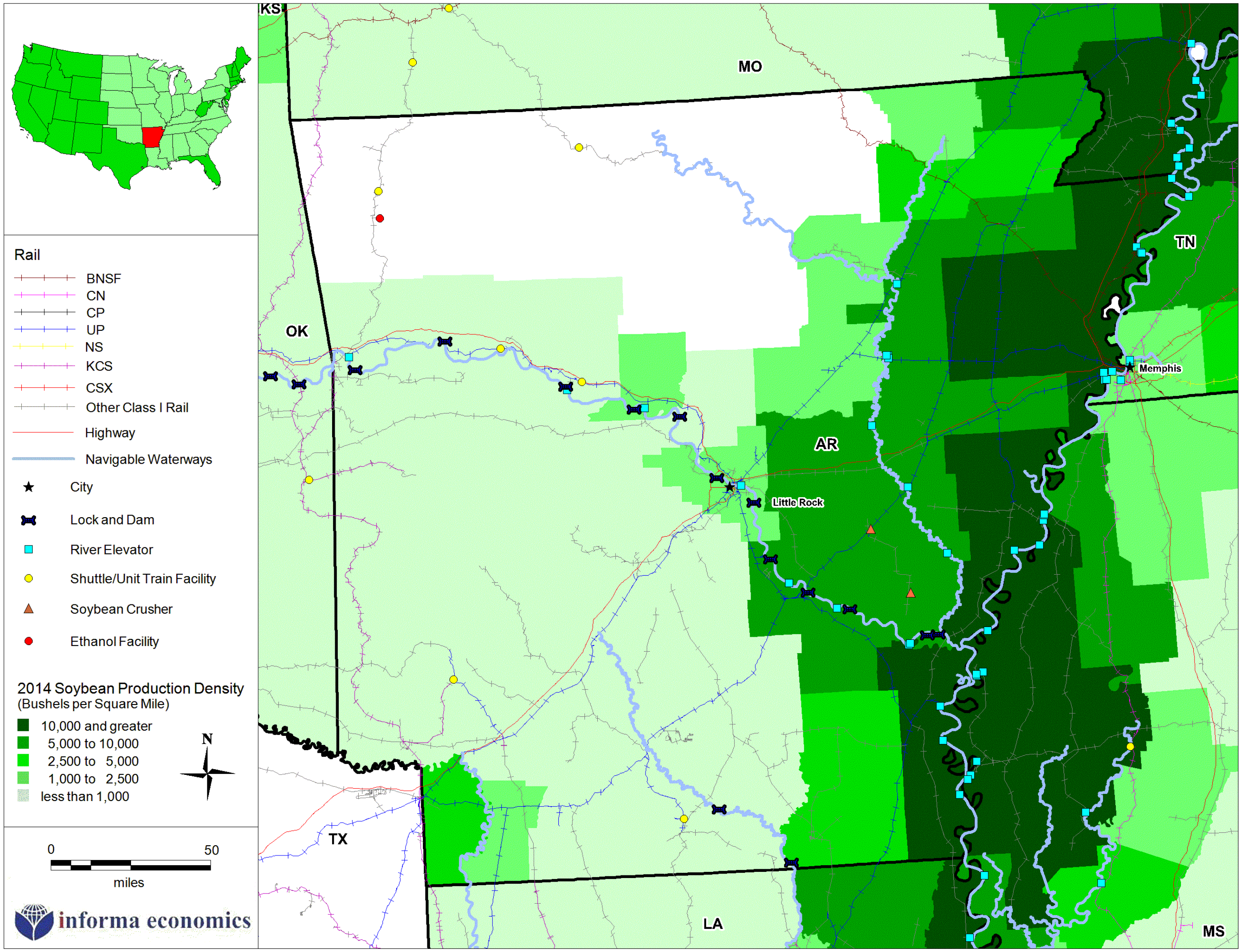
ALABAMA FLOWCHART OF SOYBEAN MOVEMENTS (2013/14)



ALABAMA FLOWCHART OF SOYBEAN VALUE (2013/14)



ARKANSAS



Production

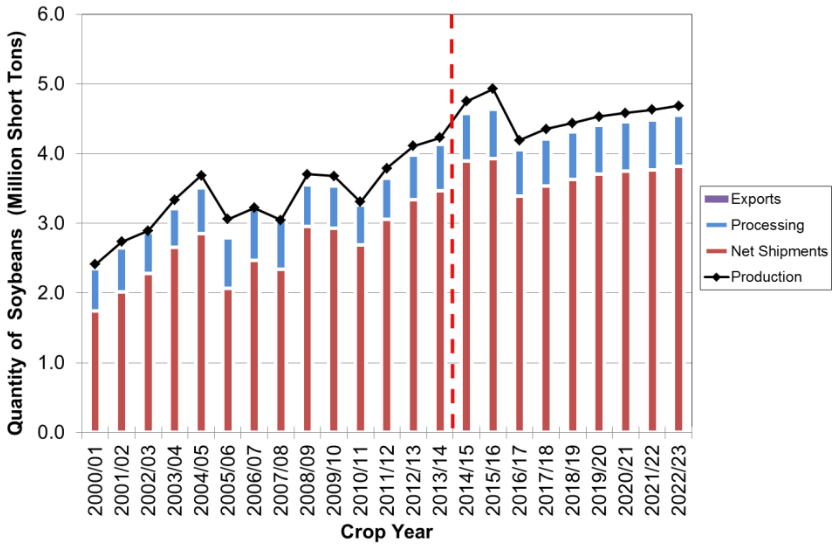
- Soybean production mostly along eastern border of state, near Mississippi River Delta region.
- Arkansas is a significant producer of poultry, primarily broilers and turkeys.

Infrastructure

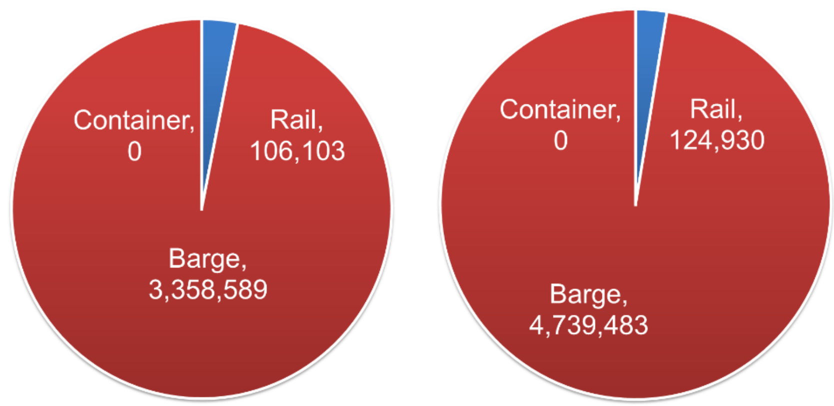
- Arkansas has 2,698 miles of rail lines, 656 miles of interstate, and 101,656 total road miles.
- The state also has 6 shuttle facilities, 2 soybean crush facilities, 1 ethanol facility, 182 grain elevators, and 25 river elevators.

ARKANSAS

Soybean Surplus and Deficit Outlook



Soybean Movements by Mode (Short Tons)



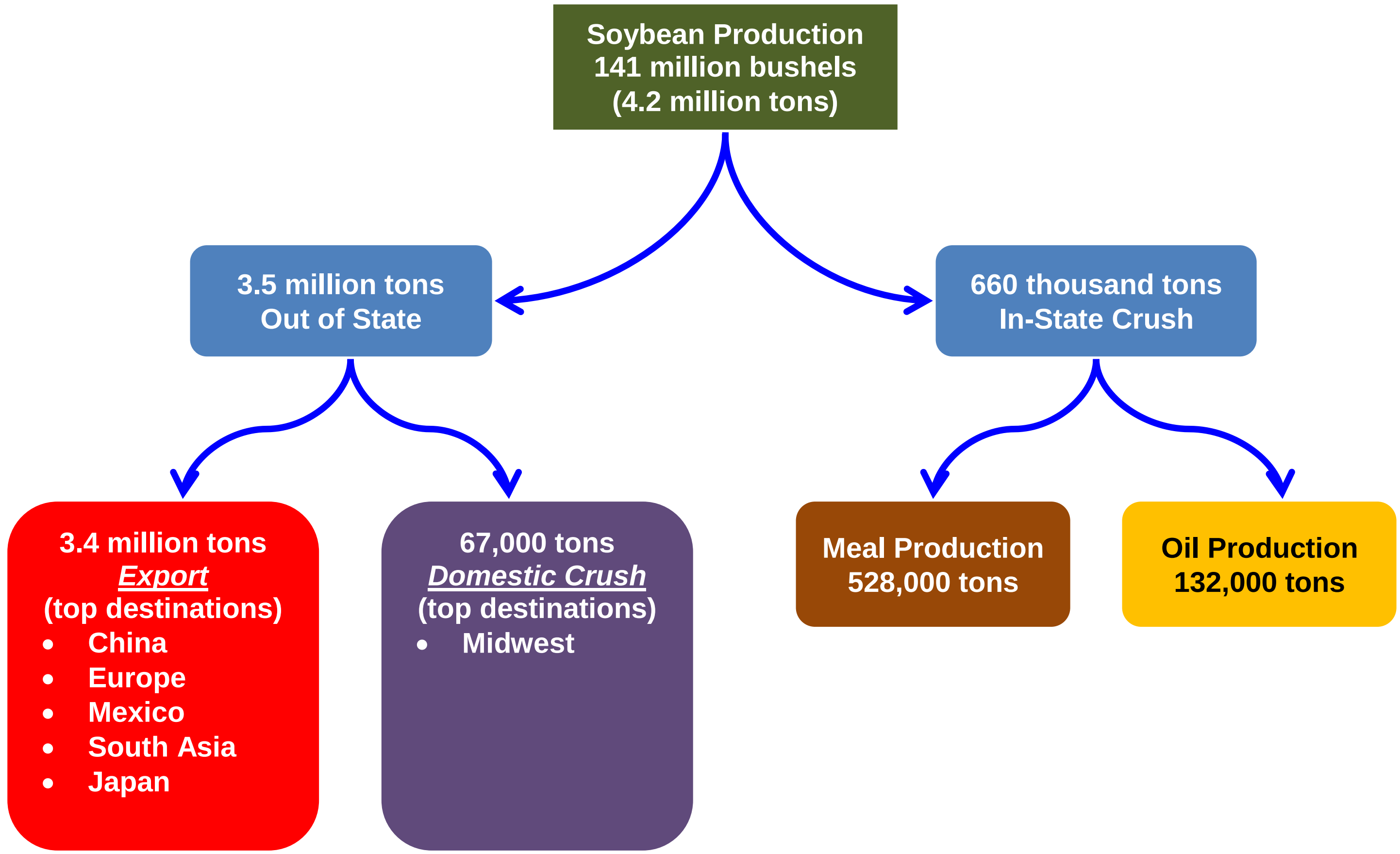
2013/14 **2022/23**

Agricultural Infrastructure: Crush, Ethanol Facilities, Livestock Processing, and Grain Storage			
Facility Type	**# of Facilities**	**Capacity/Size**	
Soybean Crushers	2	1,976	MT/Day
Ethanol Facility* (operating)	1	0.04	MGY
Federally Inspected Livestock Slaughter/Processing Facilities	73	n/a	
State Inspected Livestock Slaughter/Processing Facilities	0	n/a	
Grain Elevators**	182	327,467	Thous. Bu. Storage
Shuttle Elevators	6	5,935	Thous. Bu. Storage
River Elevators	25	62,019	Thous. Bu. Storage

** 1 Cellulosic ethanol facility is included in ethanol facility database.*

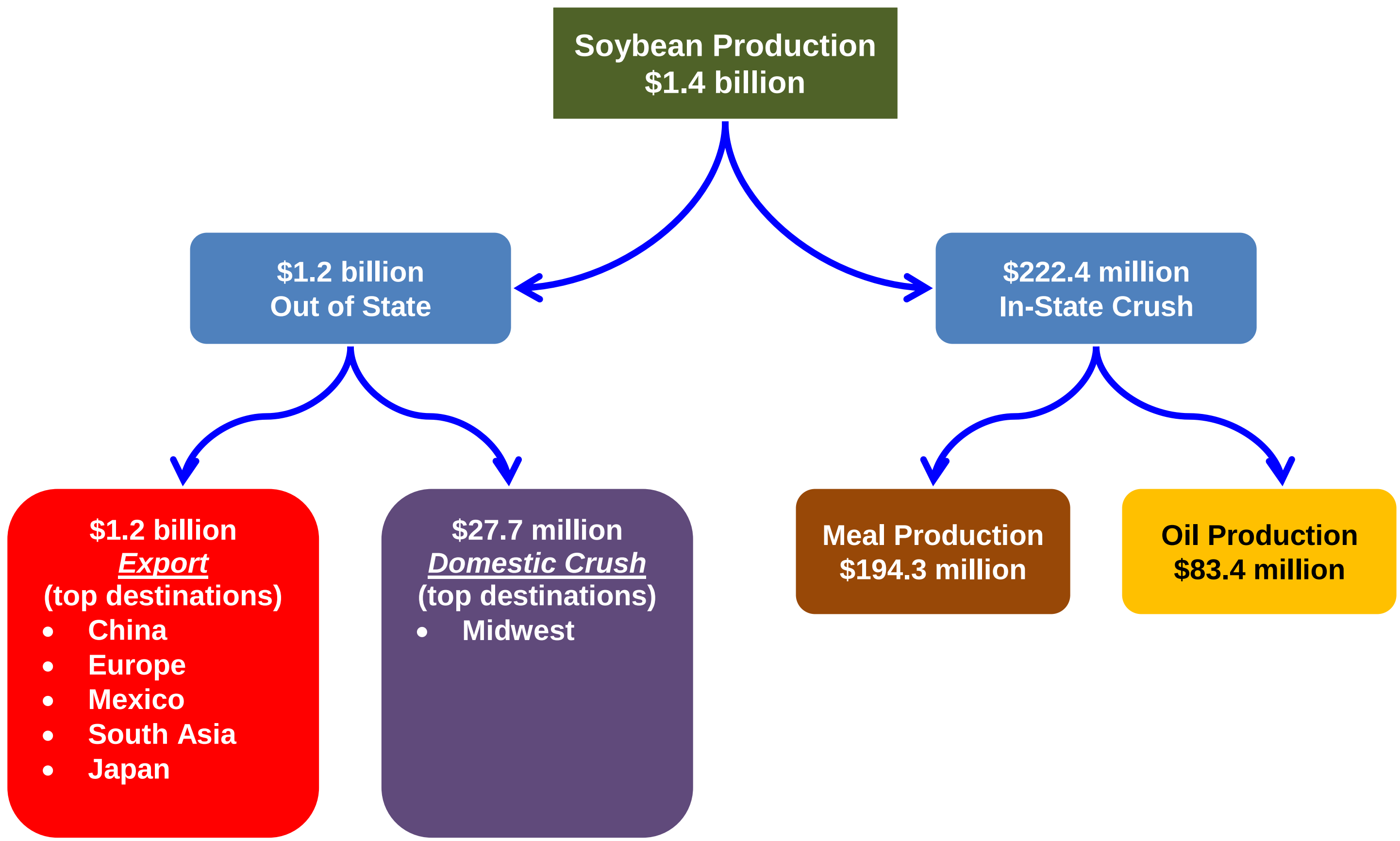
*** Shuttle and river elevators are included in the list of grain elevators.*

ARKANSAS FLOWCHART OF SOYBEAN MOVEMENTS (2013/14)

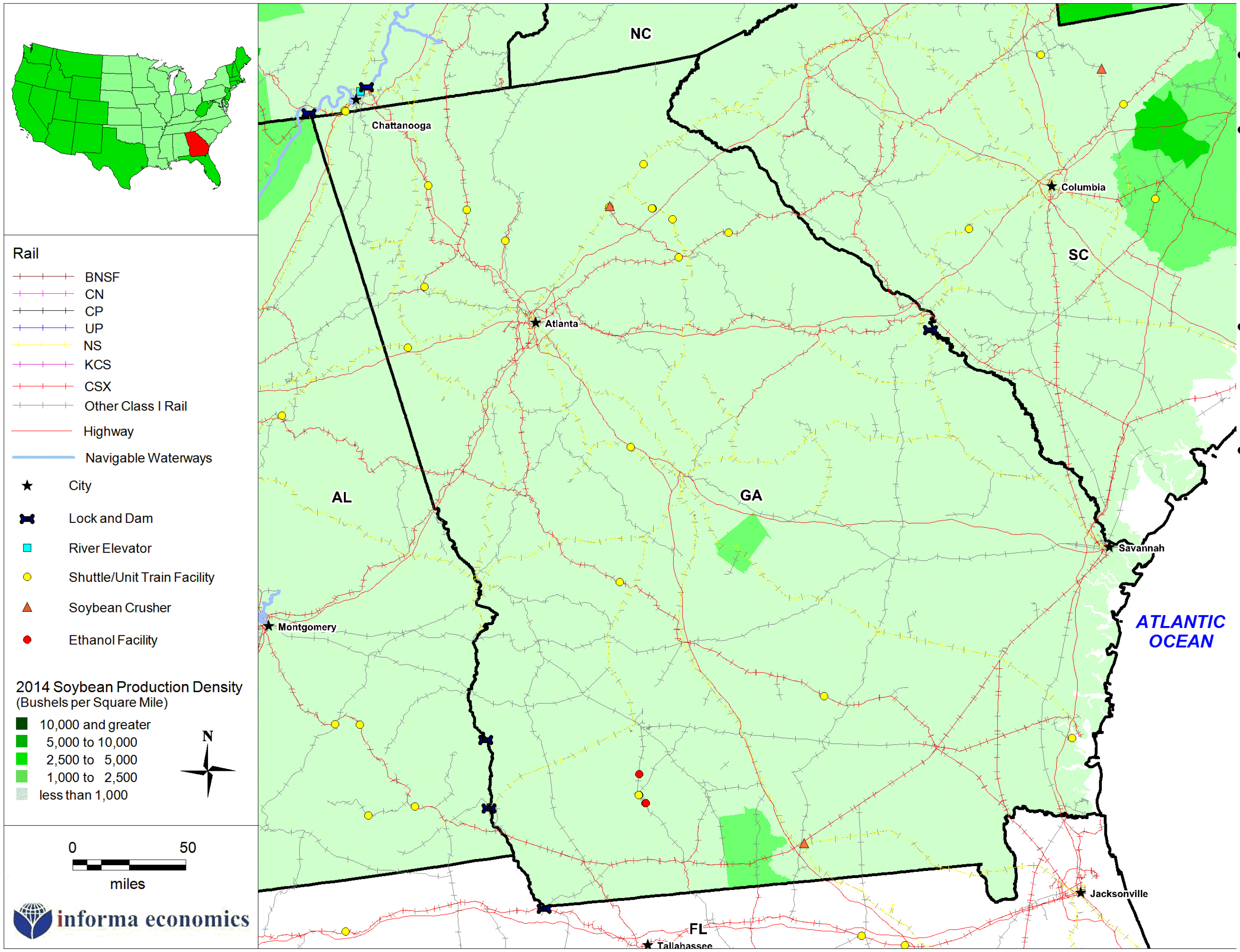


*Assumption $25 premium for export

ARKANSAS FLOWCHART OF SOYBEAN VALUE (2013/14)



GEORGIA



Production

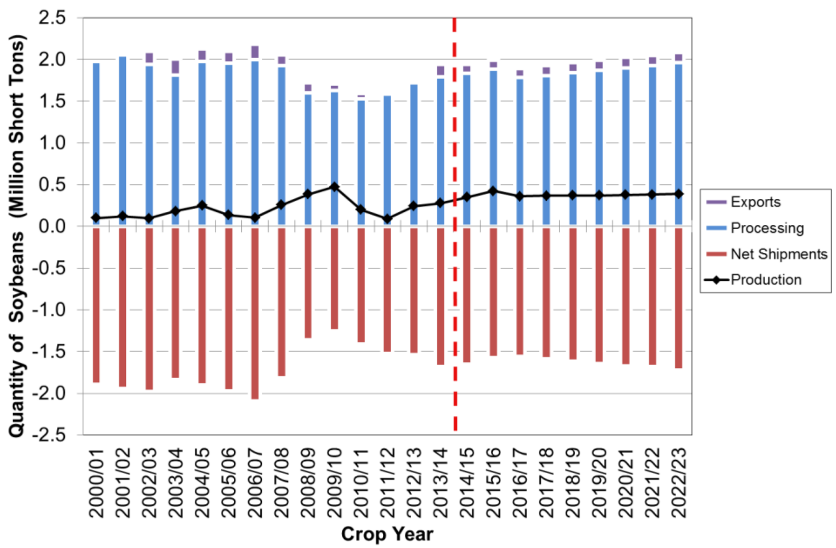
- Soybean production mostly in Brooks and Bleckley counties.
- Georgia is a significant producer of poultry, primarily broilers, contributing 15% of U.S. production.

Infrastructure

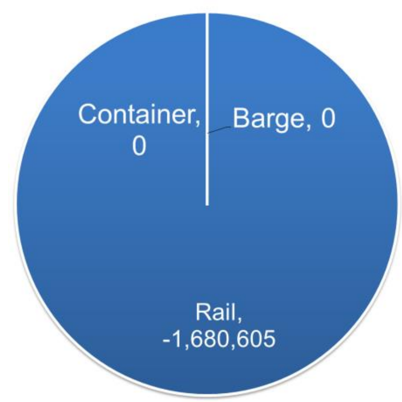
- Georgia has 4,653 miles of rail lines, 1,247 miles of interstate, and 128,620 total road miles.
- The state also has 0 shuttle facility, 2 soybean crush facilities, 2 ethanol facilities, 203 grain elevators, and 0 river elevator.

GEORGIA

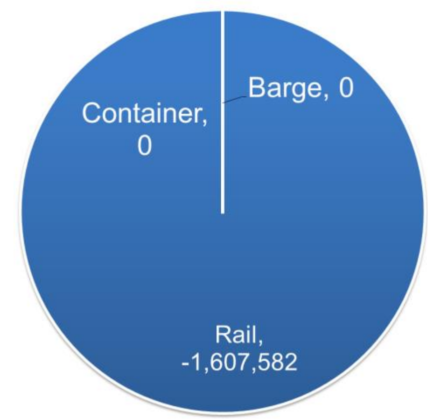
Soybean Surplus and Deficit Outlook



Soybean Movements by Mode (Short Tons)



2013/14



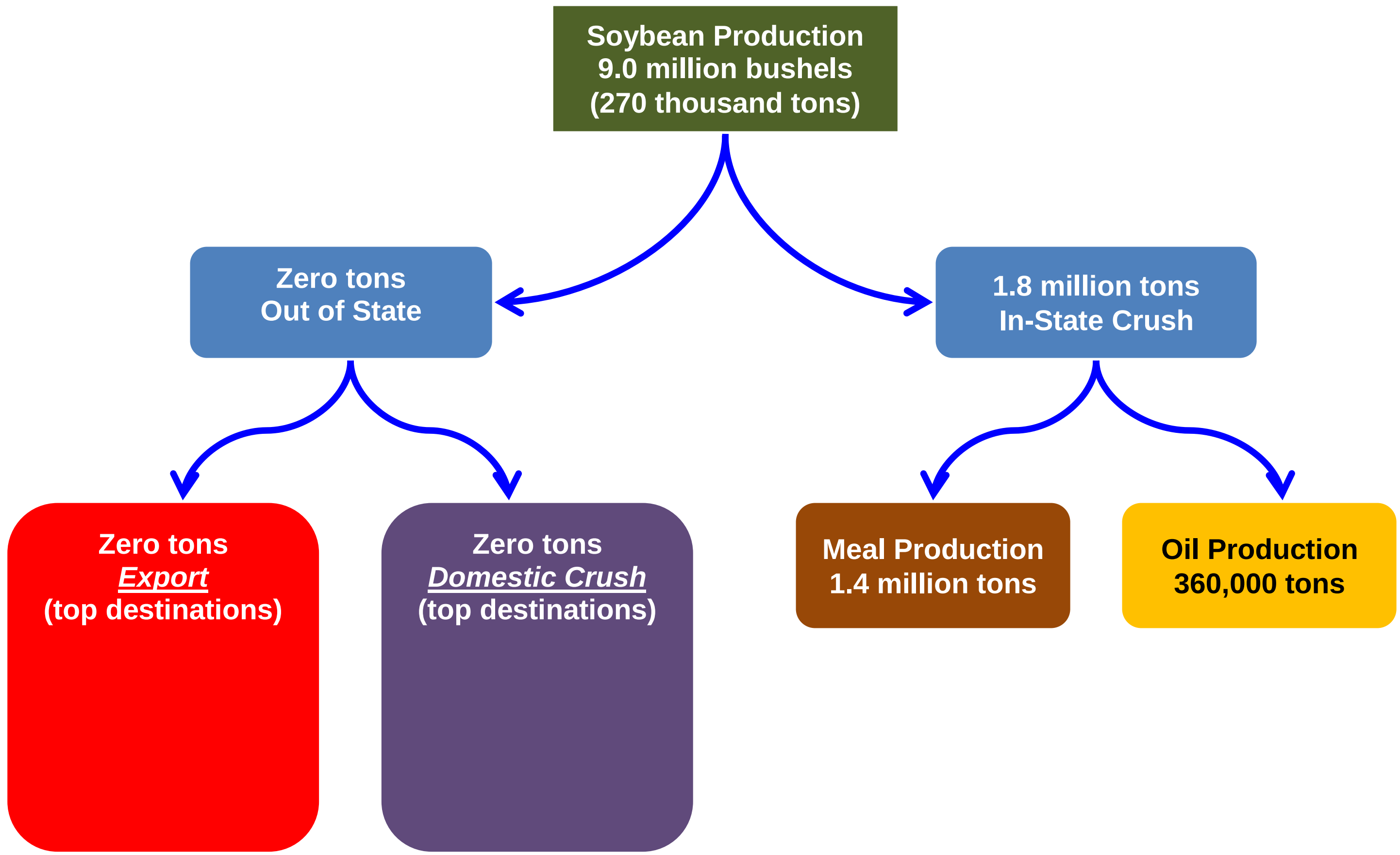
2022/23

** A negative number indicates the state is a net inshipment*

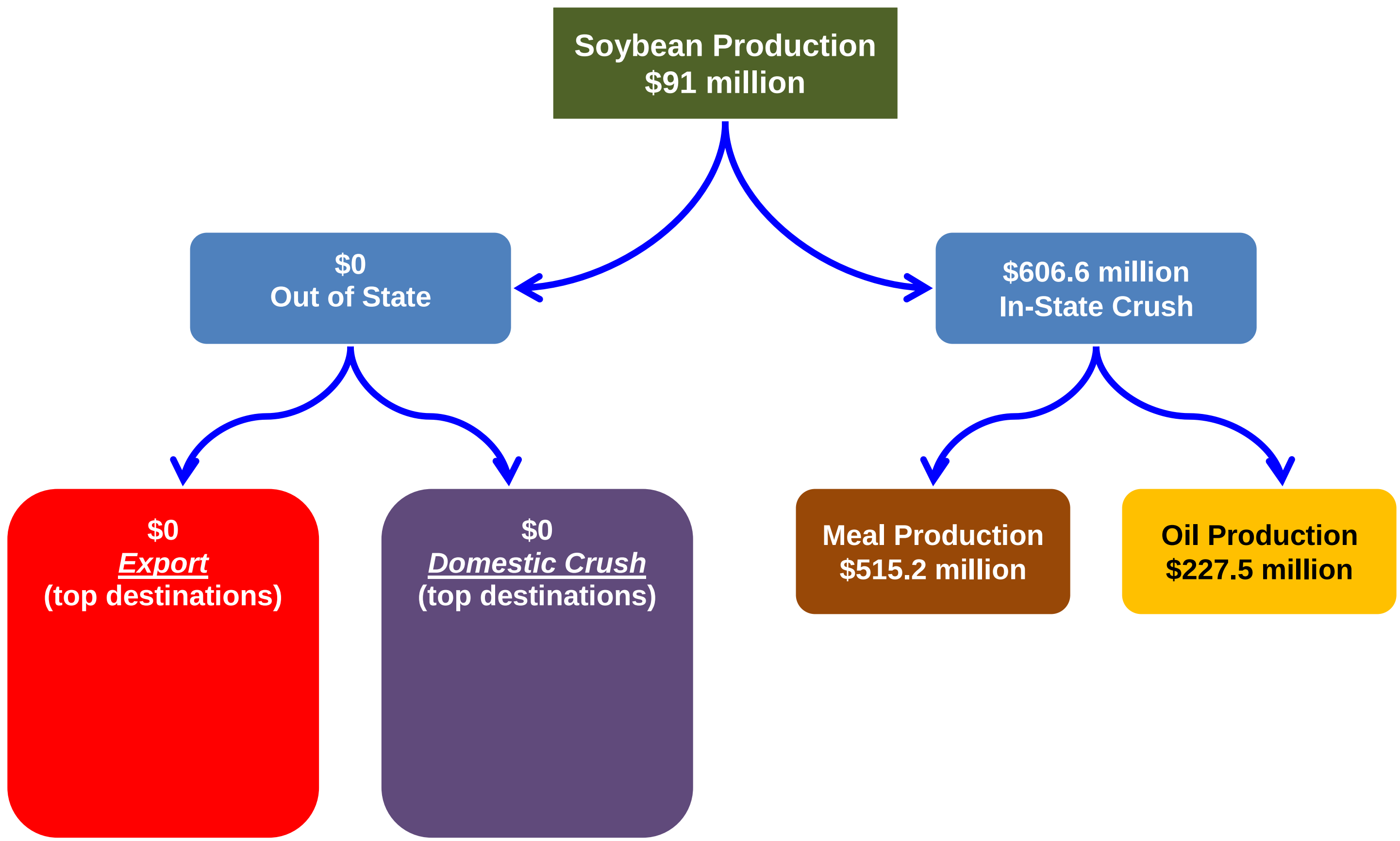
Agricultural Infrastructure: Crush, Ethanol Facilities, Livestock Processing, and Grain Storage			
Facility Type	**# of Facilities**	**Capacity/Size**	
Soybean Crushers	2	5,307	MT/Day
Ethanol Facility (operating)	2	120	MGY
Federally Inspected Livestock Slaughter/Processing Facilities	100	n/a	
State Inspected Livestock Slaughter/Processing Facilities	51	n/a	
Grain Elevators*	203	18,249	Thous. Bu. Storage
Shuttle Elevators	19	12,624	Thous. Bu. Storage
River Elevators	0	-	Thous. Bu. Storage

** Shuttle and river elevators are included in the list of grain elevators.*

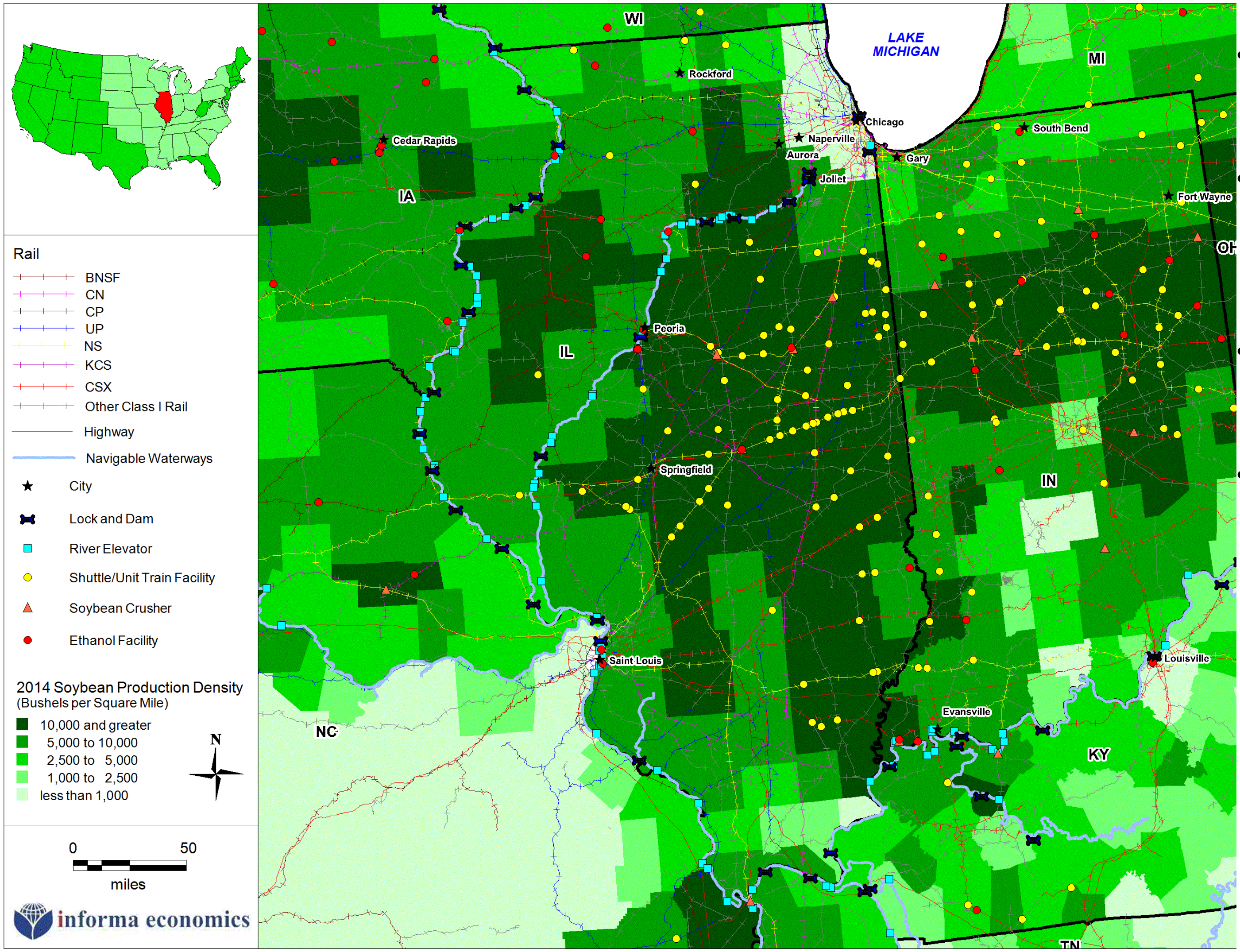
GEORGIA FLOWCHART OF SOYBEAN MOVEMENTS (2013/14)



GEORGIA FLOWCHART OF SOYBEAN VALUE (2013/14)



ILLINOIS



Production

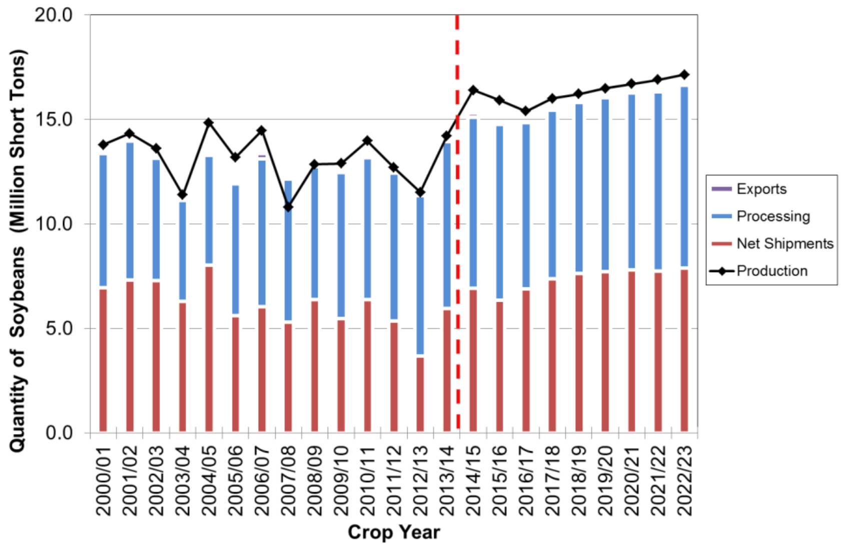
- Soybean production throughout the state, with greatest densities in central eastern portion of the state.
- In terms of livestock, Illinois is a significant contributor to U.S. hog production.

Infrastructure

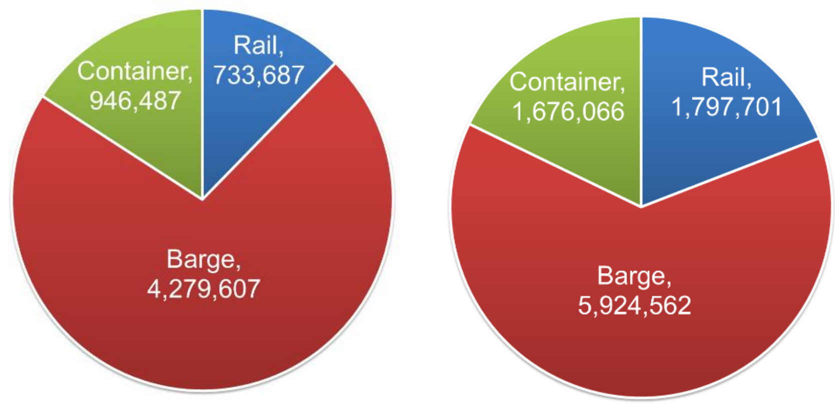
- Illinois has 6,986 miles of rail lines, 2,185 miles of interstate, and 145,708 miles of roadways.
- Illinois has 77 shuttle facilities, 6 soybean crush facilities, 14 ethanol facilities, 1,066 grain elevators, and 62 river elevators.

ILLINOIS

Soybean Surplus and Deficit Outlook



Soybean Movements by Mode (Short Tons)

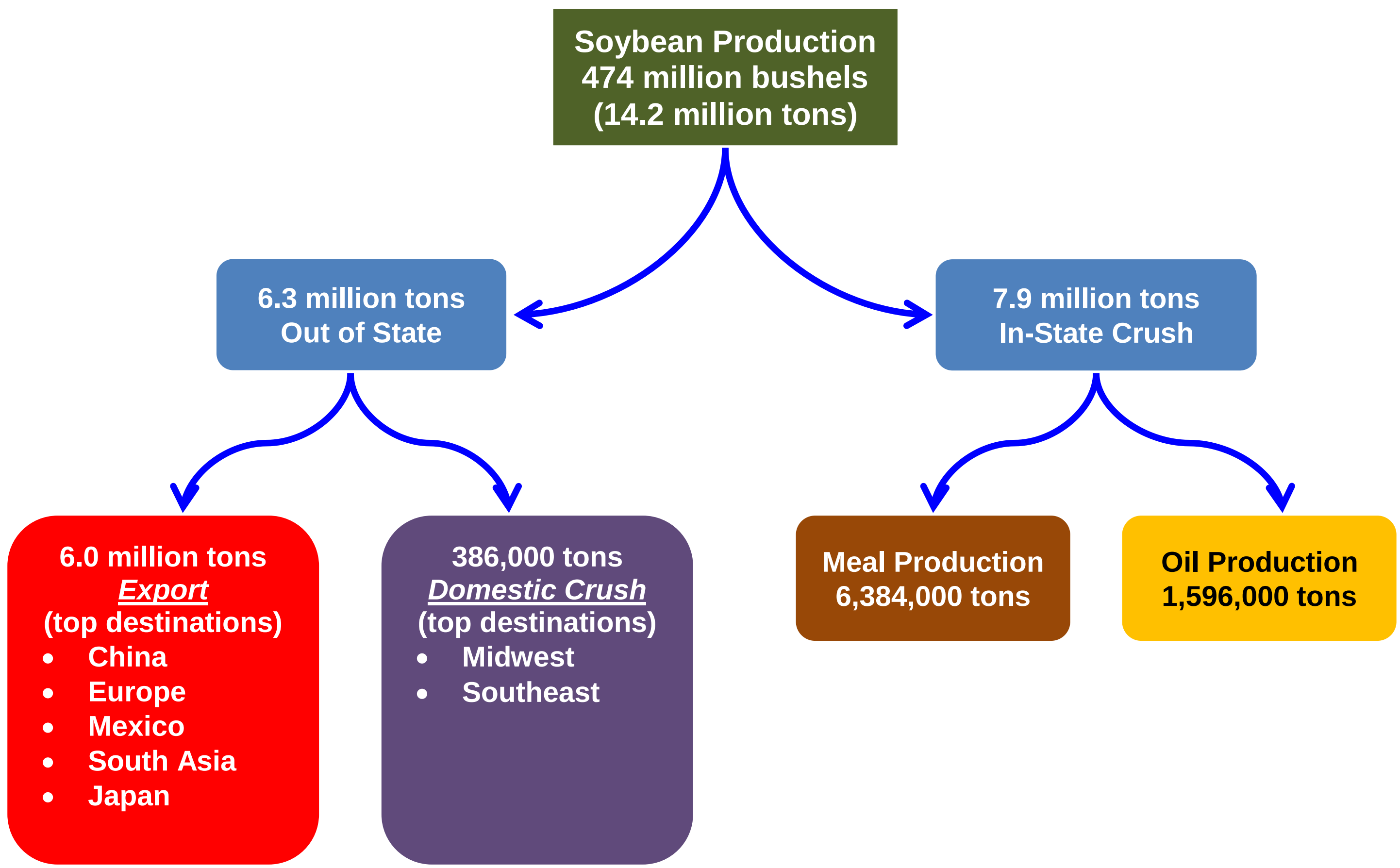


2013/14 **2022/23**

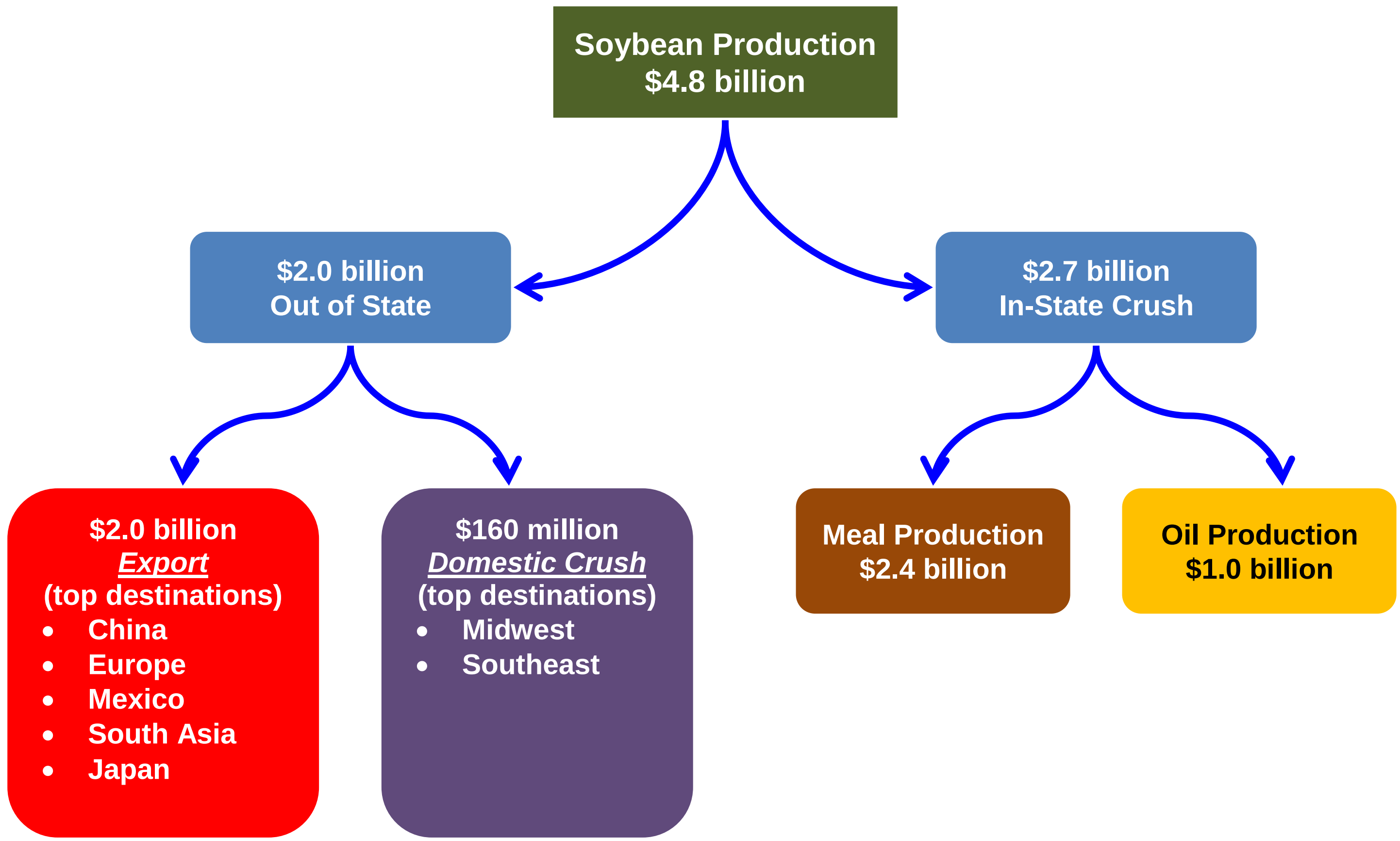
Agricultural Infrastructure: Crush, Ethanol Facilities, Livestock Processing, and Grain Storage			
Facility Type	# of Facilities	Capacity/Size	
Soybean Crushers	6	22,456	MT/Day
Ethanol Facility (operating)	14	1,632	MGY
Federally Inspected Livestock Slaughter/Processing Facilities	253	n/a	
State Inspected Livestock Slaughter/Processing Facilities	161	n/a	
Grain Elevators*	1,066	1,421,144	Thous. Bu. Storage
Shuttle Elevators	77	270,792	Thous. Bu. Storage
River Elevators	62	100,372	Thous. Bu. Storage

** Shuttle and river elevators are included in the list of grain elevators.*

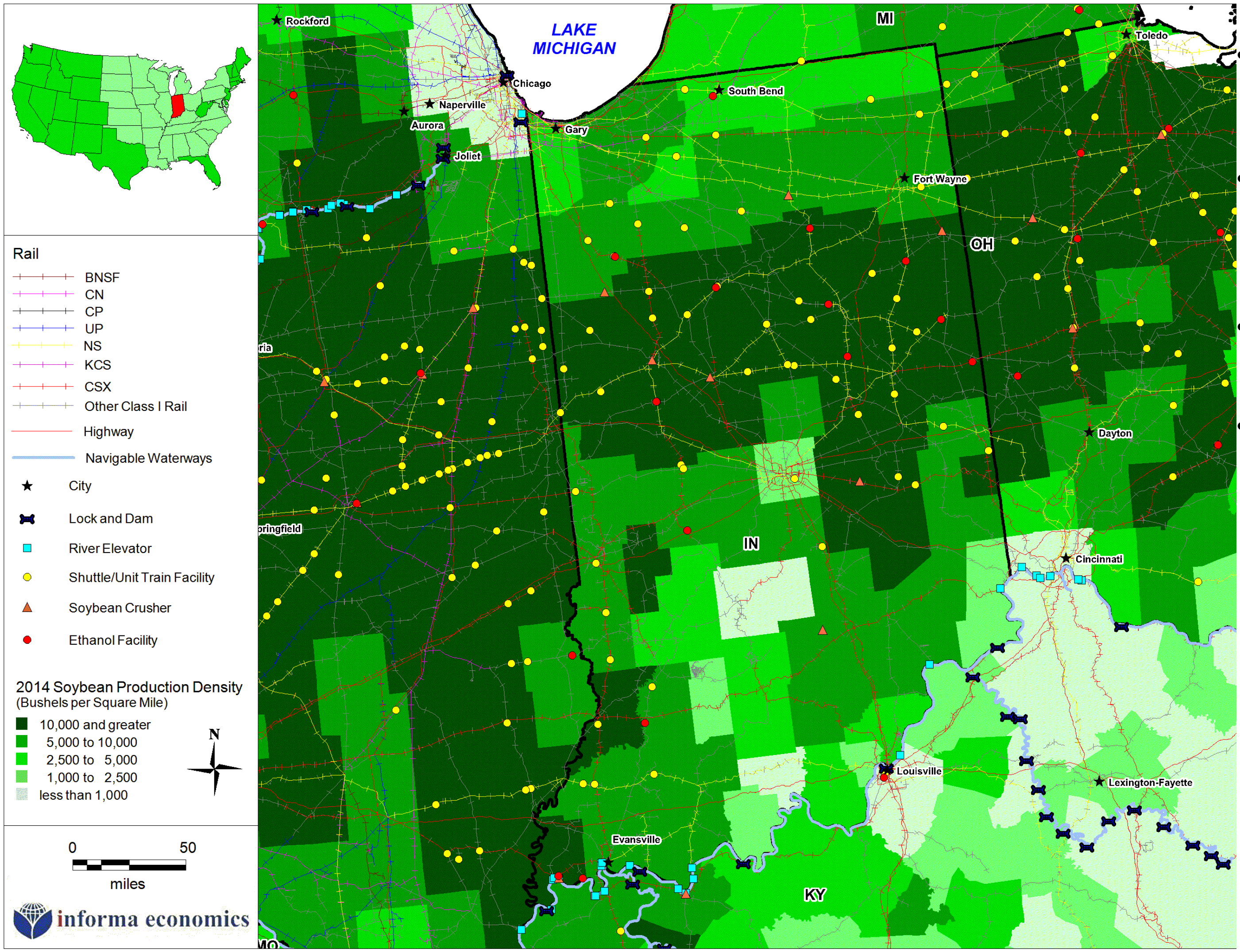
ILLINOIS FLOWCHART OF SOYBEAN MOVEMENTS (2013/14)



ILLINOIS FLOWCHART OF SOYBEAN VALUE (2013/14)



INDIANA



Production

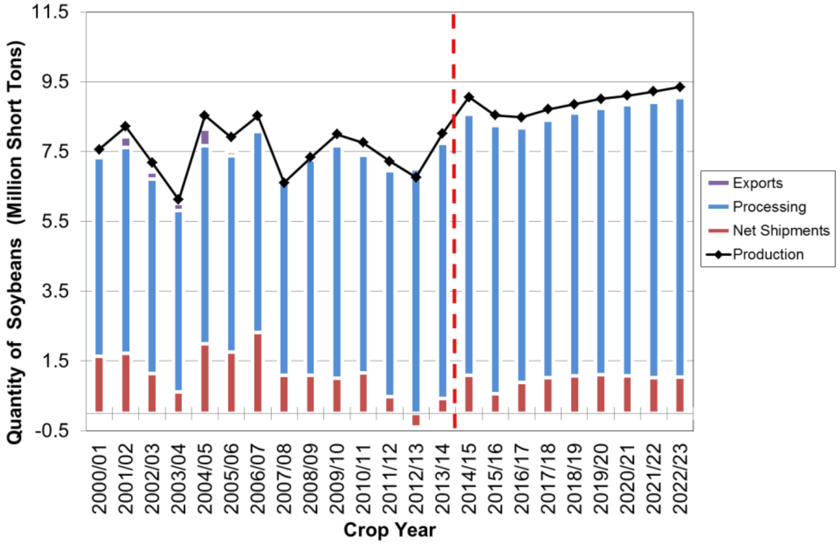
- Soybean production throughout the state, with the greatest densities in the center of the state.
- Indiana is a primary contributor of hog production in the U.S.

Infrastructure

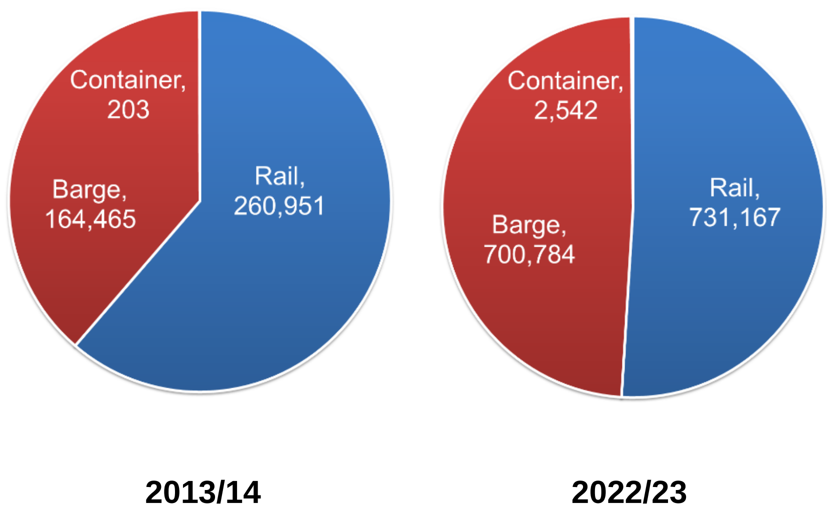
- Indiana has 4,075 miles of rail lines, 1,188 miles of interstate, and 97,553 miles of roadways.
- Indiana has 56 shuttle facilities, 8 soybean crush facilities, 14 ethanol facilities, 374 grain elevators, and 11 river elevators.

INDIANA

Soybean Surplus and Deficit Outlook



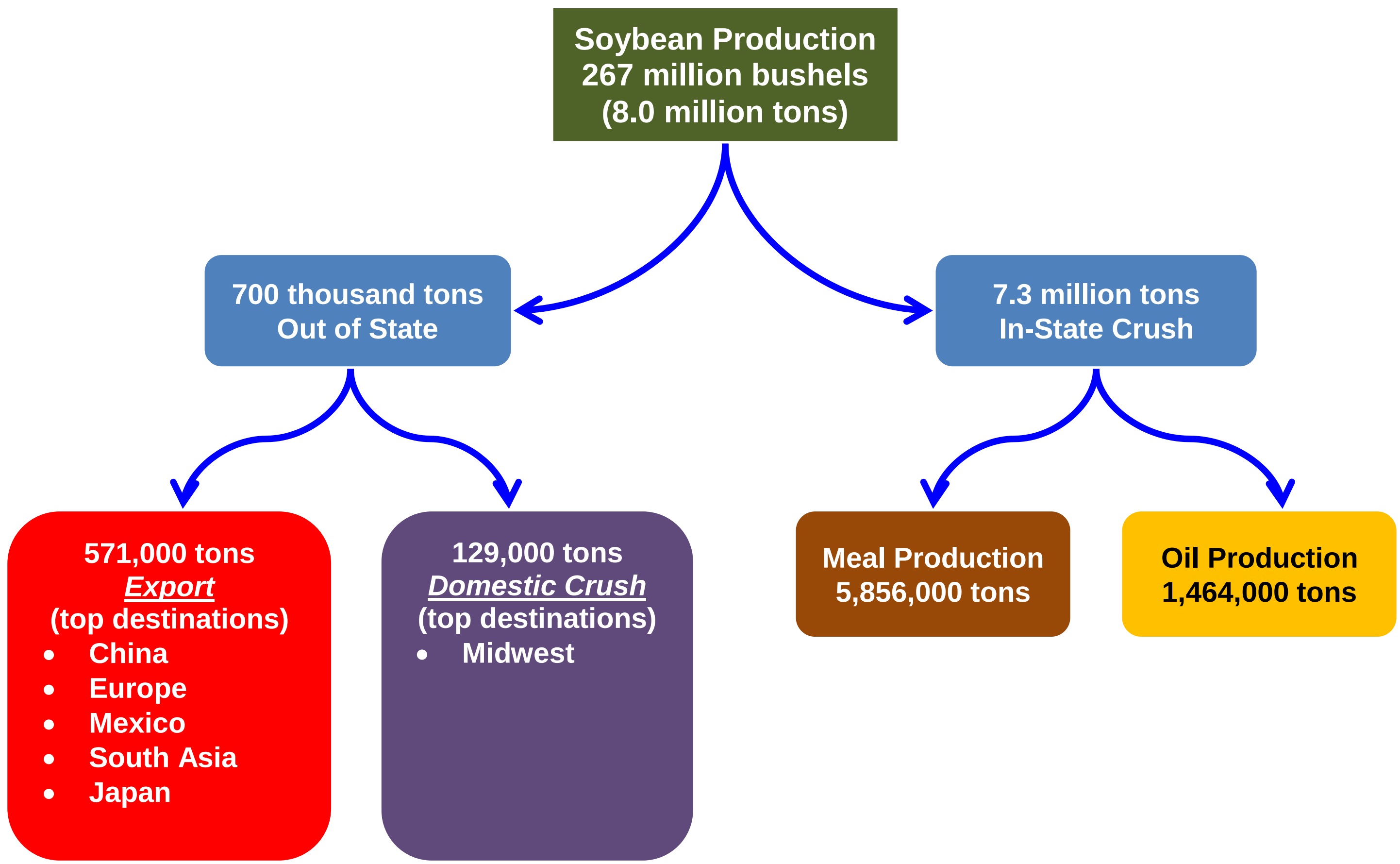
Soybean Movements by Mode (Short Tons)



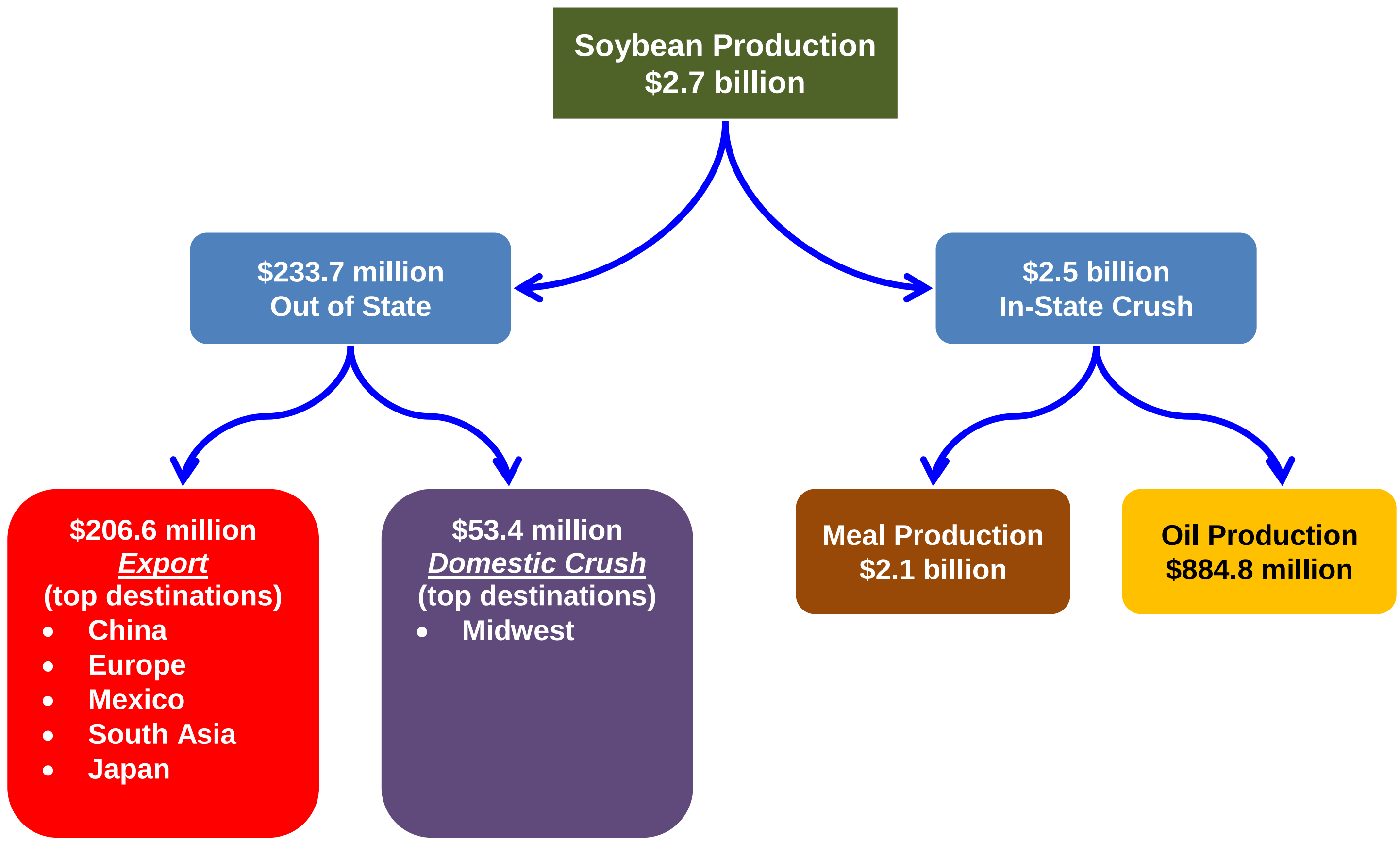
Agricultural Infrastructure: Crush, Ethanol Facilities, Livestock Processing, and Grain Storage			
Facility Type	**# of Facilities**	**Capacity/Size**	
Soybean Crushers	8	22,652	MT/Day
Ethanol Facility (operating)	14	1,171	MGY
Federally Inspected Livestock Slaughter/Processing Facilities	58	n/a	
State Inspected Livestock Slaughter/Processing Facilities	107	n/a	
Grain Elevators*	374	418,388	Thous. Bu. Storage
Shuttle Elevators	56	186,406	Thous. Bu. Storage
River Elevators	11	22,660	Thous. Bu. Storage

** Shuttle and river elevators are included in the list of grain elevators.*

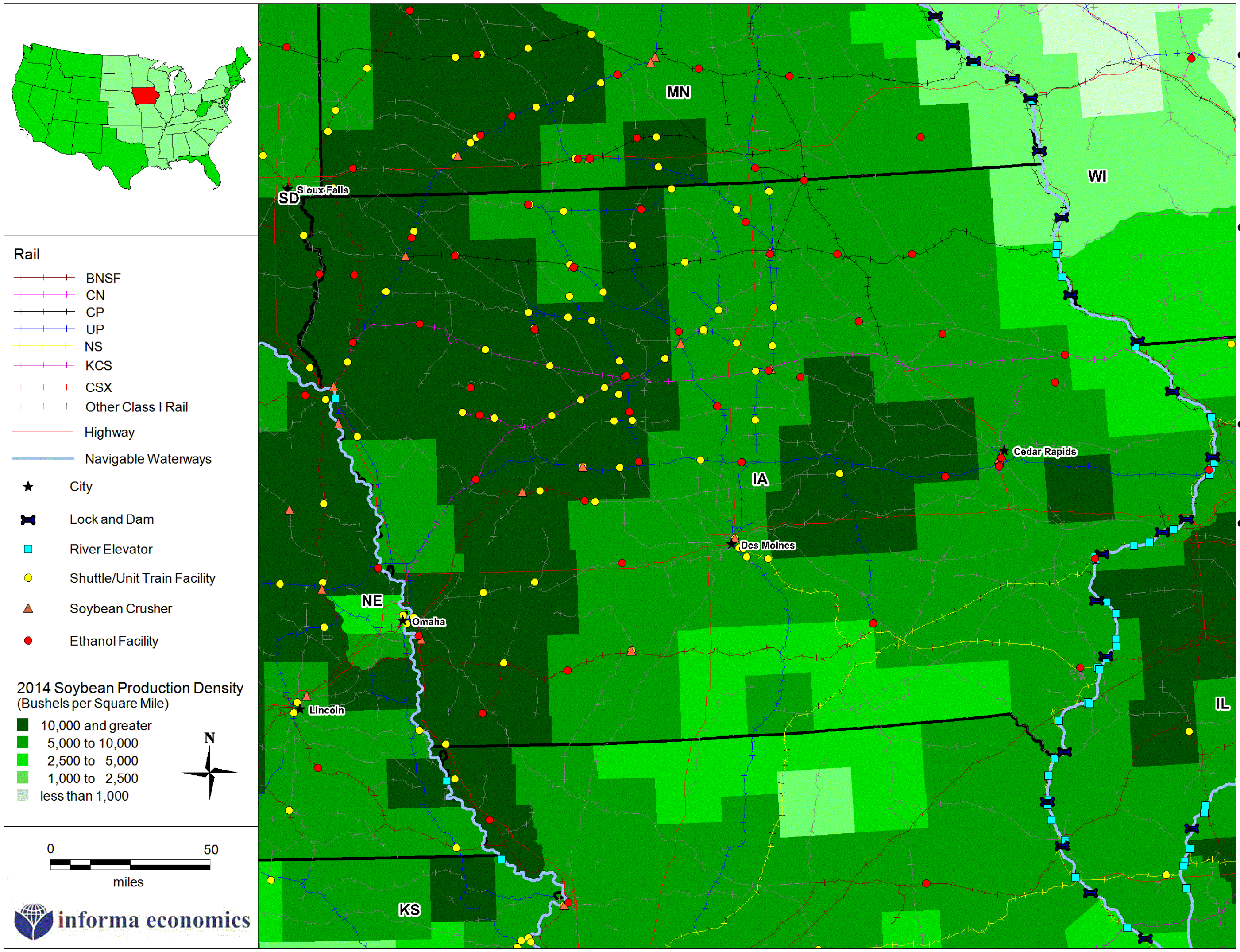
INDIANA FLOWCHART OF SOYBEAN MOVEMENTS (2013/14)



INDIANA FLOWCHART OF SOYBEAN VALUE (2013/14)



IOWA



Production

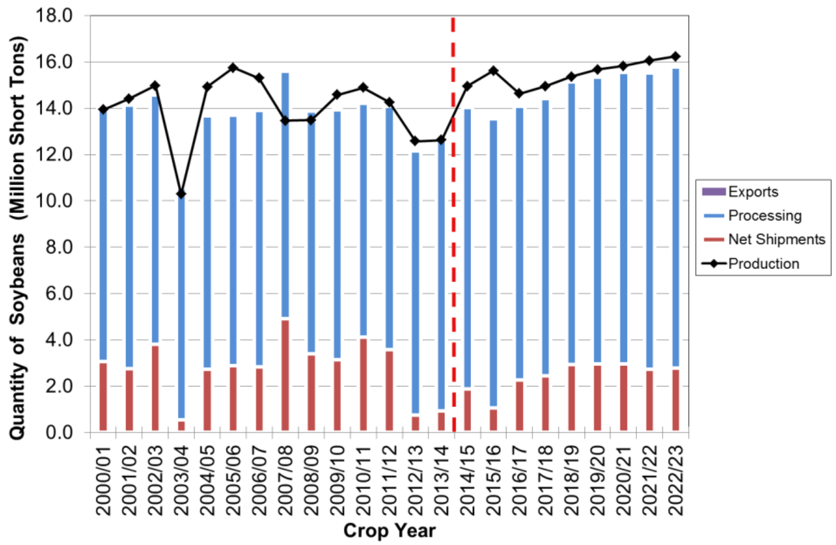
- Soybean production throughout the state, with the greatest densities in the western portion of the state, particularly in the northwest.
- Iowa is the largest producer of pork in the U.S. and also a significant producer of cattle.

Infrastructure

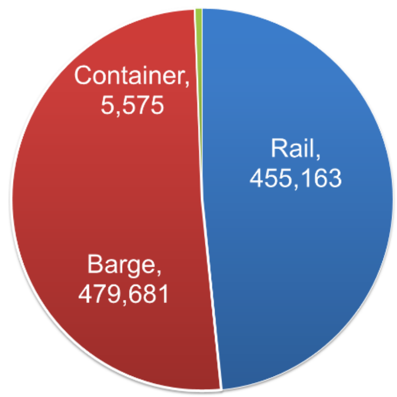
- Iowa has 3,869 miles of rail lines, 782 miles of interstate, and 114,429 miles of roadways.
- Iowa has 62 shuttle facilities, 14 soybean crush facilities, 44 ethanol facilities, 829 grain elevators, and 14 river elevators.

IOWA

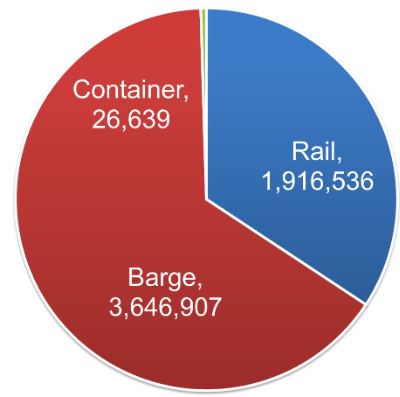
Soybean Surplus and Deficit Outlook



Soybean Movements by Mode (Short Tons)



2013/14



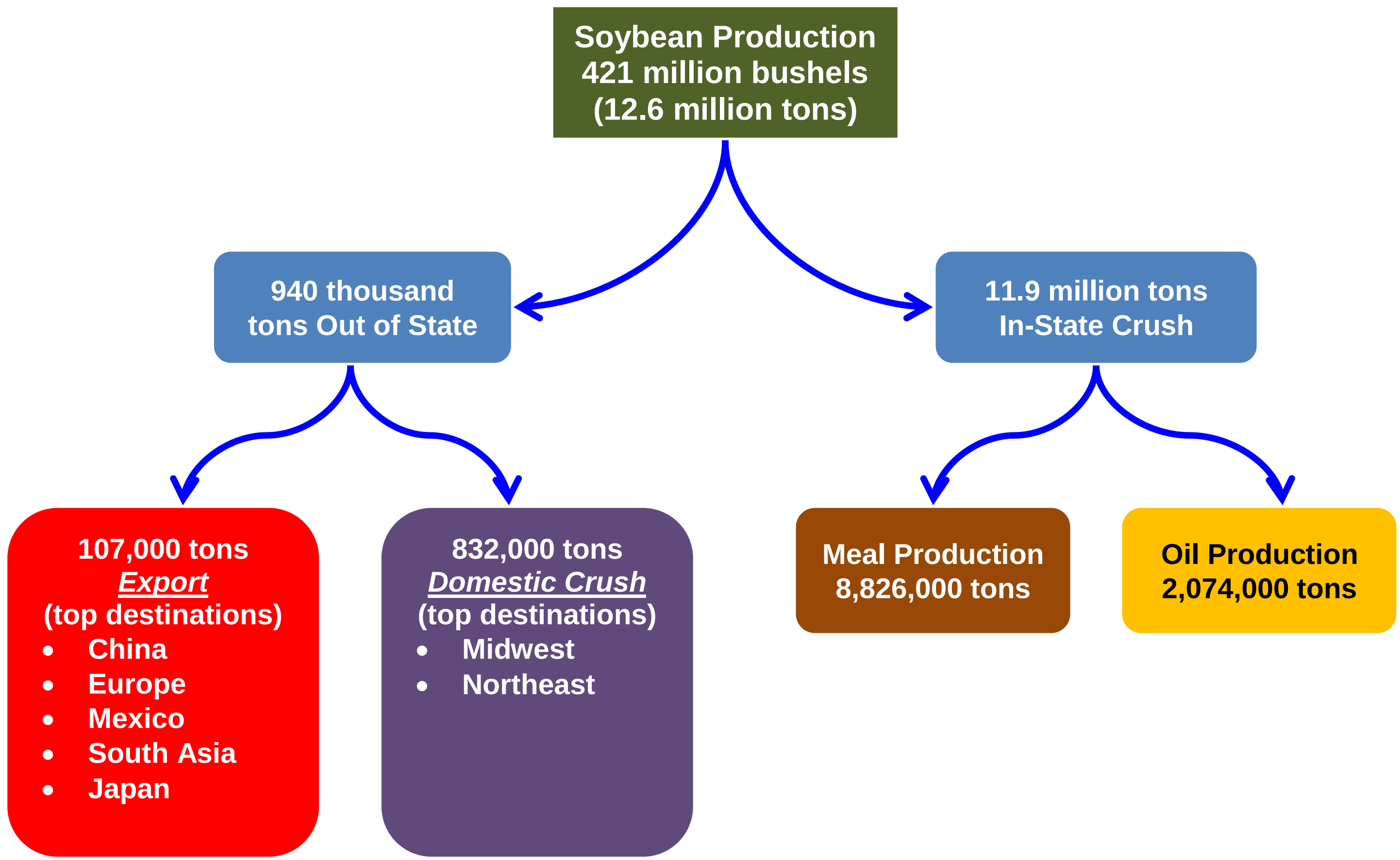
2022/23

Agricultural Infrastructure: Crush, Ethanol Facilities, Livestock Processing, and Grain Storage			
Facility Type	**# of Facilities**	**Capacity/Size**	
Soybean Crushers	14	36,482	MT/Day
Ethanol Facility* (operating)	44	3,838	MGY
Federally Inspected Livestock Slaughter/Processing Facilities	111	n/a	
State Inspected Livestock Slaughter/Processing Facilities	76	n/a	
Grain Elevators**	829	1,356,623	Thous. Bu. Storage
Shuttle Elevators	62	271,638	Thous. Bu. Storage
River Elevators	14	29,385	Thous. Bu. Storage

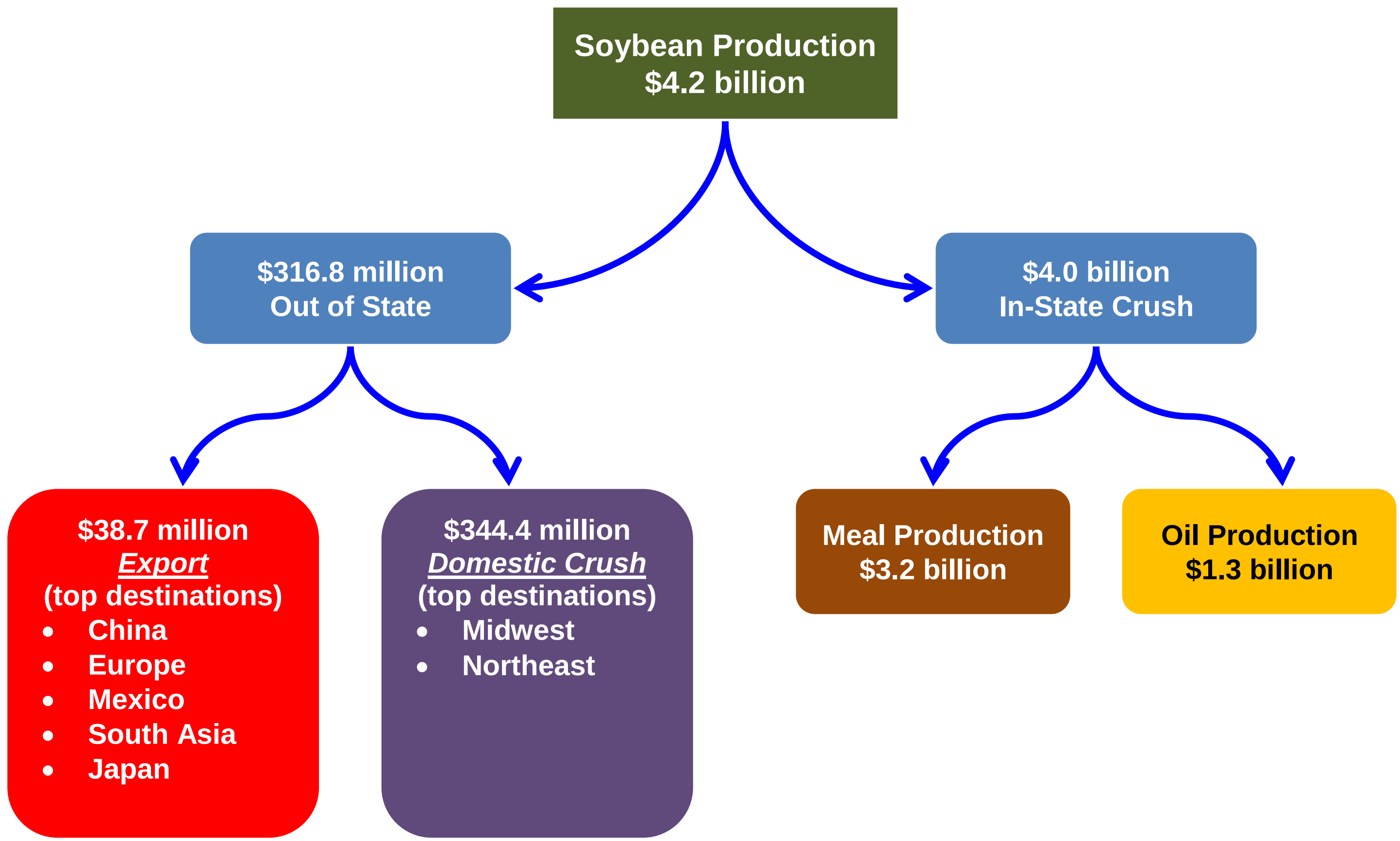
** 2 Cellulosic ethanol facilities are included in ethanol facility database.*

*** Shuttle and river elevators are included in the list of grain elevators.*

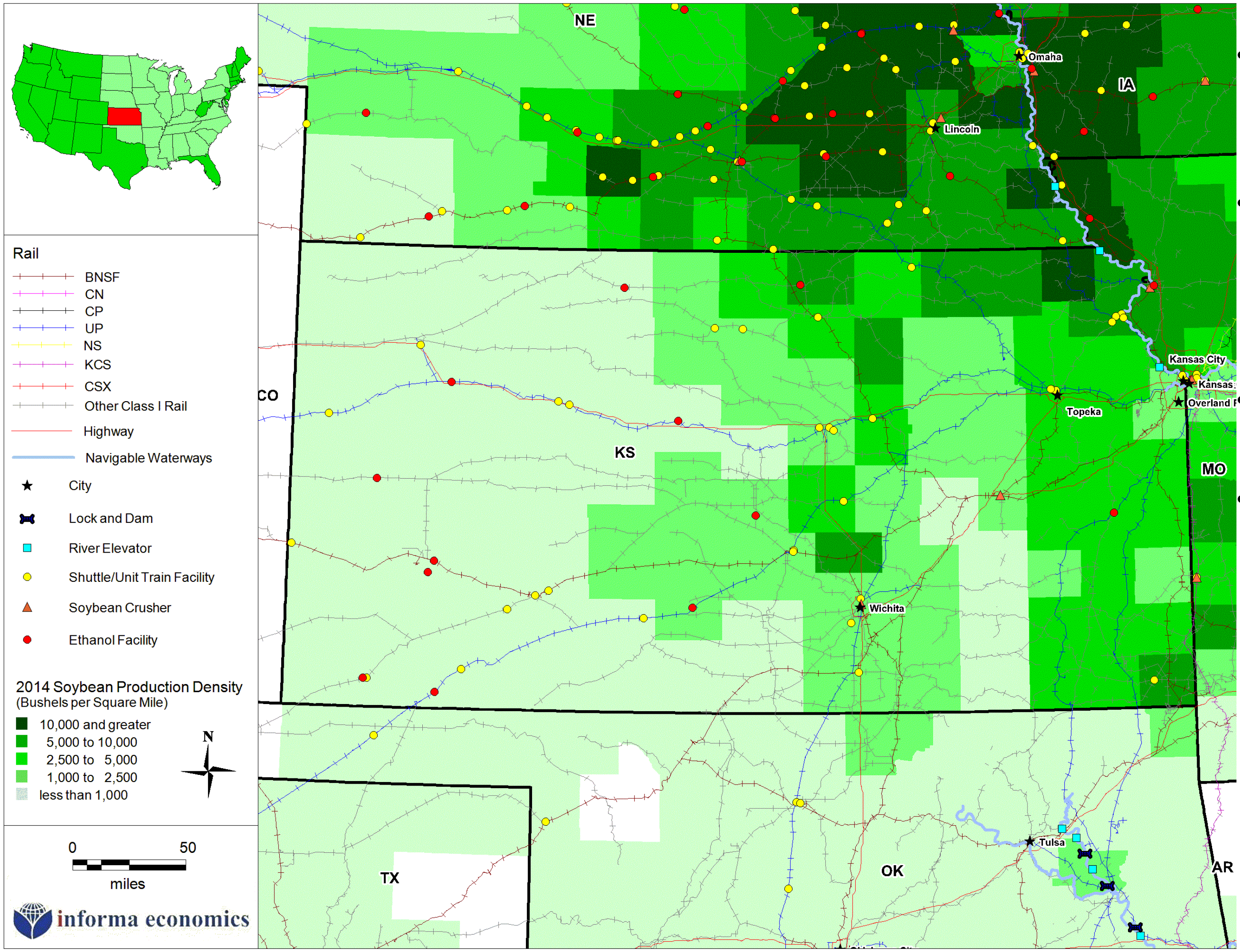
IOWA FLOWCHART OF SOYBEAN MOVEMENTS (2013/14)



IOWA FLOWCHART OF SOYBEAN VALUE (2013/14)



KANSAS



Production

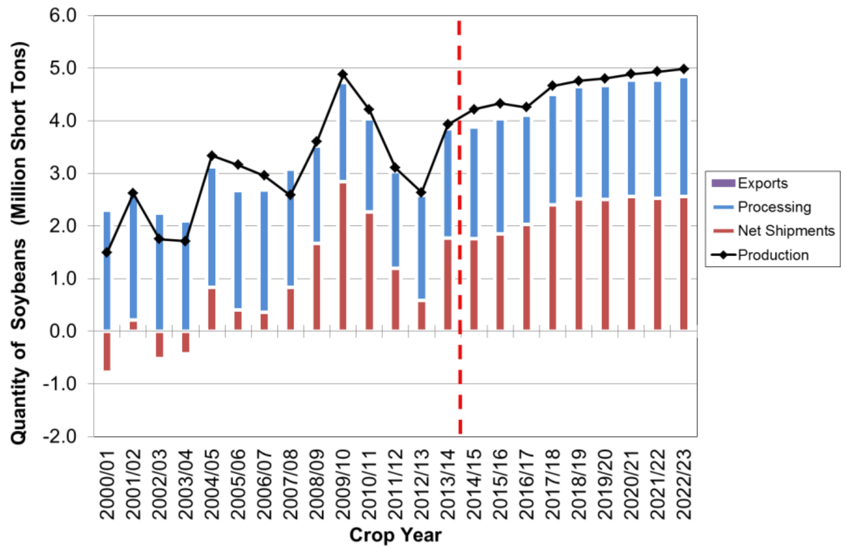
- Soybean production in mostly in the eastern portion of the state, with production densities highest northeast portion of the state.
- Kansas livestock inventories consist largely of cattle, contributing 6% of U.S. production.

Infrastructure

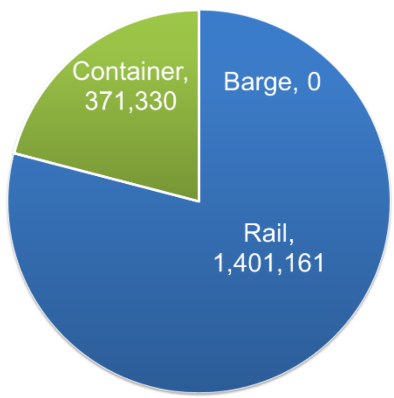
- Kansas has 4,855 miles of rail lines, 874 miles of interstate, and 140,687 miles of roadways.
- Kansas has 39 shuttle facilities, 2 soybean crush facilities, 12 ethanol facilities, 691 grain elevators, and 2 river elevators.

KANSAS

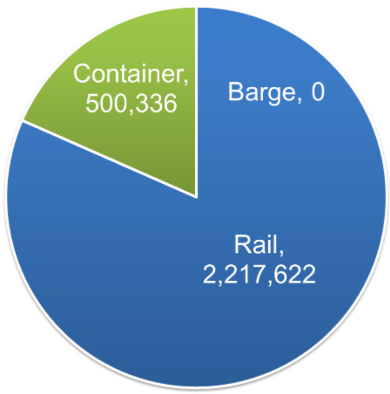
Soybean Surplus and Deficit Outlook



Soybean Movements by Mode (Short Tons)



2013/14



2022/23

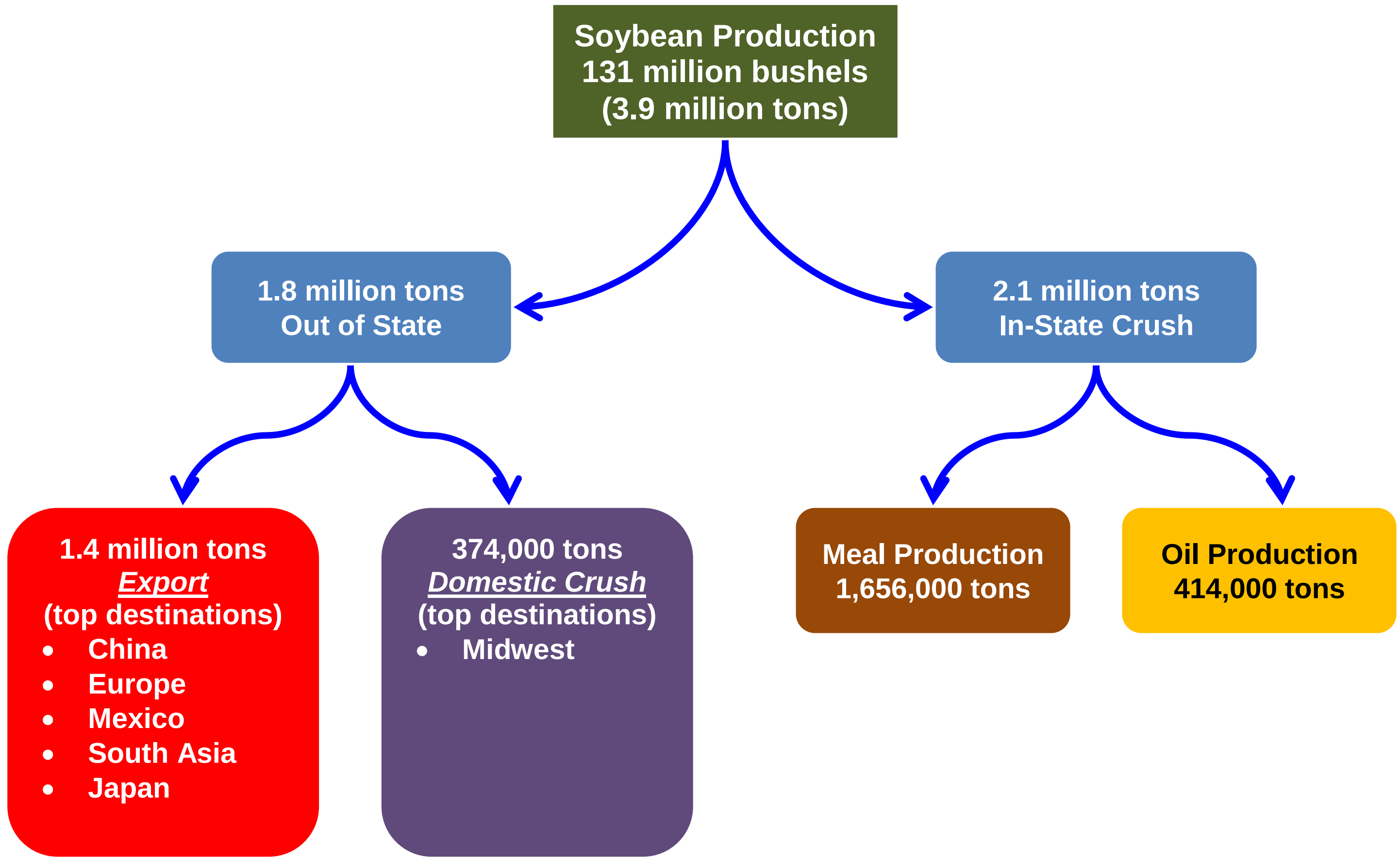
Agricultural Infrastructure: Crush, Ethanol Facilities, Livestock Processing, and Grain Storage

Facility Type	# of Facilities	Capacity/Size	
Soybean Crushers	2	6,158	MT/Day
Ethanol Facility* (operating)	12	492	MGY
Federally Inspected Livestock Slaughter/Processing Facilities	58	n/a	
State Inspected Livestock Slaughter/Processing Facilities	63	n/a	
Grain Elevators**	691	752,398	Thous. Bu. Storage
Shuttle Elevators	39	235,151	Thous. Bu. Storage
River Elevators	2	3,693	Thous. Bu. Storage

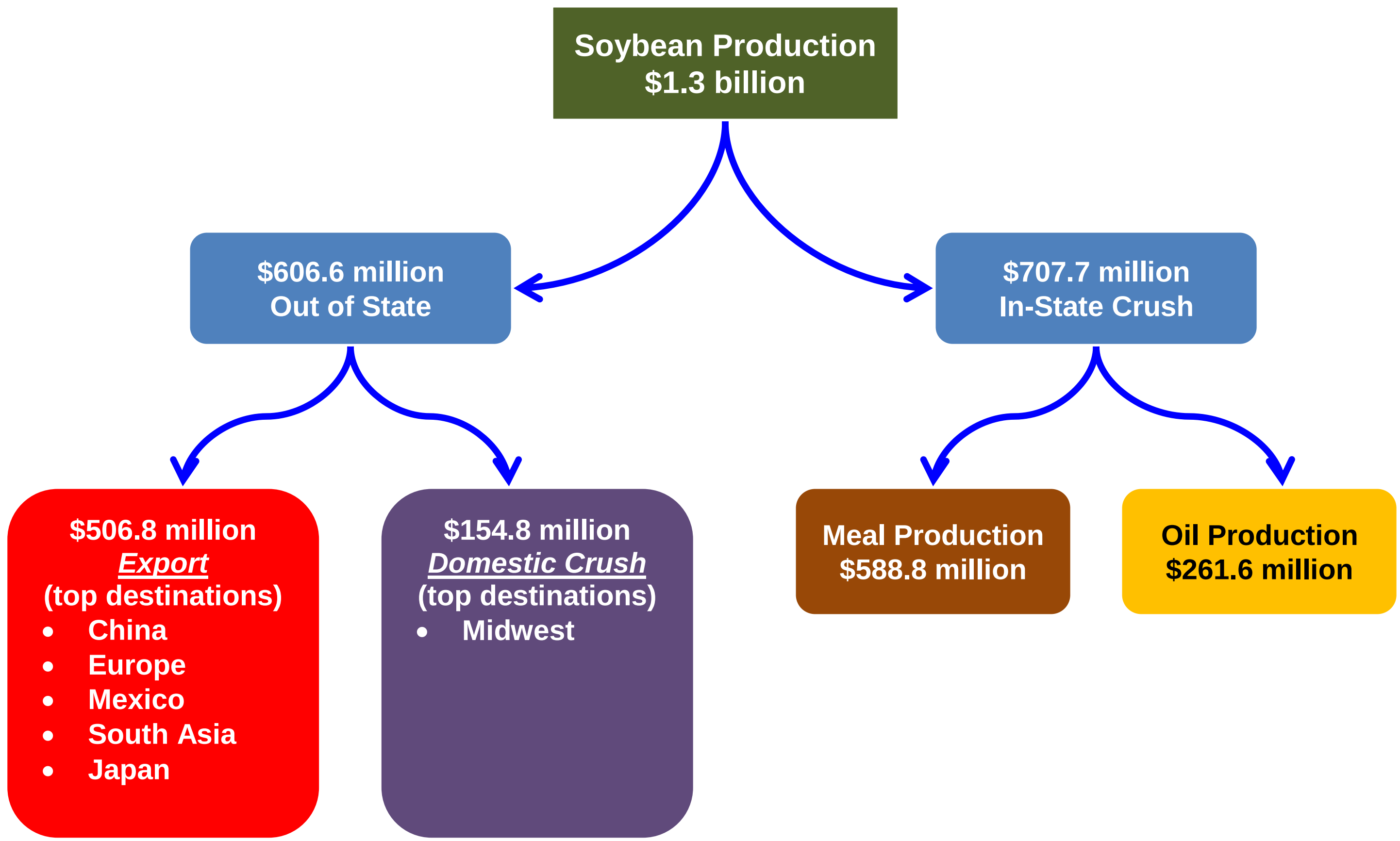
** 1 Cellulosic ethanol facility is included in ethanol facility database.*

*** Shuttle and river elevators are included in the list of grain elevators.*

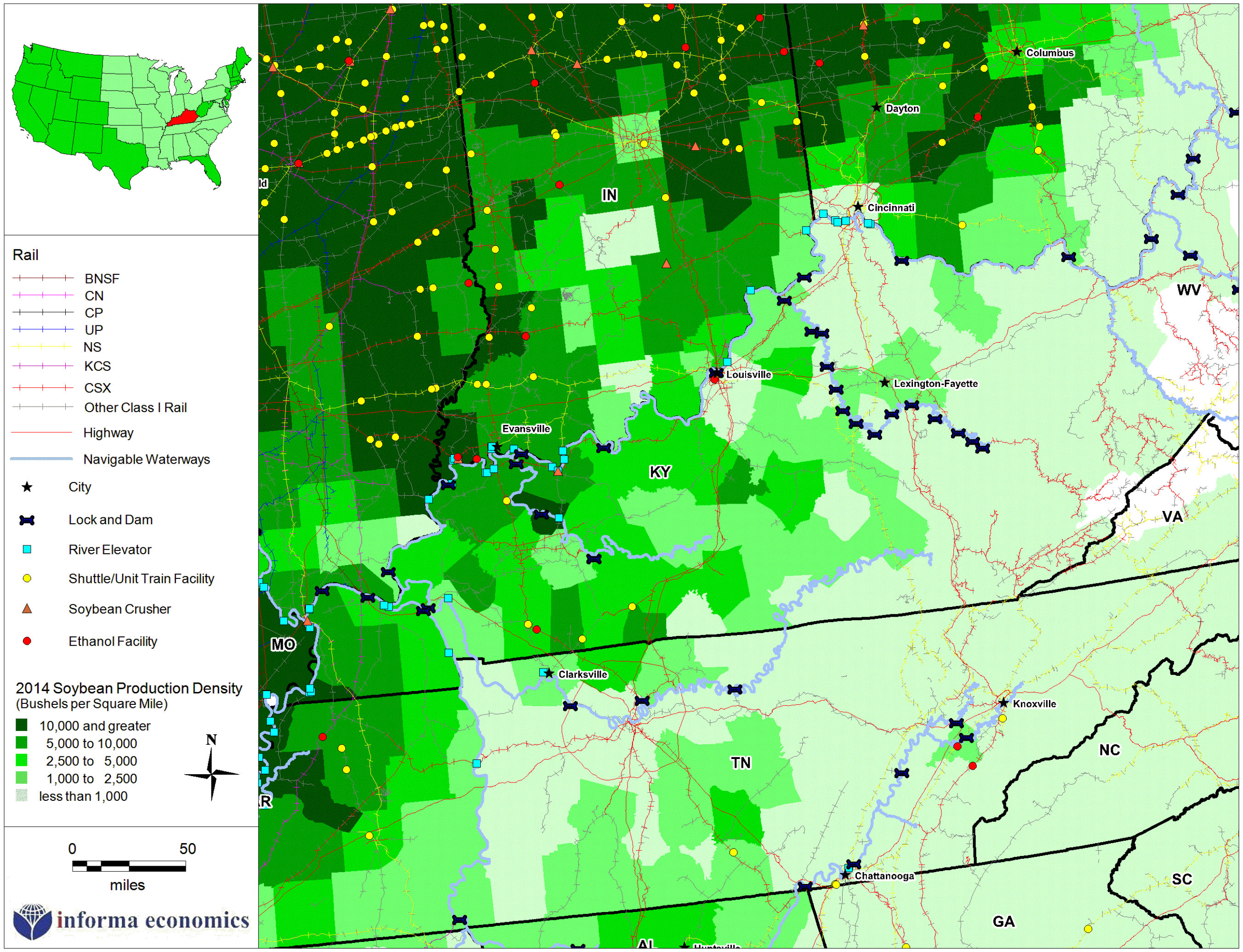
KANSAS FLOWCHART OF SOYBEAN MOVEMENTS (2013/14)



KANSAS FLOWCHART OF SOYBEAN VALUE (2013/14)



KENTUCKY



Production

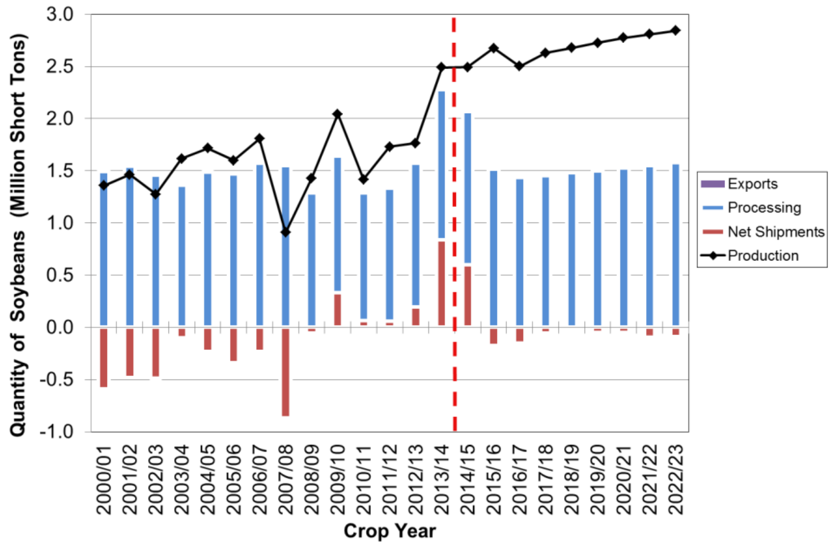
- Soybean production mostly in the western portion of the state, with production densities highest in the far west of the state.
- Significant Kentucky livestock inventories consist of broilers and cattle.

Infrastructure

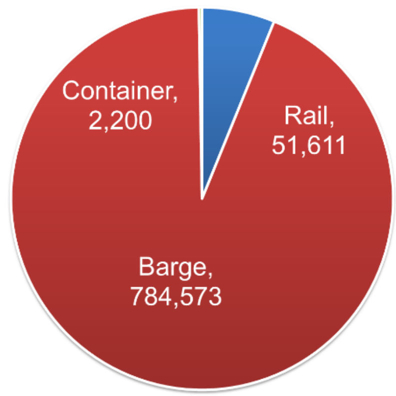
- Kentucky has 2,608 miles of rail lines, 801 miles of interstate, and 79,598 miles of roadways.
- Kentucky has 6 shuttle facilities, 1 soybean crush facility, 2 ethanol facilities, 72 grain elevators and 15 river elevators.

KENTUCKY

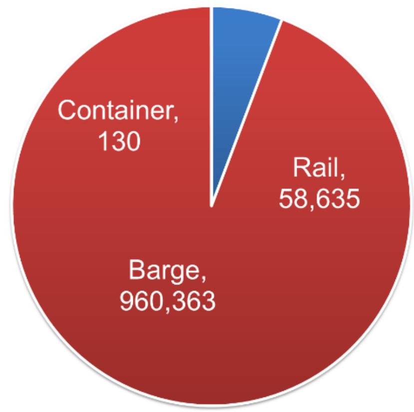
Soybean Surplus and Deficit Outlook



Soybean Movements by Mode (Short Tons)



2013/14

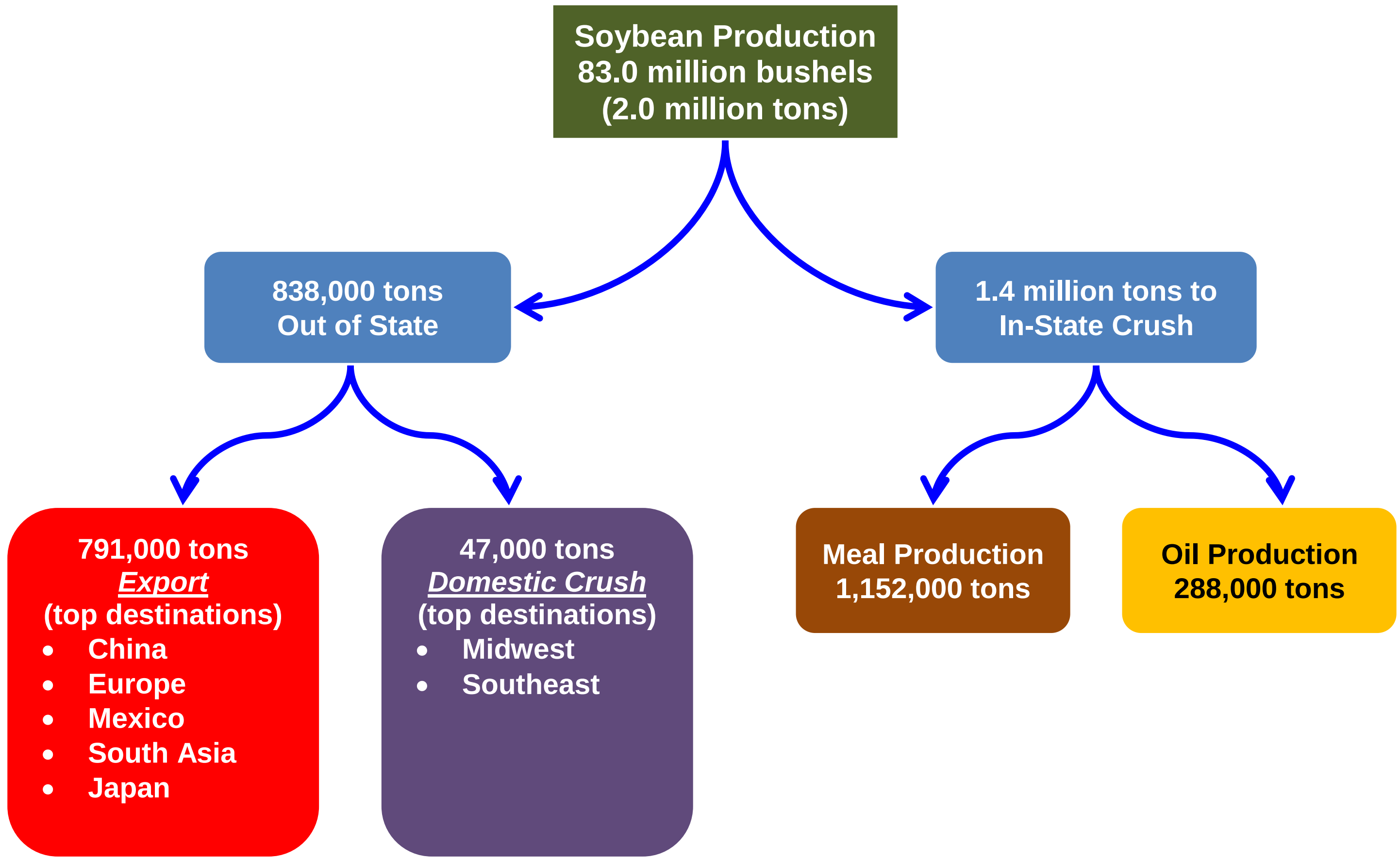


2022/23

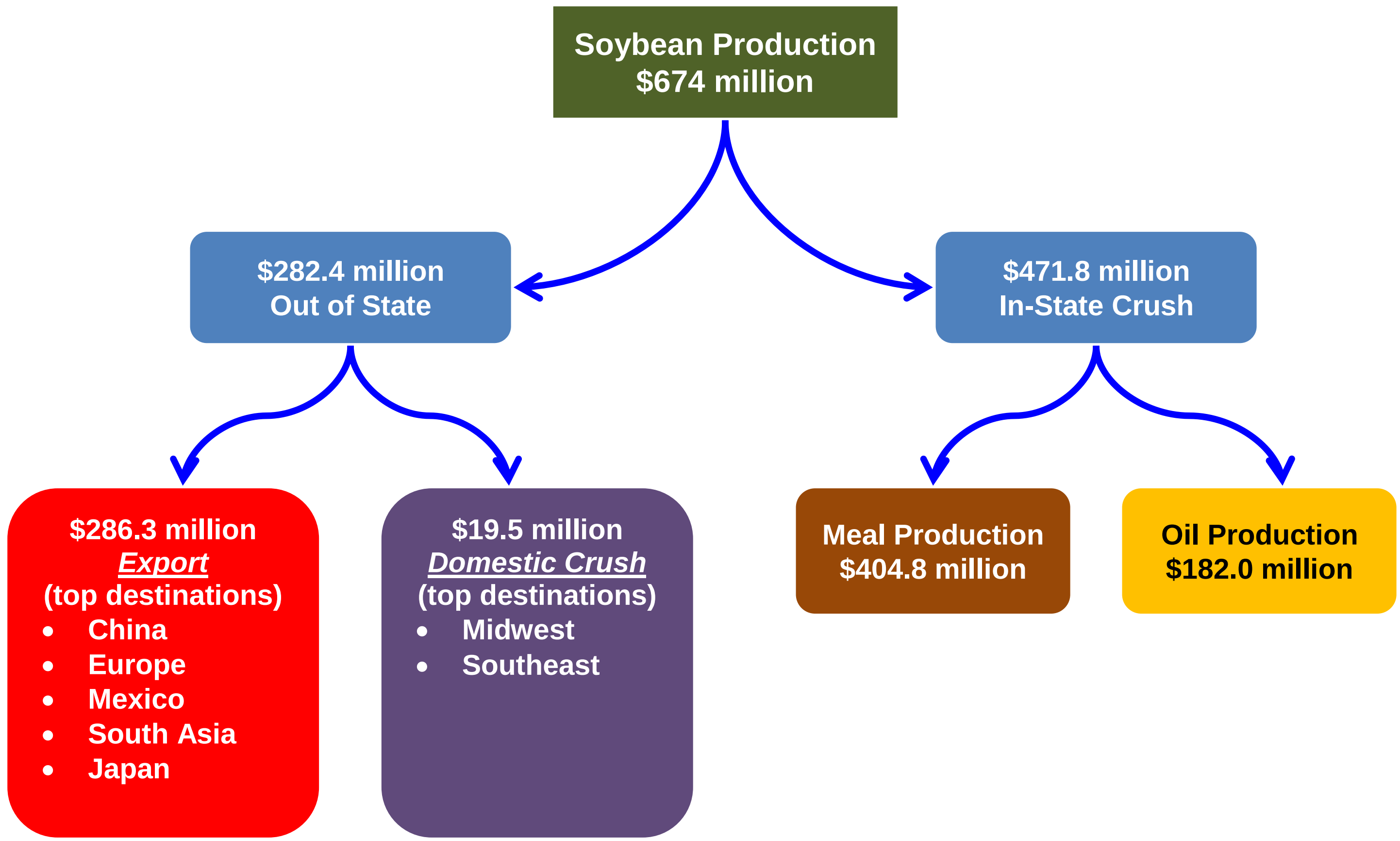
Agricultural Infrastructure: Crush, Ethanol Facilities, Livestock Processing, and Grain Storage		
Facility Type	**# of Facilities**	**Capacity/Size**
Soybean Crushers	1	4,265 MT/Day
Ethanol Facility (operating)	2	36 MGY
Federally Inspected Livestock Slaughter/Processing Facilities	102	n/a
State Inspected Livestock Slaughter/Processing Facilities	0	n/a
Grain Elevators*	72	359,360 Thous. Bu. Storage
Shuttle Elevators	6	16,360 Thous. Bu. Storage
River Elevators	15	22,885 Thous. Bu. Storage

** Shuttle and river elevators are included in the list of grain elevators.*

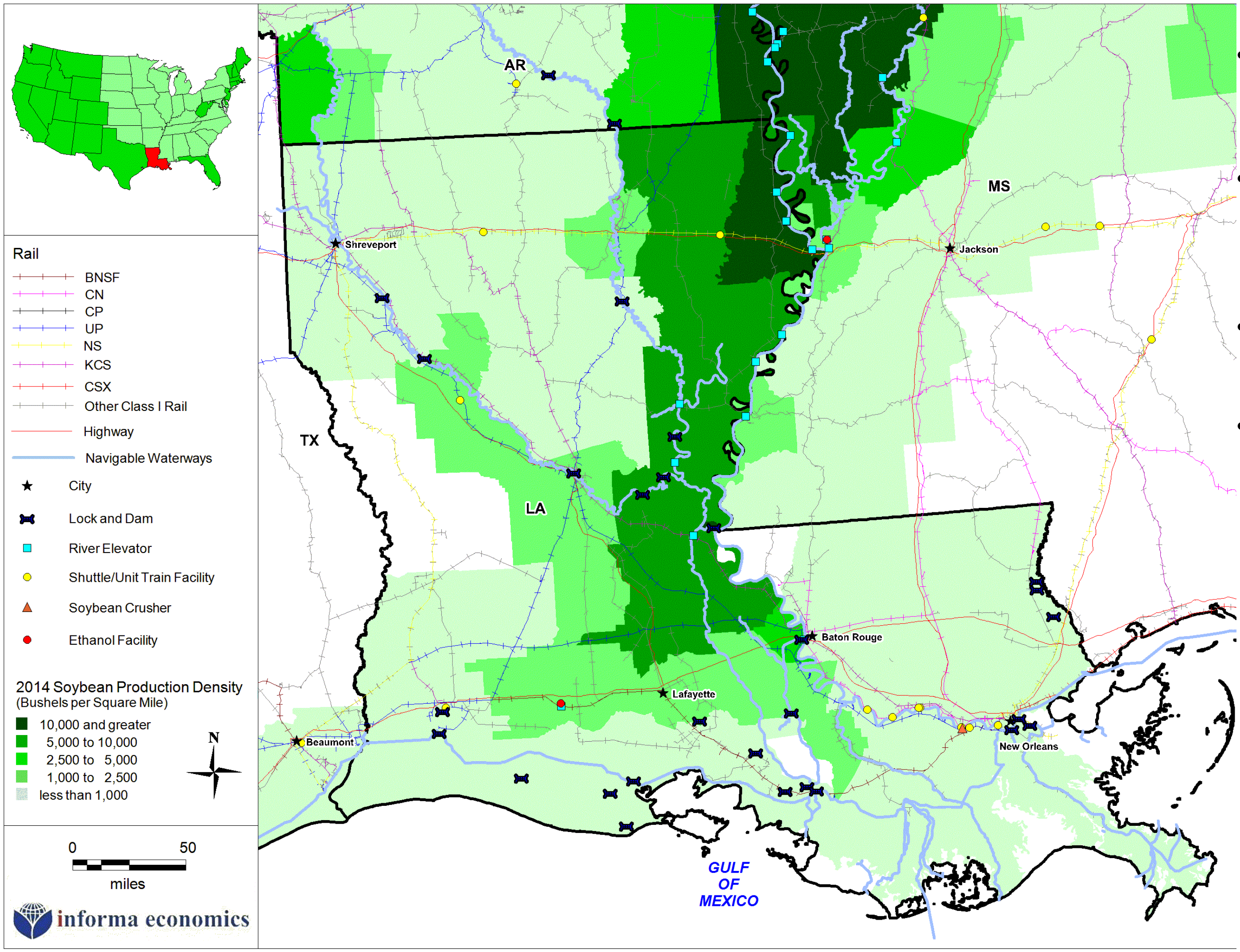
KENTUCKY FLOWCHART OF SOYBEAN MOVEMENTS (2013/14)



KENTUCKY FLOWCHART OF SOYBEAN VALUE (2013/14)



LOUISIANA



Production

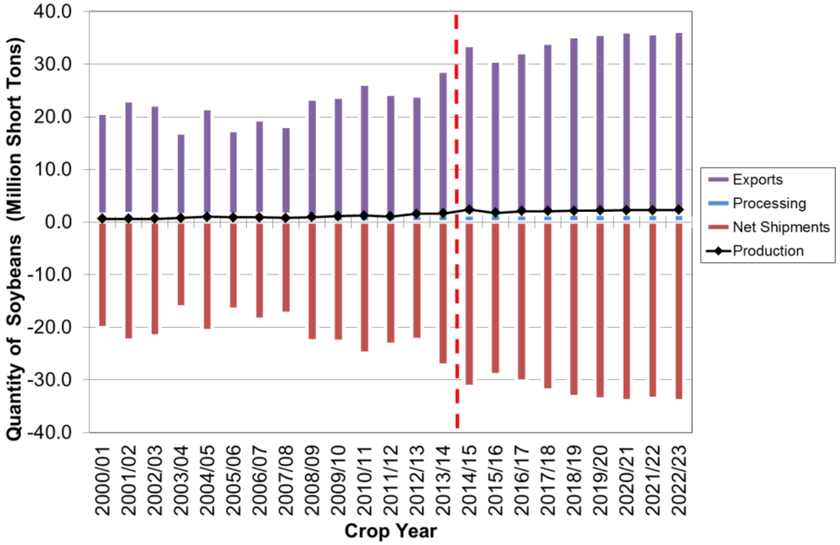
- Soybean production occurs mostly along the eastern border of the state, near the Mississippi River Delta
- Louisiana's livestock inventories consist of broilers and cattle.

Infrastructure

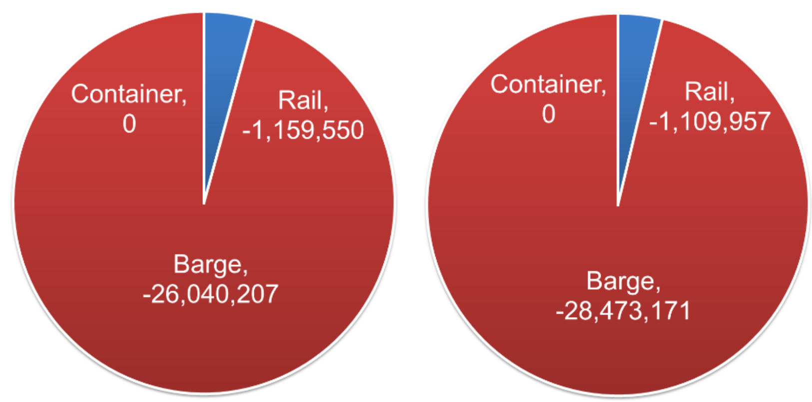
- Louisiana has 2,927 miles of rail lines, 926 miles of interstate, and 61,427 total road miles.
- The state also has 11 shuttle facilities, 1 soybean crush facility, 1 ethanol facility; 90 grain elevators, and 12 river elevators.

LOUISIANA

Soybean Surplus and Deficit Outlook



Soybean Movements by Mode (Short Tons)



2013/14 **2022/23**

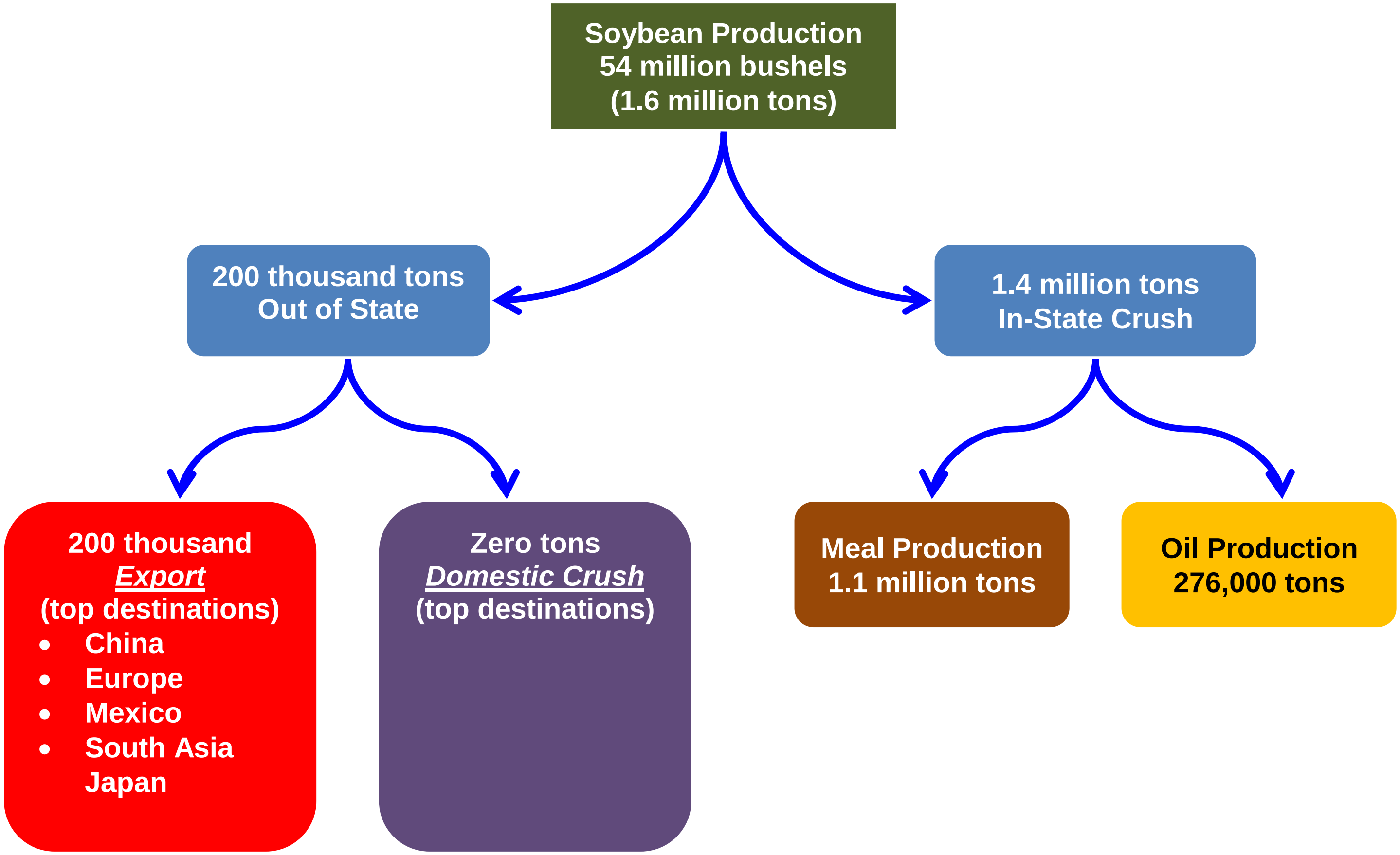
** A negative number indicates the state is a net inshipment*

Agricultural Infrastructure: Crush, Ethanol Facilities, Livestock Processing, and Grain Storage			
Facility Type	**# of Facilities**	**Capacity/Size**	
Soybean Crushers	1	4,116	MT/Day
Ethanol Facility* (operating)	1	1.50	MGY
Federally Inspected Livestock Slaughter/Processing Facilities	42	n/a	
State Inspected Livestock Slaughter/Processing Facilities	56	n/a	
Grain Elevators**	90	106,802	Thous. Bu. Storage
Shuttle Elevators	11	44,724	Thous. Bu. Storage
River Elevators	12	25,284	Thous. Bu. Storage

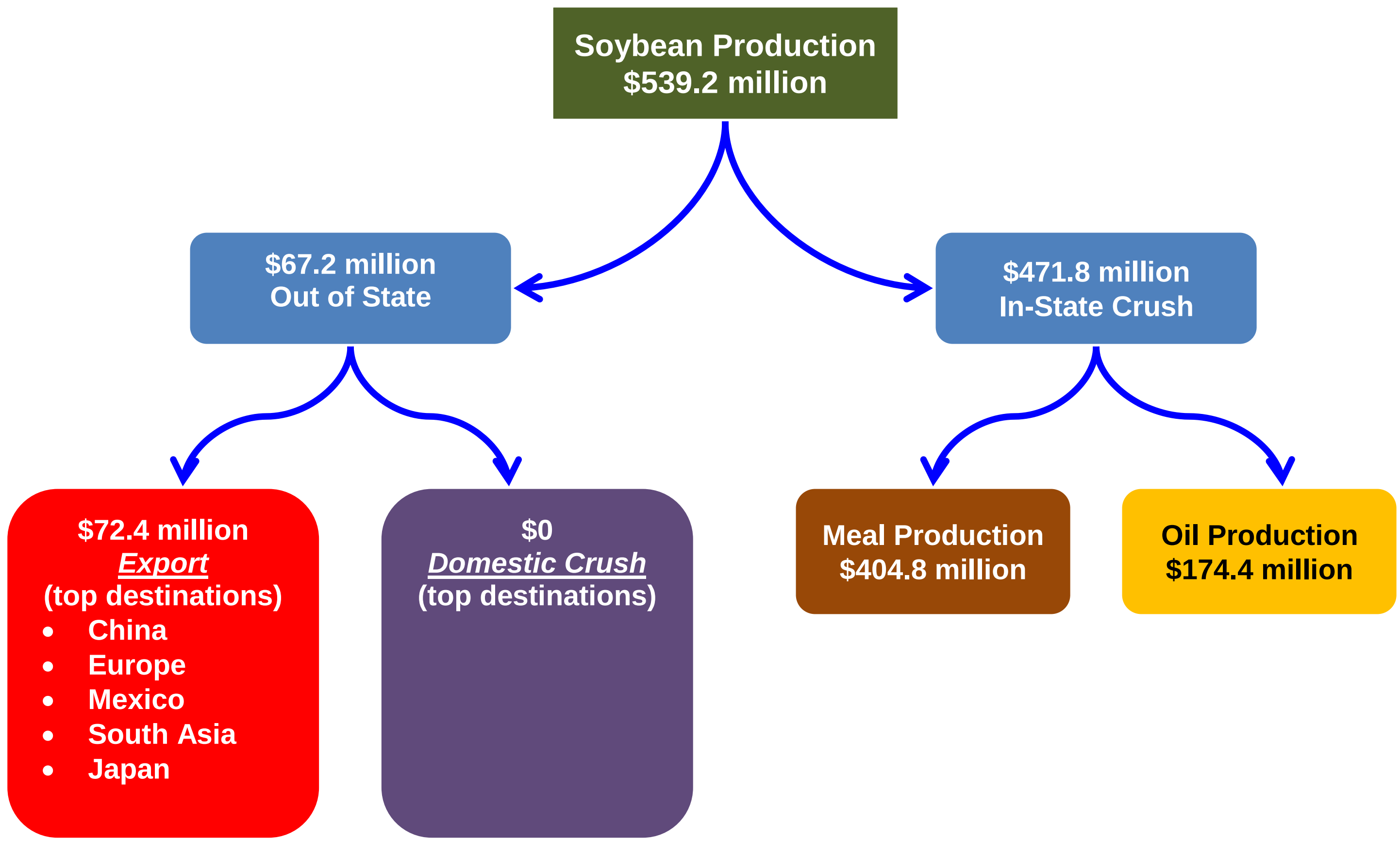
** 1 Cellulosic ethanol facility is included in ethanol facility database.*

*** Shuttle and river elevators are included in the list of grain elevators.*

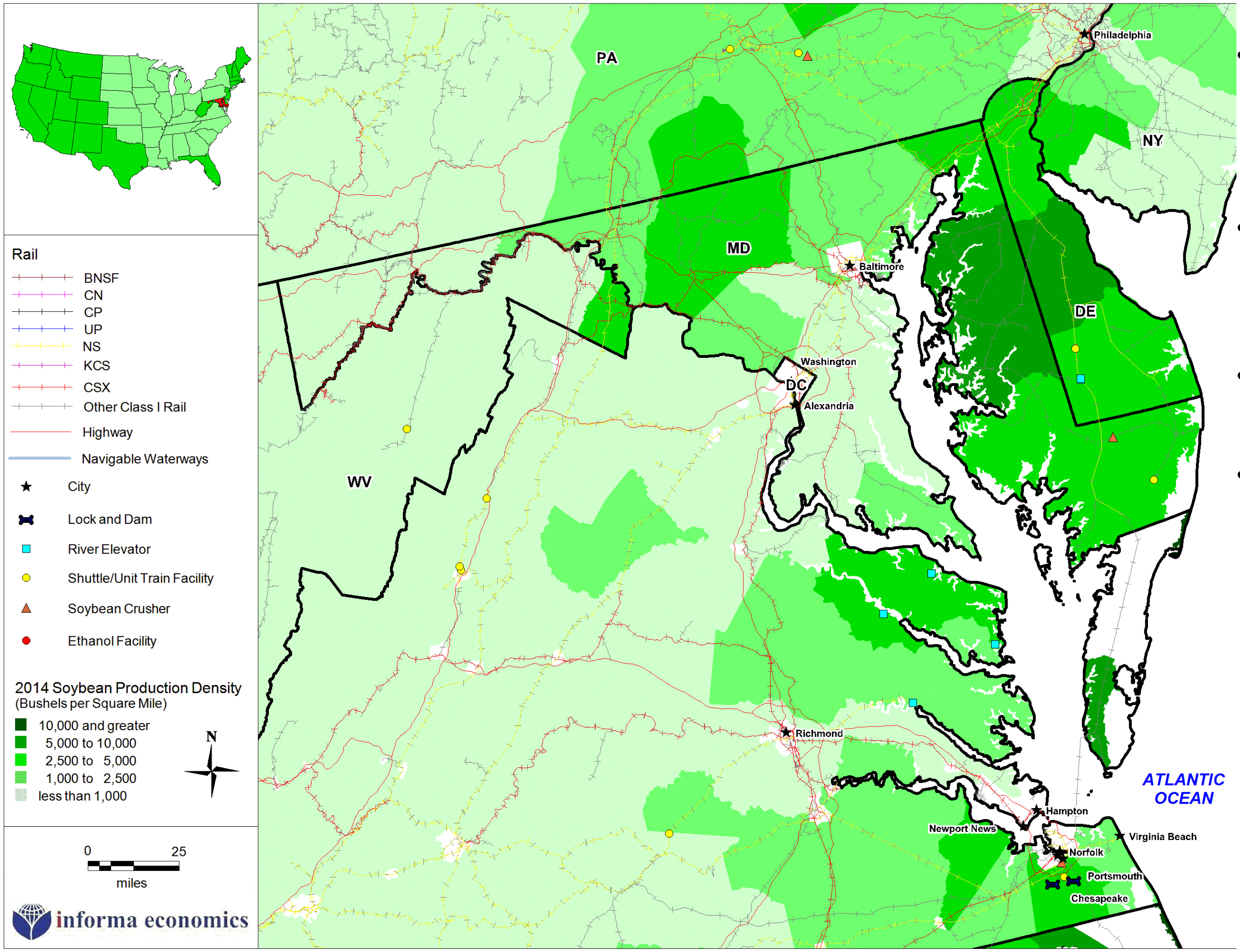
LOUISIANA FLOWCHART OF SOYBEAN MOVEMENTS (2013/14)



LOUISIANA FLOWCHART OF SOYBEAN VALUE (2013/14)



MARYLAND



Production

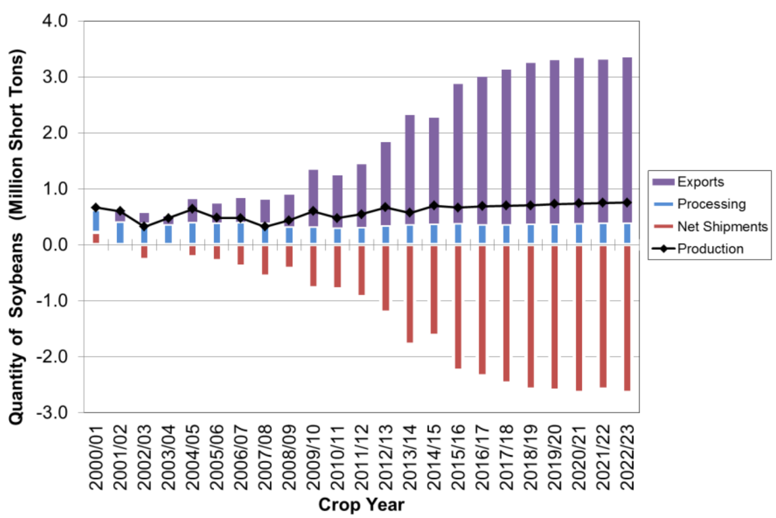
- Soybean production throughout the state, with heaviest production along the eastern border of the state, near the Delmarva Peninsula.
- Maryland's livestock inventories consist primarily of broilers.

Infrastructure

- Maryland has 758 miles of rail lines, 481 miles of interstate, and 32,422 total road miles.
- The state also has 1 shuttle facility, 1 soybean crush facility, 0 ethanol facilities, 45 grain elevators, and 0 river elevators.

MARYLAND

Soybean Surplus and Deficit Outlook



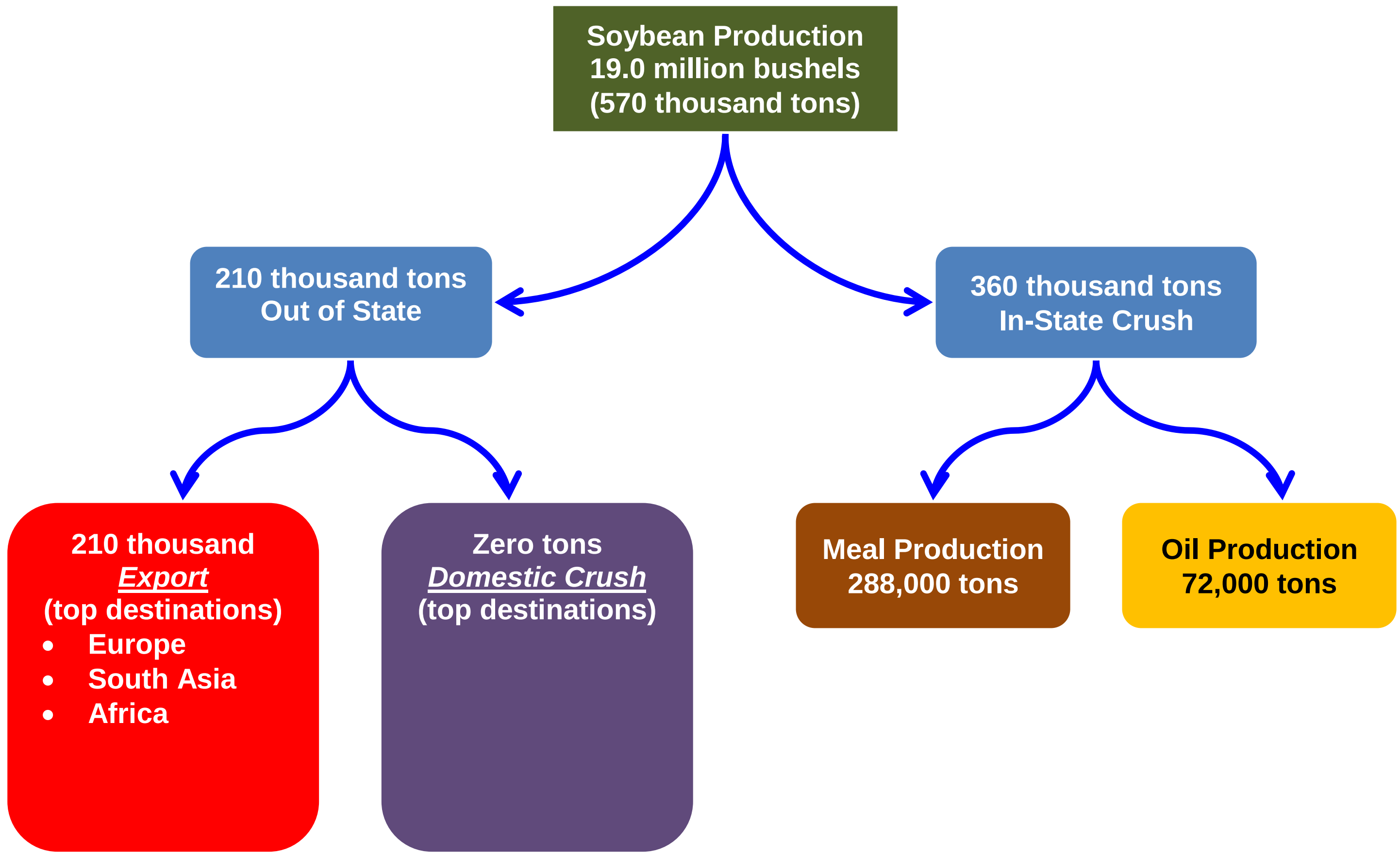
Soybean Movements by Mode (Short Tons)

** A negative number indicates the state is a net inshipment*

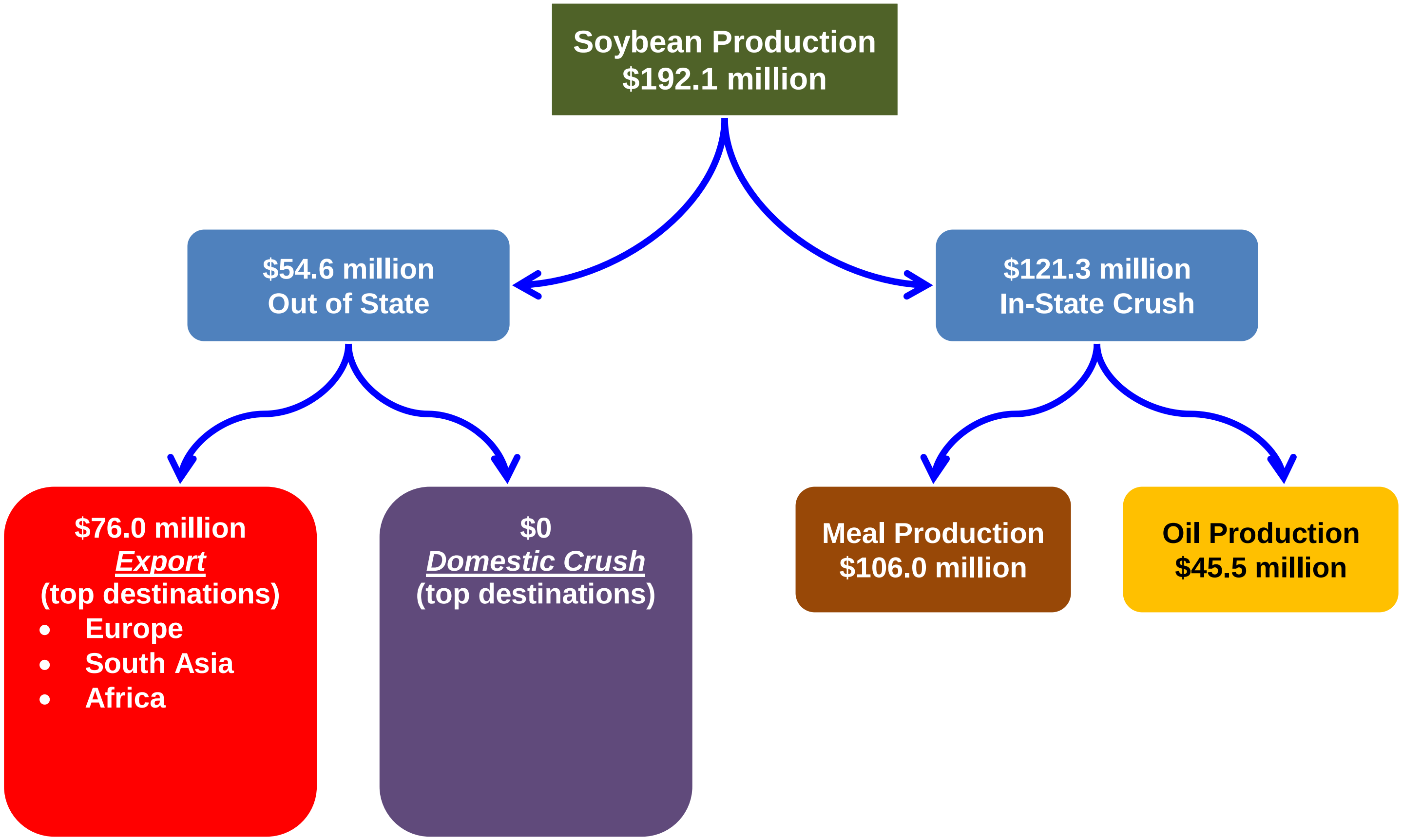
Agricultural Infrastructure: Crush, Ethanol Facilities, Livestock Processing, and Grain Storage			
Facility Type	**# of Facilities**	**Capacity/Size**	
Soybean Crushers	1	1,089	MT/Day
Ethanol Facility (operating)	0	-	MGY
Federally Inspected Livestock Slaughter/Processing Facilities	77	n/a	
State Inspected Livestock Slaughter/Processing Facilities	0	n/a	
Grain Elevators*	45	49,691	Thous. Bu. Storage
Shuttle Elevators	1	1,200	Thous. Bu. Storage
River Elevators	0	-	Thous. Bu. Storage

** Shuttle and river elevators are included in the list of grain elevators.*

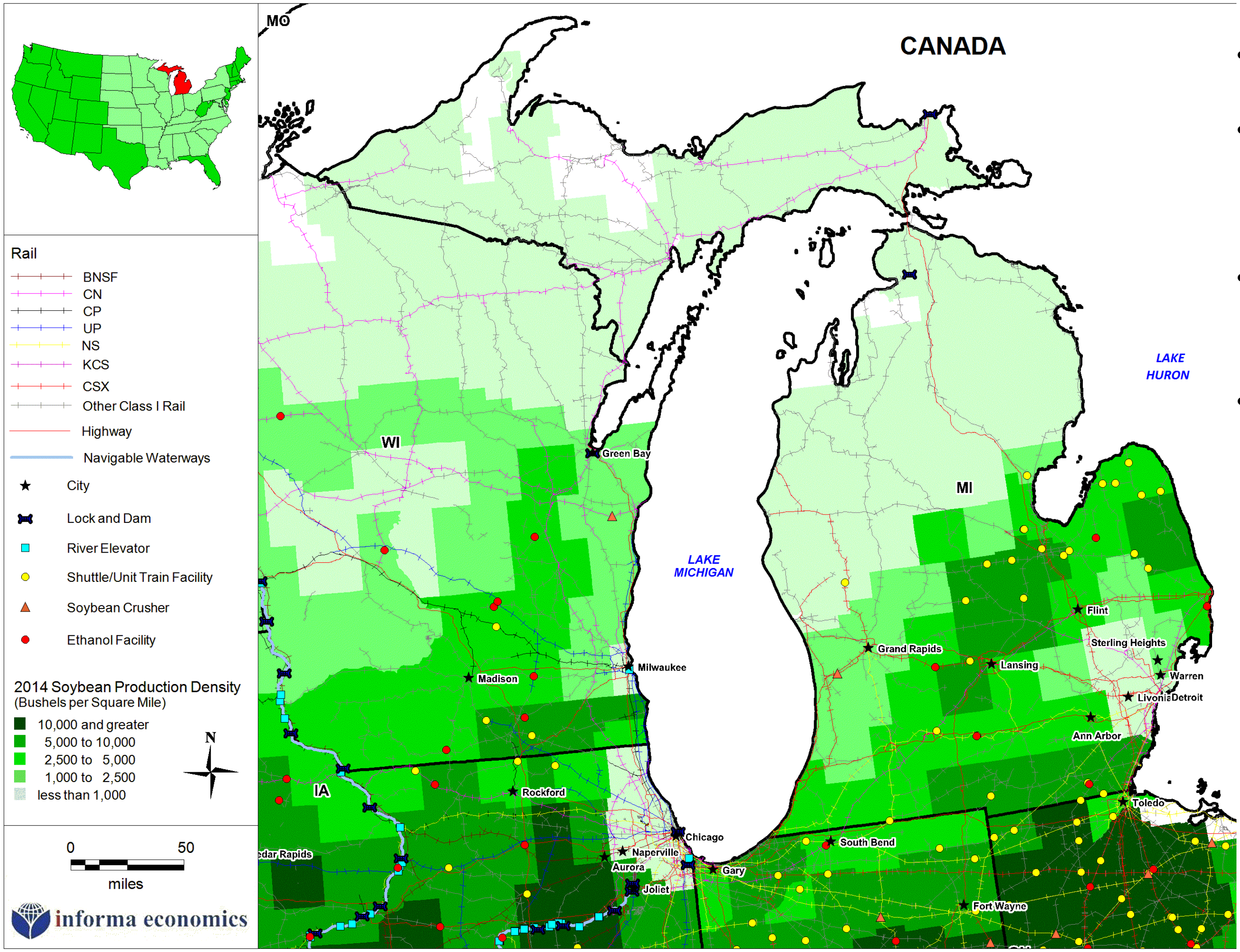
MARYLAND FLOWCHART OF SOYBEAN MOVEMENTS (2013/14)



MARYLAND FLOWCHART OF SOYBEAN VALUE (2013/14)



MICHIGAN



Production

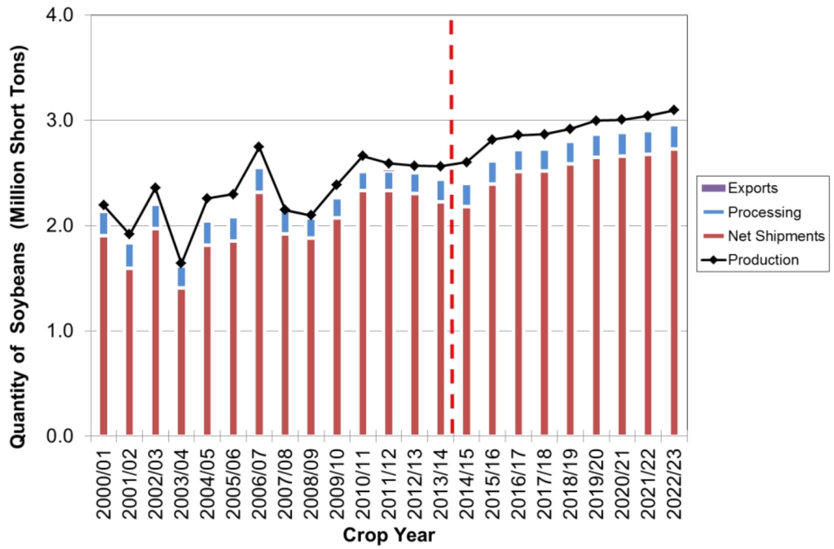
- Soybean production in mostly in the southern portion of the state.
- In terms of livestock, Michigan is a key producer of dairy cattle.

Infrastructure

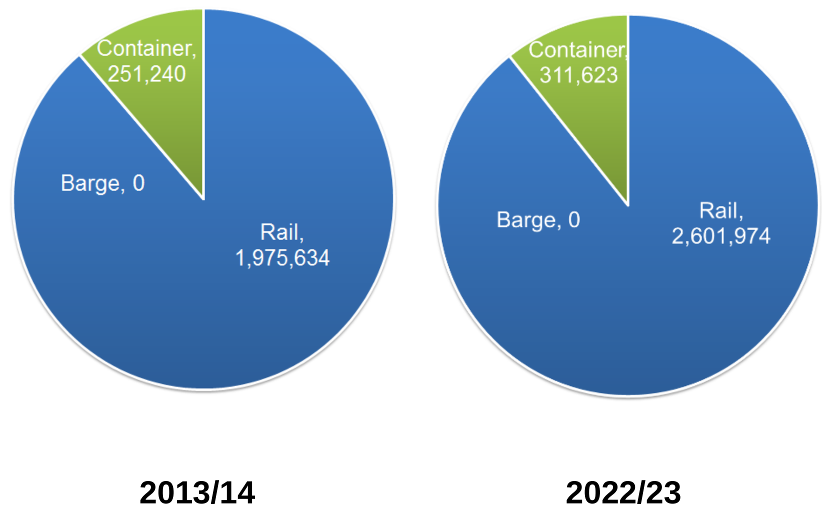
- Michigan has 3,542 miles of rail lines, 1,244 miles of interstate, and 121,141 miles of roadways.
- Michigan has 26 shuttle facilities, 1 soybean crush facility, 5 ethanol facilities, 205 grain elevators, and 0 river elevator.

MICHIGAN

Soybean Surplus and Deficit Outlook



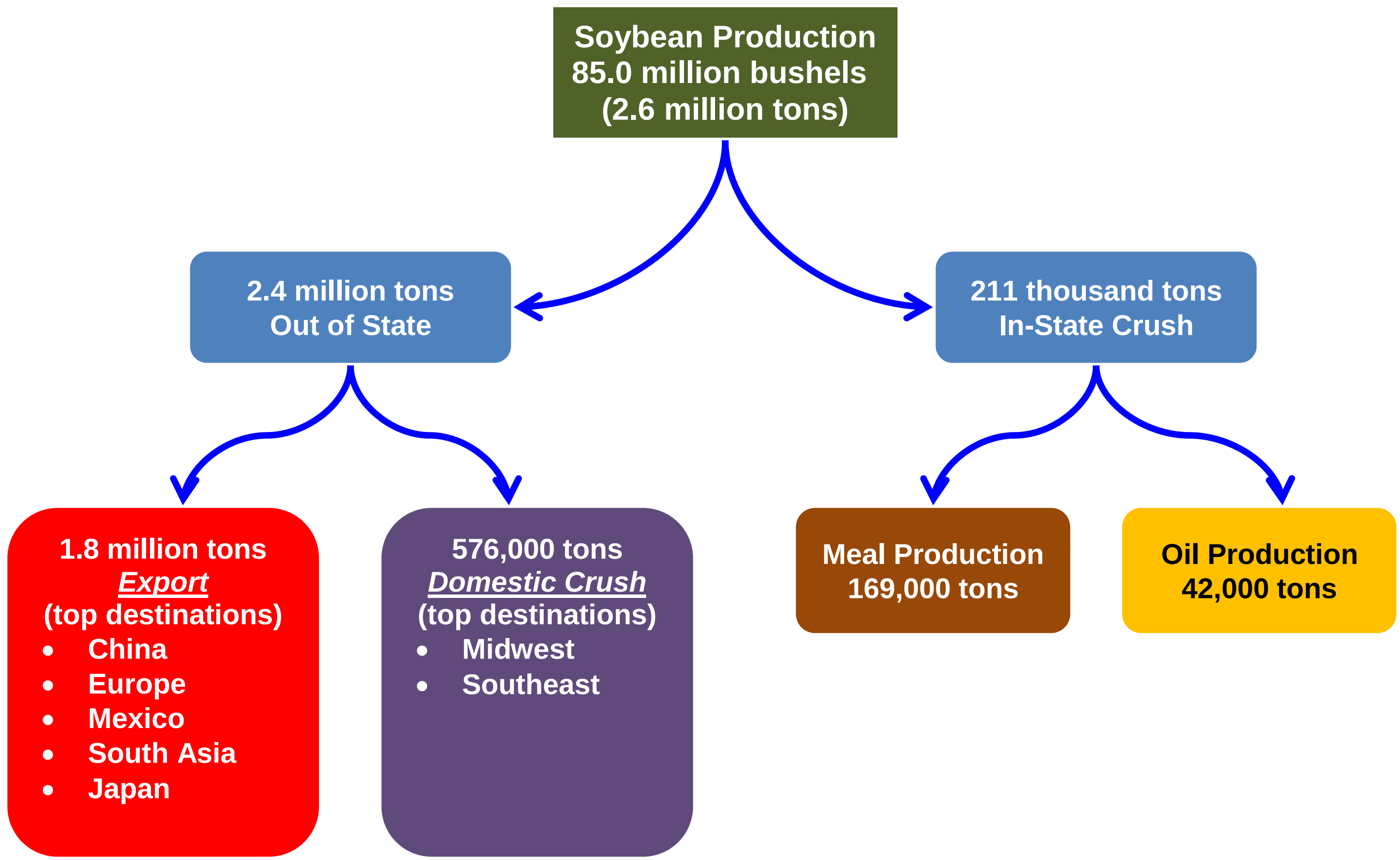
Soybean Movements by Mode (Short Tons)



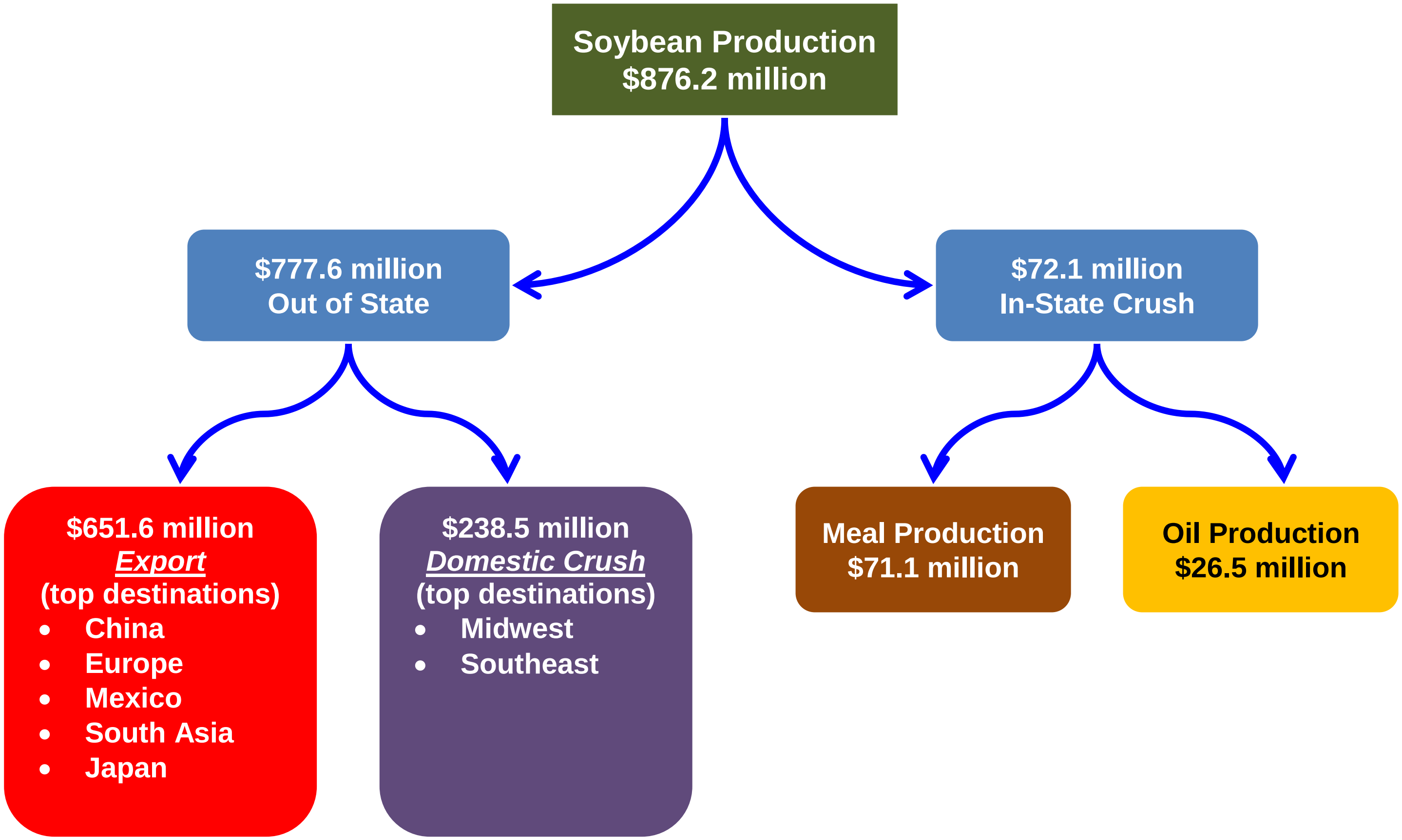
Agricultural Infrastructure: Crush, Ethanol Facilities, Livestock Processing, and Grain Storage			
Facility Type	# of Facilities	Capacity/Size	
Soybean Crushers	1	840	MT/Day
Ethanol Facility (operating)	5	273	MGY
Federally Inspected Livestock Slaughter/Processing Facilities	150	n/a	
State Inspected Livestock Slaughter/Processing Facilities	0	n/a	
Grain Elevators*	205	215,952	Thous. Bu. Storage
Shuttle Elevators	26	102,737	Thous. Bu. Storage
River Elevators	0	-	Thous. Bu. Storage

** Shuttle and river elevators are included in the list of grain elevators.*

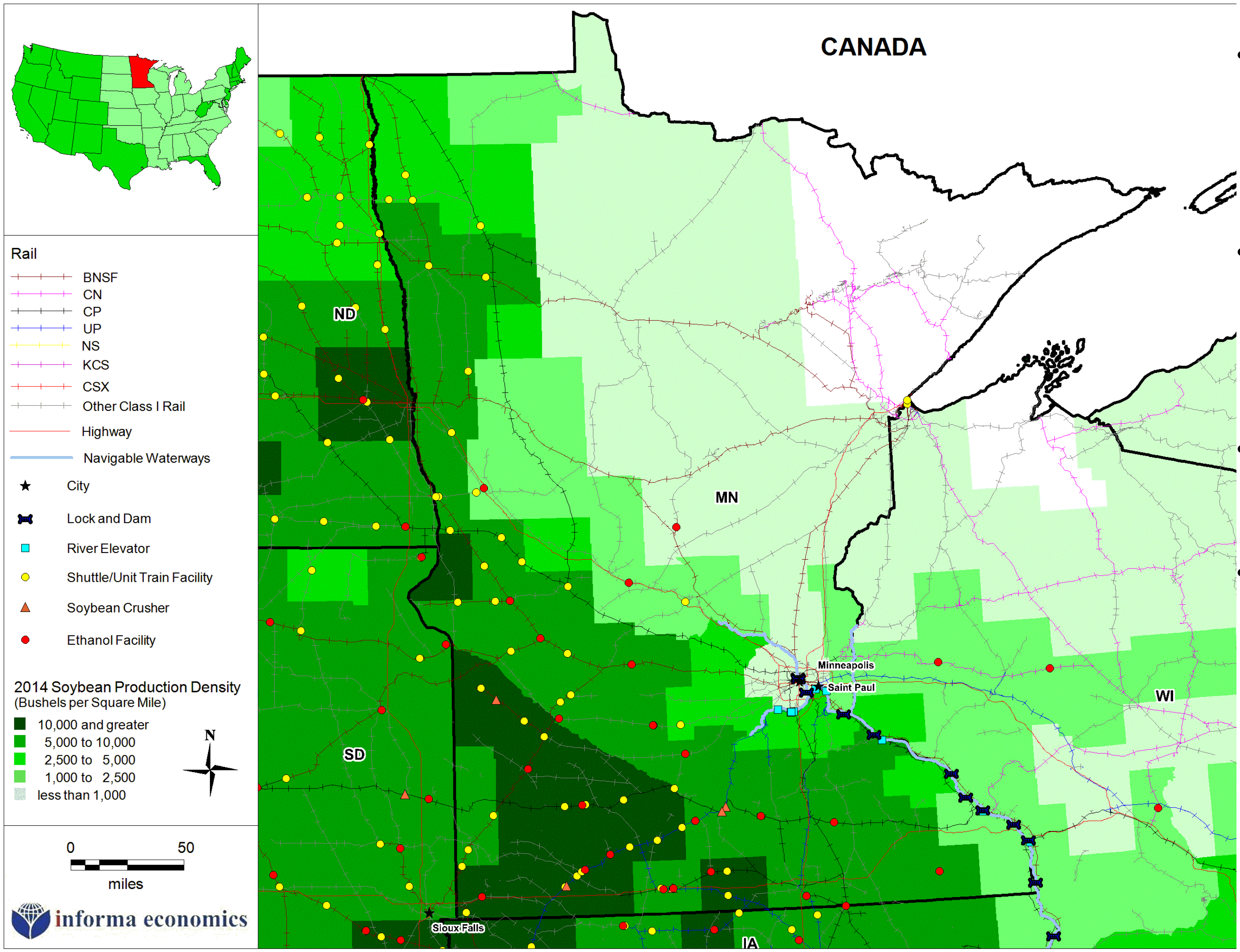
MICHIGAN FLOWCHART OF SOYBEAN MOVEMENTS (2013/14)



MICHIGAN FLOWCHART OF SOYBEAN VALUE (2013/14)



MINNESOTA



Production

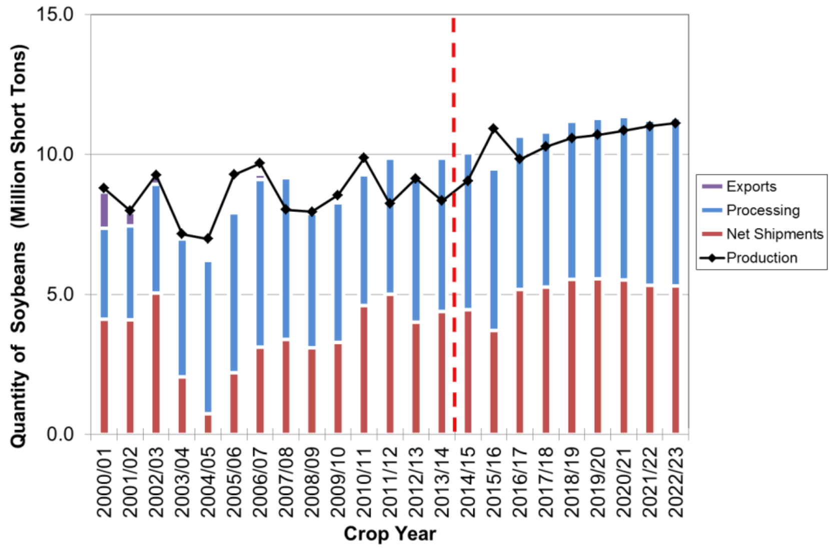
- Soybean production in mostly in the southern and western portion of the state, with production densities highest in the southwestern portion of the state.
- Minnesota is the largest producer of turkeys within the selected states, contributing 12% of U.S. production.

Infrastructure

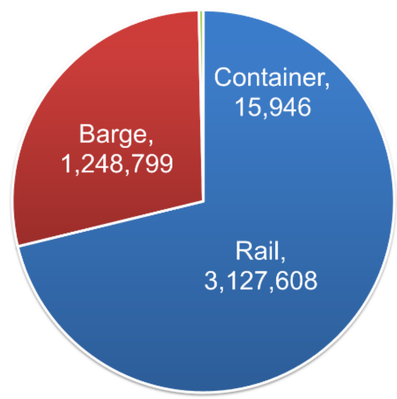
- Minnesota has 4,450 miles of rail lines, 914 miles of interstate, and 138,767 miles of roadways.
- Minnesota has 50 shuttle facilities, 5 soybean crush facilities, 22 ethanol facilities, 462 grain elevators, and 10 river elevators.

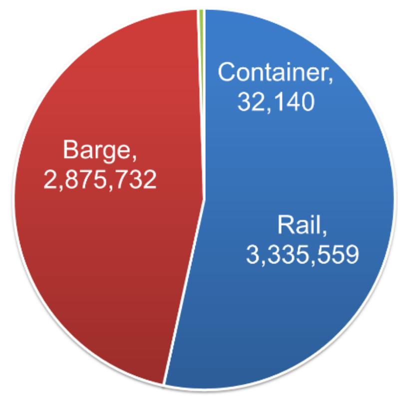
MINNESOTA

Soybean Surplus and Deficit Outlook



Soybean Movements by Mode (Short Tons)

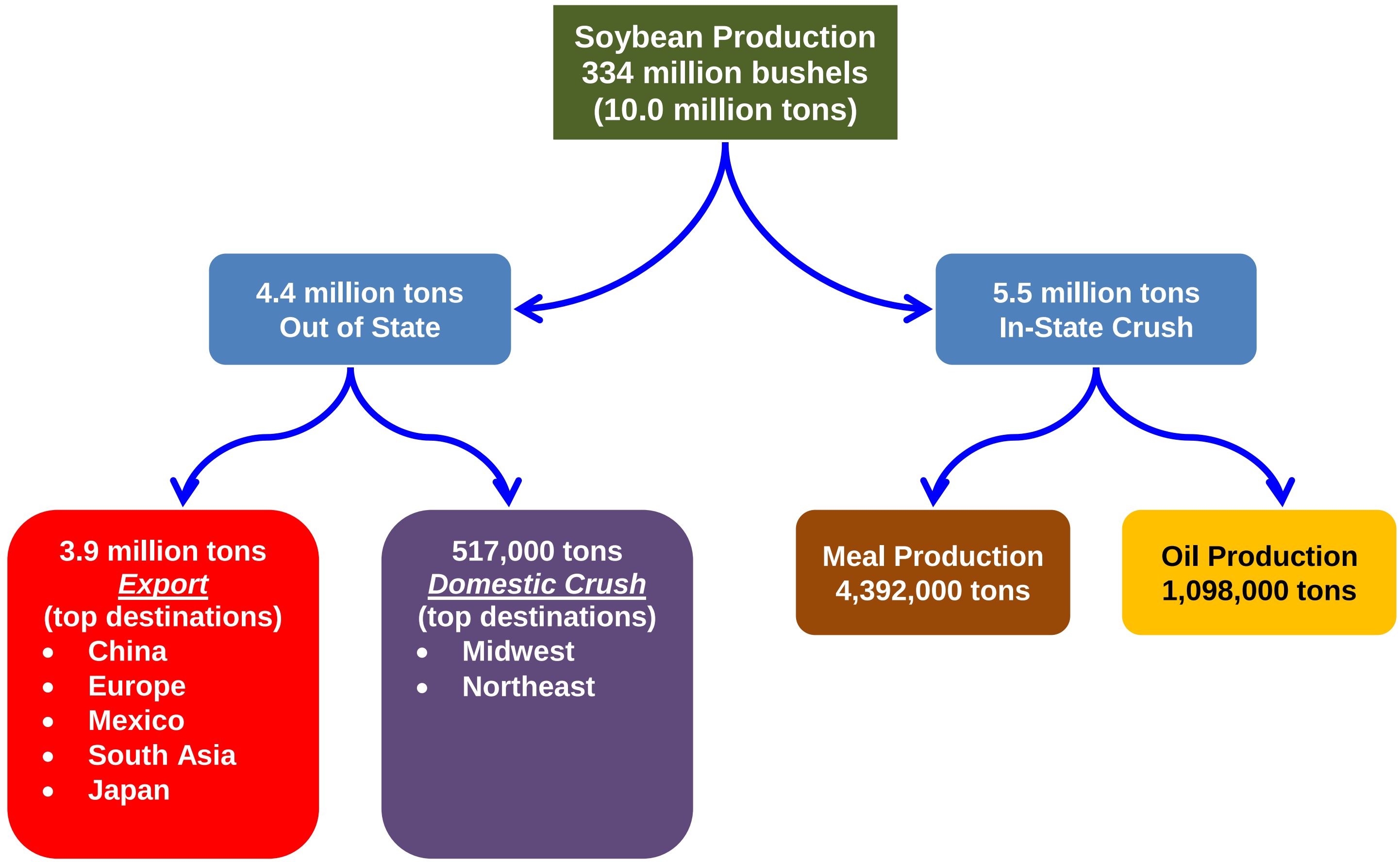




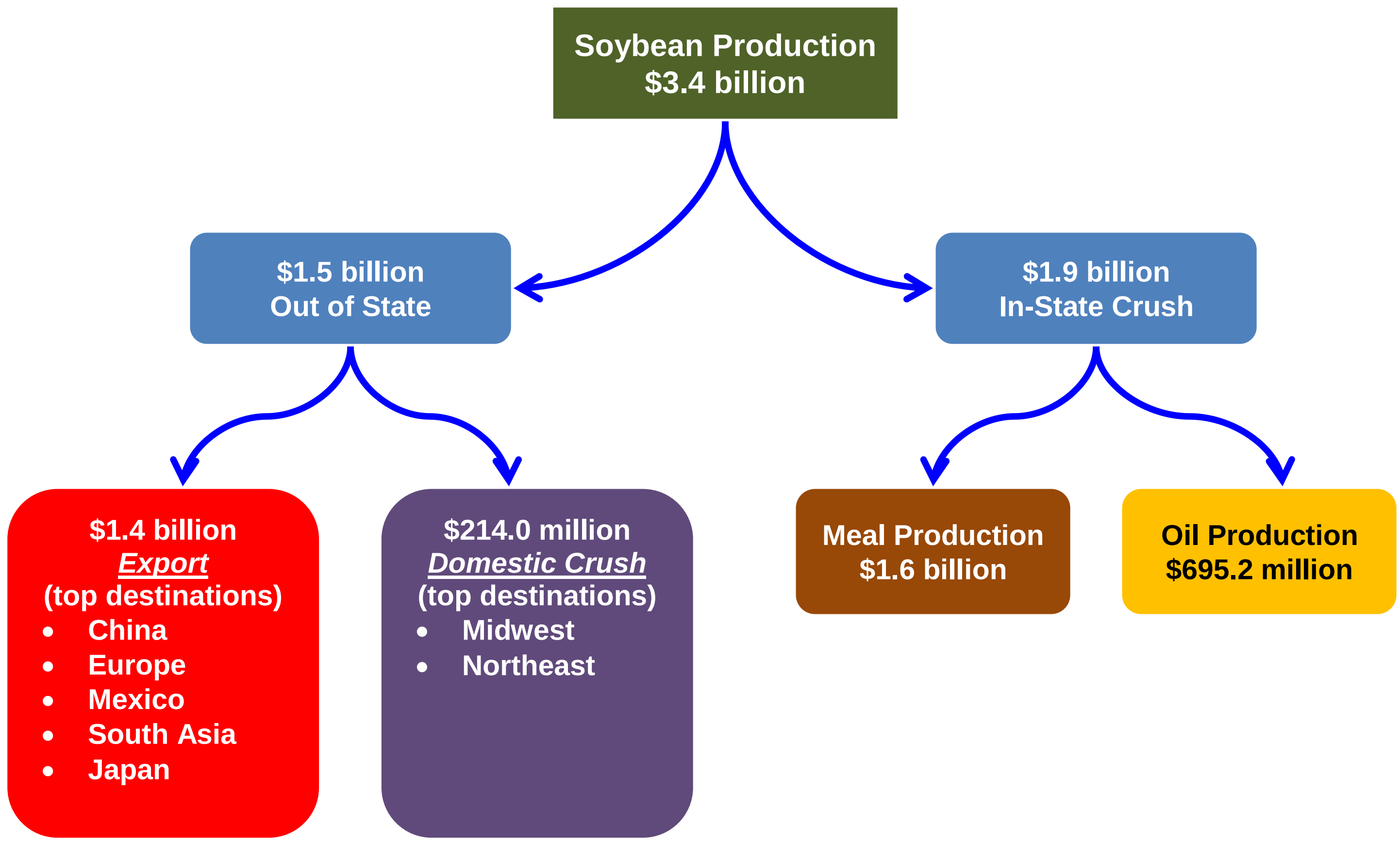
Agricultural Infrastructure: Crush, Ethanol Facilities, Livestock Processing, and Grain Storage			
Facility Type	**# of Facilities**	**Capacity/Size**	
Soybean Crushers	5	15,903	MT/Day
Ethanol Facility (operating)	22	1,175	MGY
Federally Inspected Livestock Slaughter/Processing Facilities	133	n/a	
State Inspected Livestock Slaughter/Processing Facilities	7	n/a	
Grain Elevators*	462	727,603	Thous. Bu. Storage
Shuttle Elevators	50	183,116	Thous. Bu. Storage
River Elevators	10	36,310	Thous. Bu. Storage

** Shuttle and river elevators are included in the list of grain elevators.*

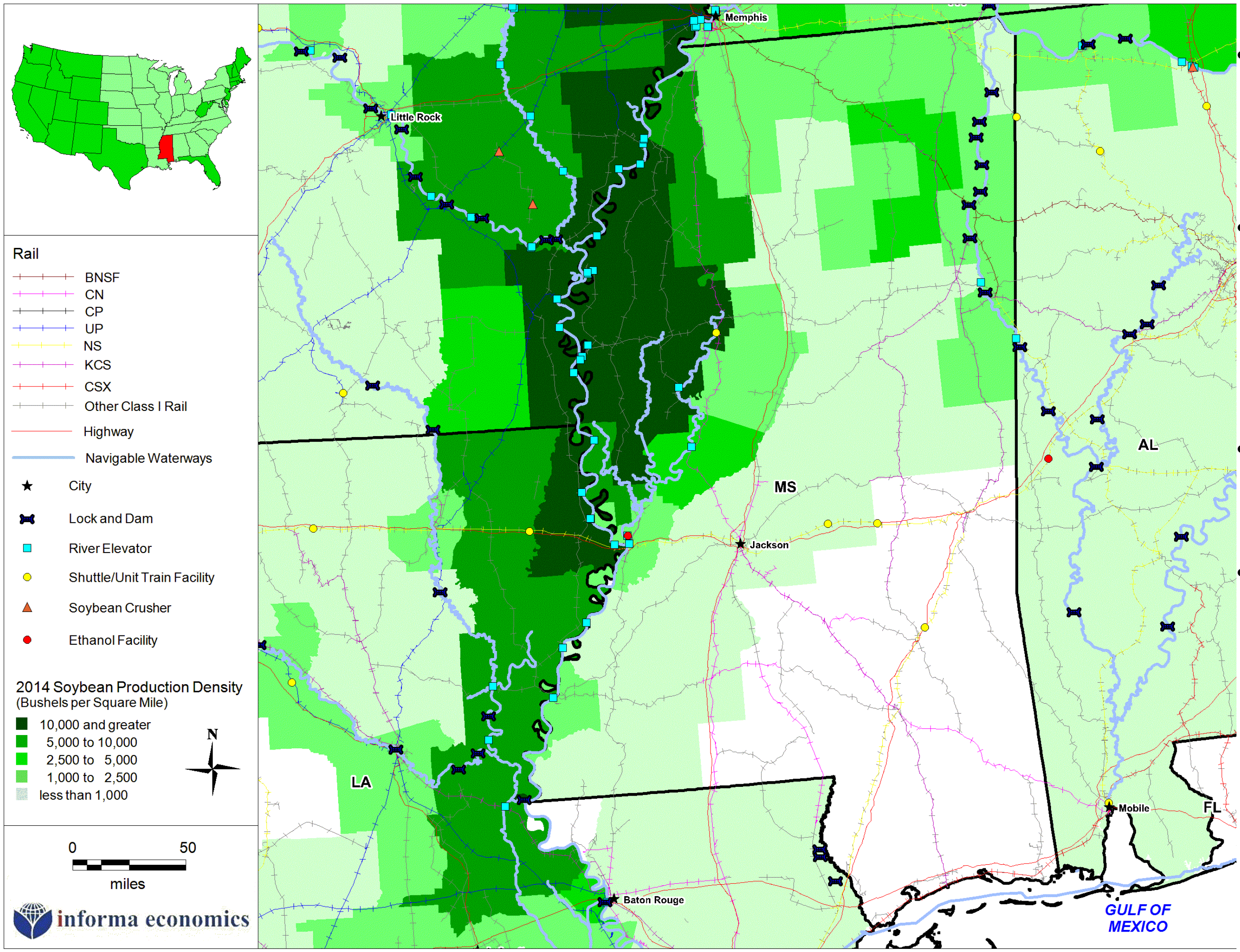
MINNESOTA FLOWCHART OF SOYBEAN MOVEMENTS (2013/14)



MINNESOTA FLOWCHART OF SOYBEAN VALUE (2013/14)



MISSISSIPPI



Production

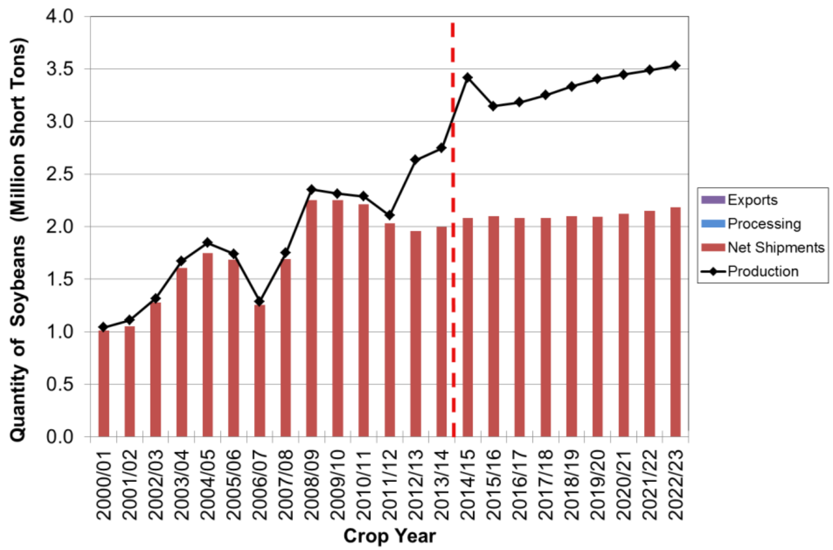
- Soybean production mostly in the northern portion of the state, with production densities highest in the northwestern portion of the state.
- Mississippi livestock inventories consist primarily of broilers, contributing to 9% of U.S. inventories.

Infrastructure

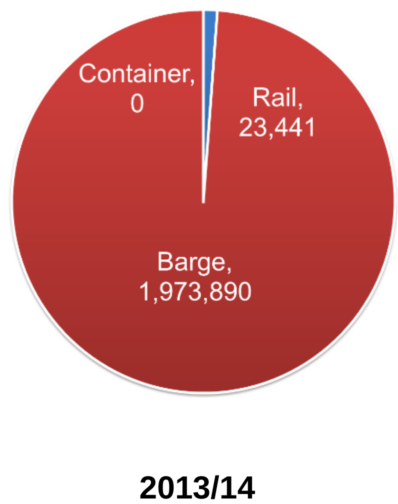
- Mississippi has 2,452 miles of rail lines, 700 miles of interstate, and 75,116 miles of roadways.
- Mississippi has 4 shuttle facilities, 0 soybean crush facility, 1 ethanol facility, 45 grain elevators, and 15 river elevators.

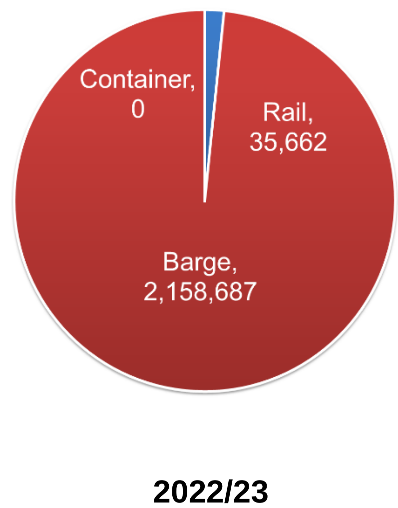
MISSISSIPPI

Soybean Surplus and Deficit Outlook



Soybean Movements by Mode (Short Tons)

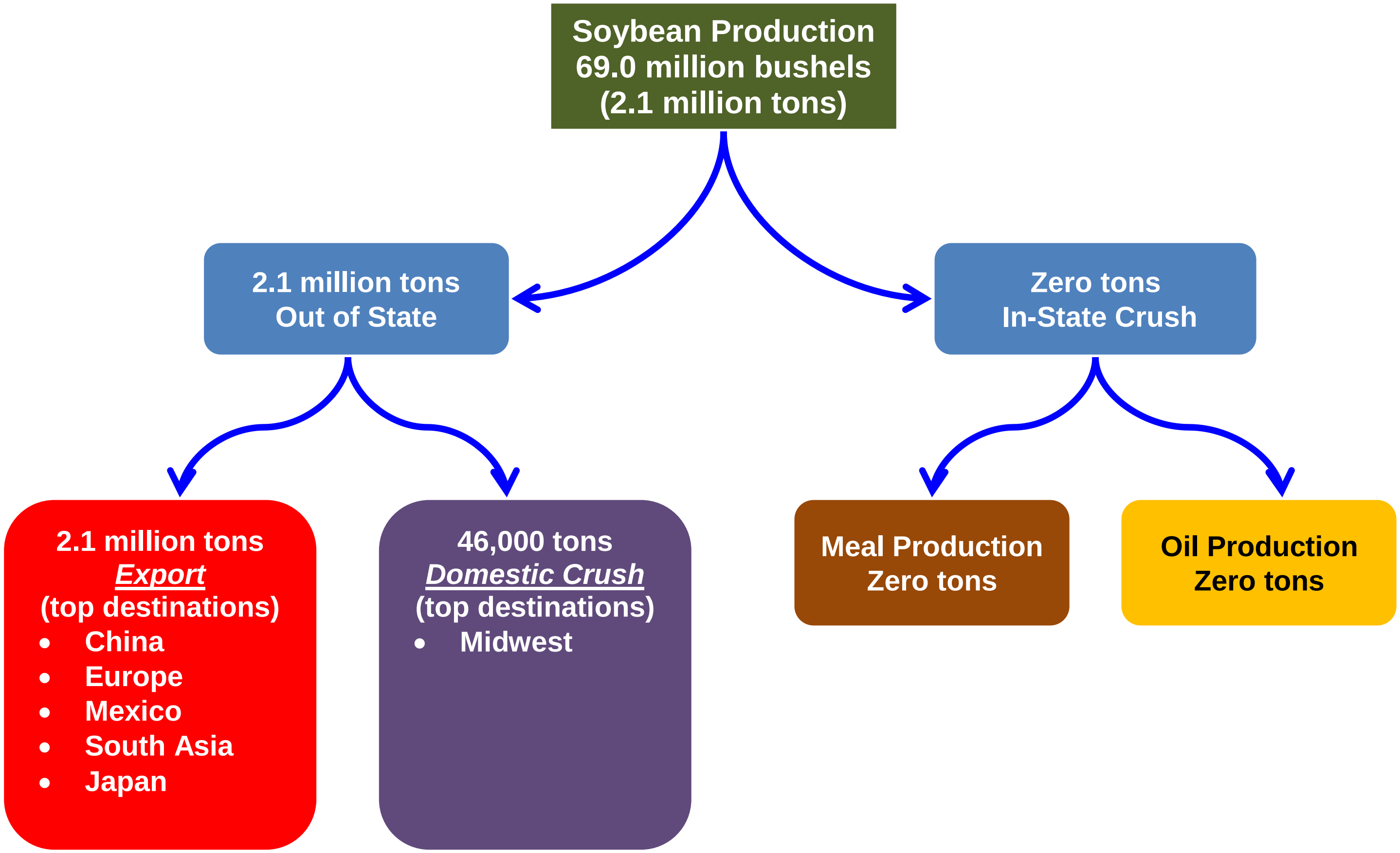




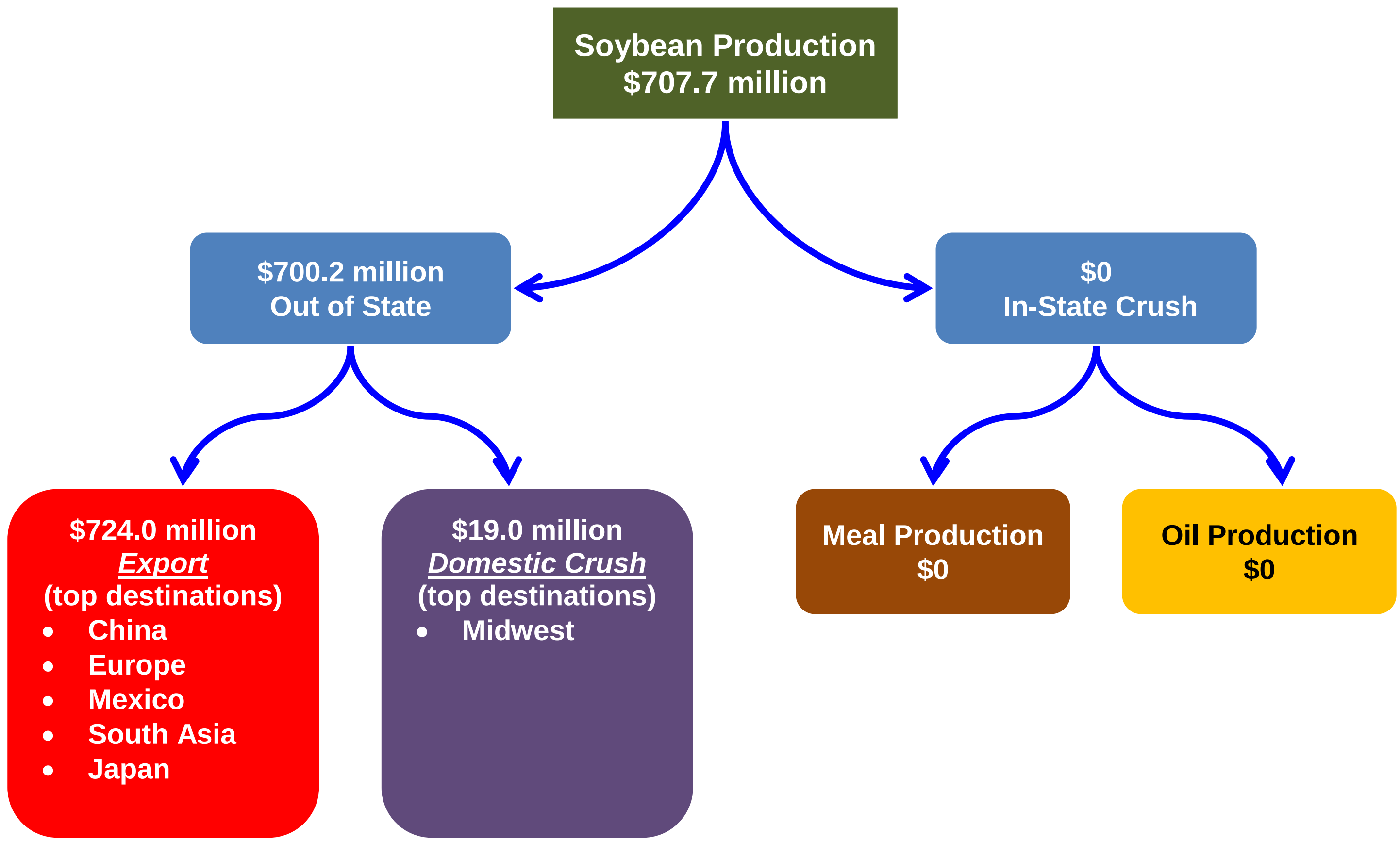
Agricultural Infrastructure: Crush, Ethanol Facilities, Livestock Processing, and Grain Storage			
Facility Type	# of Facilities	Capacity/Size	
Soybean Crushers	0	-	MT/Day
Ethanol Facility (operating)	1	60	MGY
Federally Inspected Livestock Slaughter/Processing Facilities	28	n/a	
State Inspected Livestock Slaughter/Processing Facilities	23	n/a	
Grain Elevators*	45	70,608	Thous. Bu. Storage
Shuttle Elevators	4	2,727	Thous. Bu. Storage
River Elevators	15	44,053	Thous. Bu. Storage

** Shuttle and river elevators are included in the list of grain elevators.*

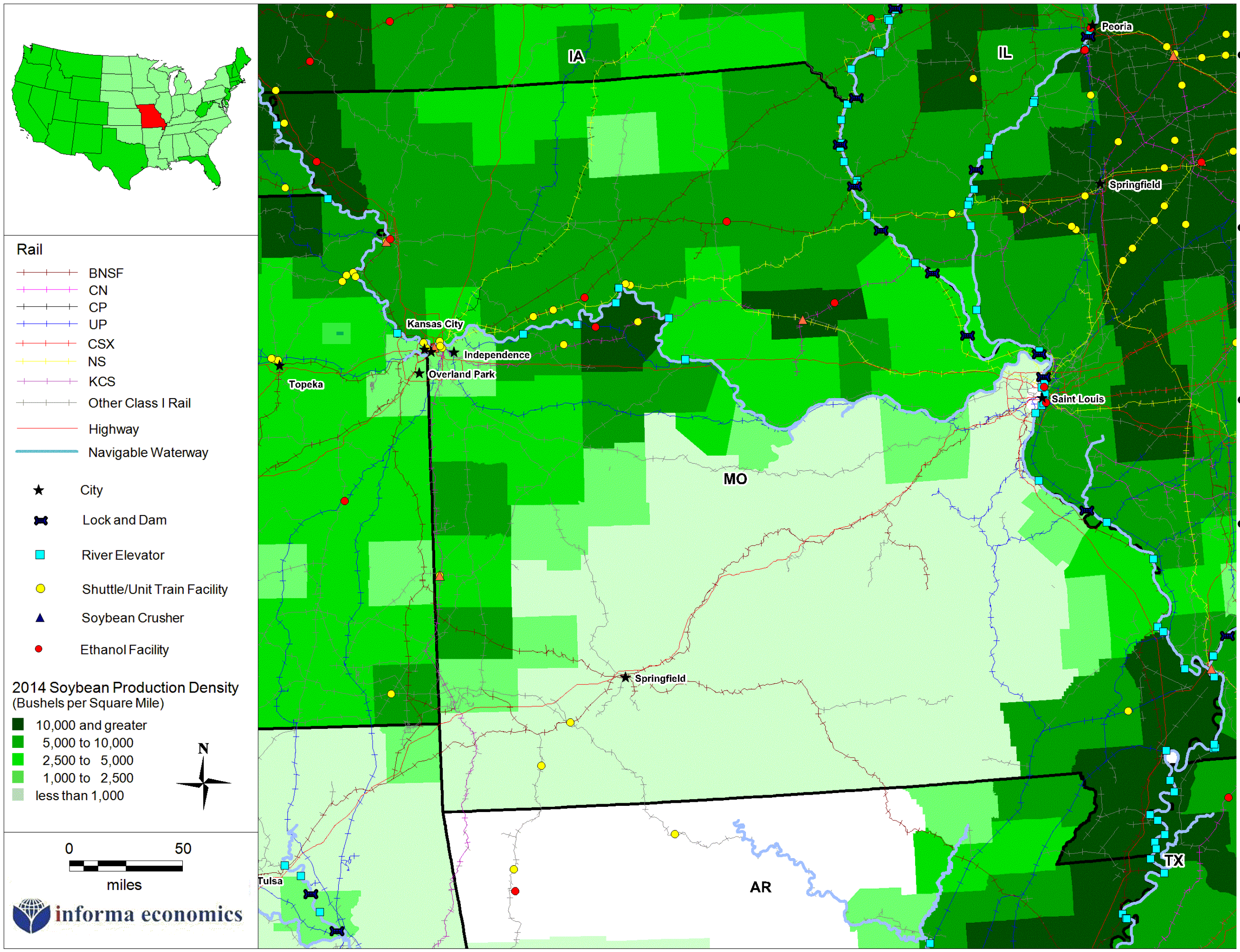
MISSISSIPPI FLOWCHART OF SOYBEAN MOVEMENTS (2013/14)



MISSISSIPPI FLOWCHART OF SOYBEAN VALUE (2013/14)



MISSOURI



Production

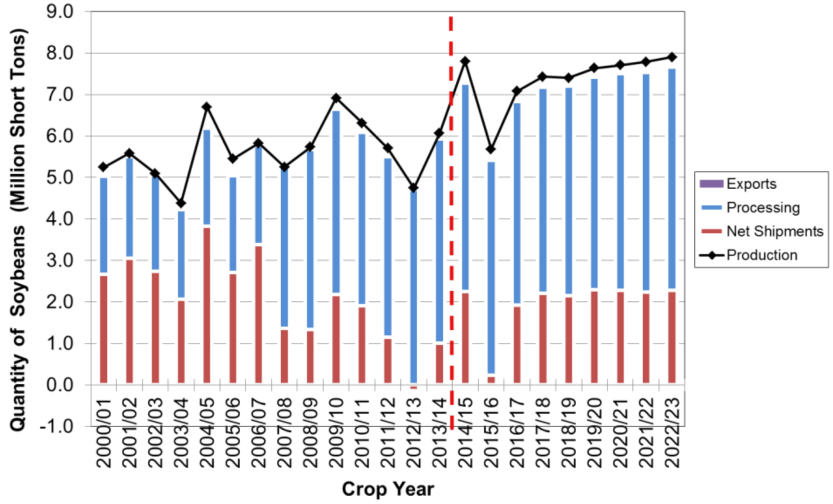
- Soybean production mostly in the northern portion of the state, with production densities highest throughout the northern portion of the state.
- Missouri is a key contributor of cattle, hogs and turkey to U.S. production levels.

Infrastructure

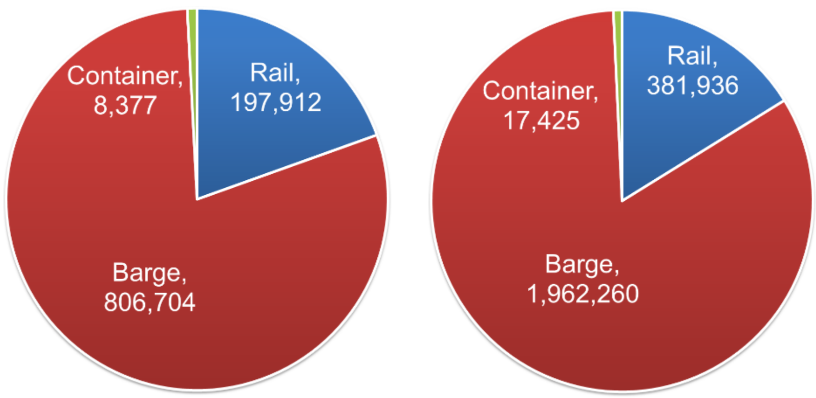
- Missouri has 3,957 miles of rail lines, 1,379 miles of interstate, and 131,900 miles of roadways.
- Missouri has 18 shuttle facilities, 4 soybean crush facilities, 6 ethanol facilities, 359 grain elevators, and 26 river elevators.

MISSOURI

Soybean Surplus and Deficit Outlook



Soybean Movements by Mode (Short Tons)

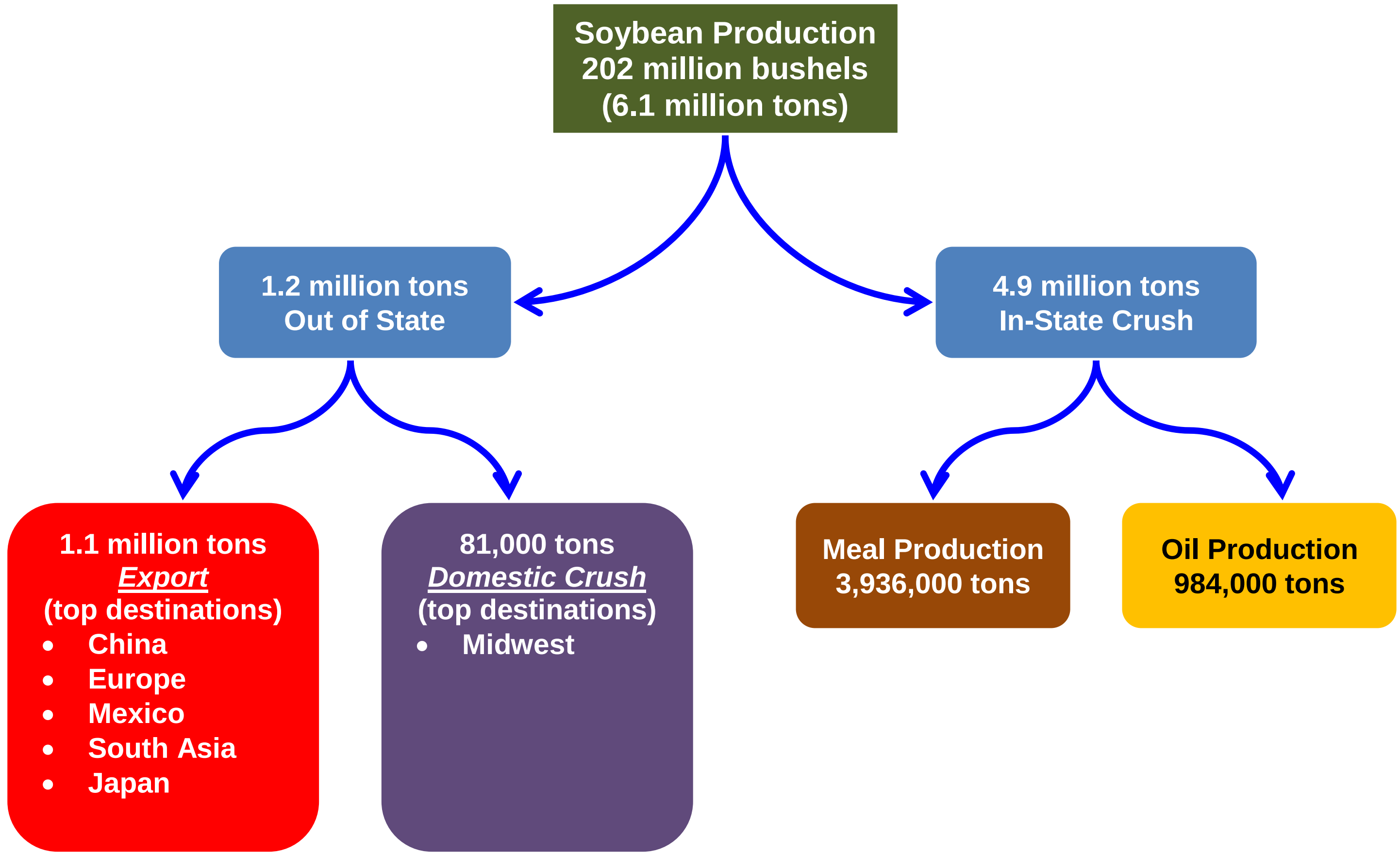


2013/14 **2022/23**

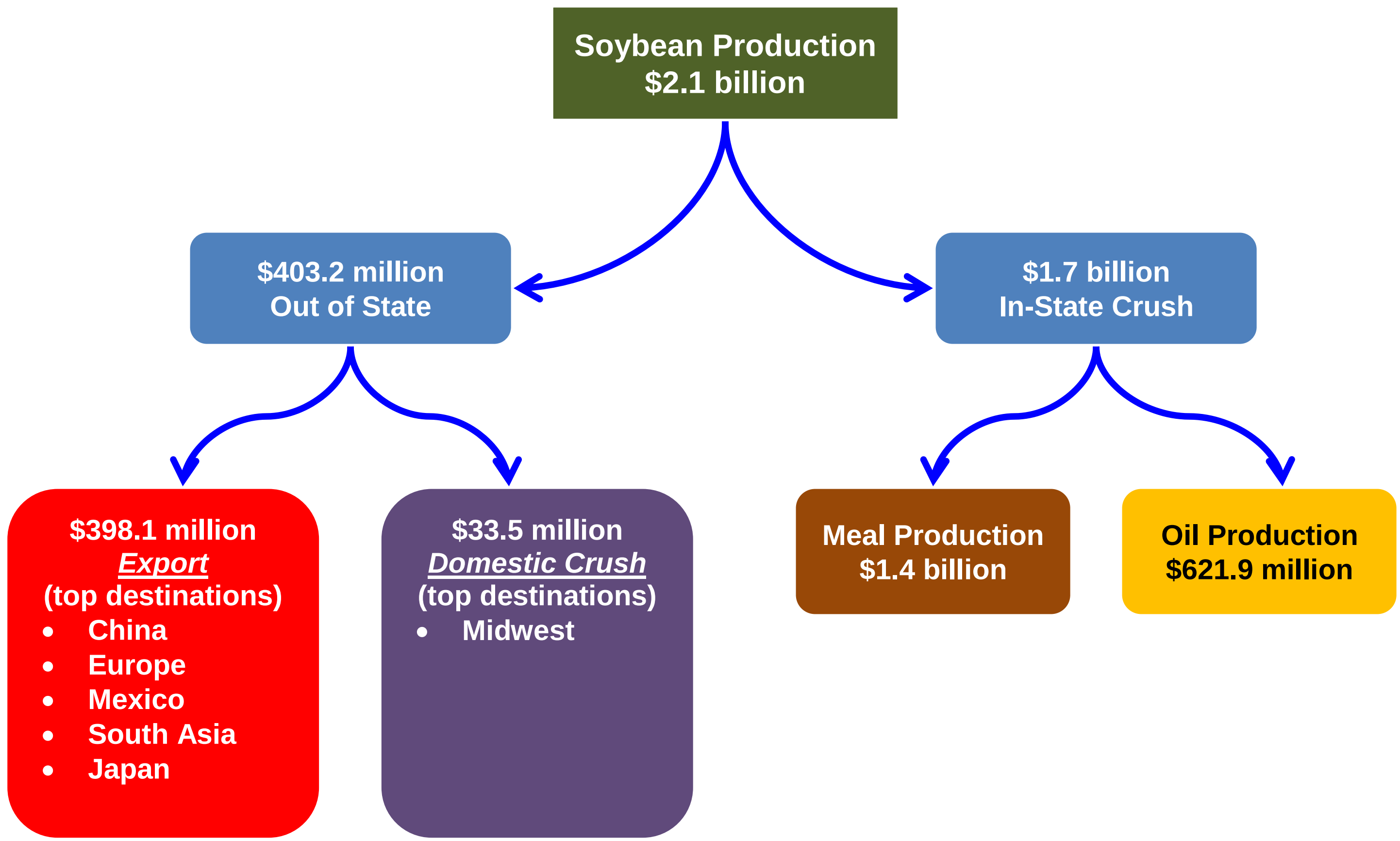
Agricultural Infrastructure: Crush, Ethanol Facilities, Livestock Processing, and Grain Storage		
Facility Type	**# of Facilities**	**Capacity/Size**
Soybean Crushers	4	11,882 MT/Day
Ethanol Facility (operating)	6	266 MGY
Federally Inspected Livestock Slaughter/Processing Facilities	139	n/a
State Inspected Livestock Slaughter/Processing Facilities	31	n/a
Grain Elevators*	359	248,812 Thous. Bu. Storage
Shuttle Elevators	18	42,384 Thous. Bu. Storage
River Elevators	26	50,413 Thous. Bu. Storage

** Shuttle and river elevators are included in the list of grain elevators.*

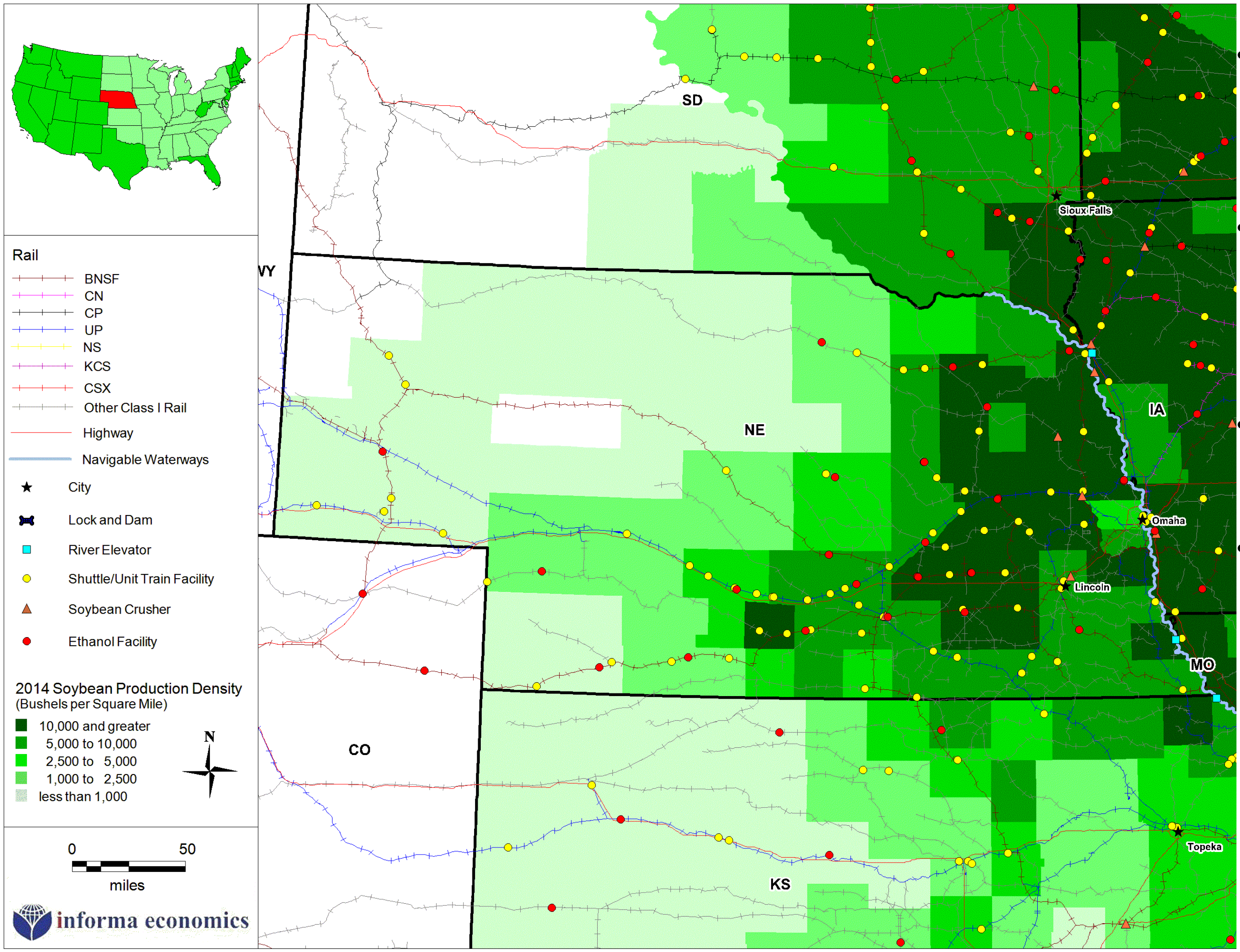
MISSOURI FLOWCHART OF SOYBEAN MOVEMENTS (2013/14)



MISSOURI FLOWCHART OF SOYBEAN VALUE (2013/14)



NEBRASKA



Production

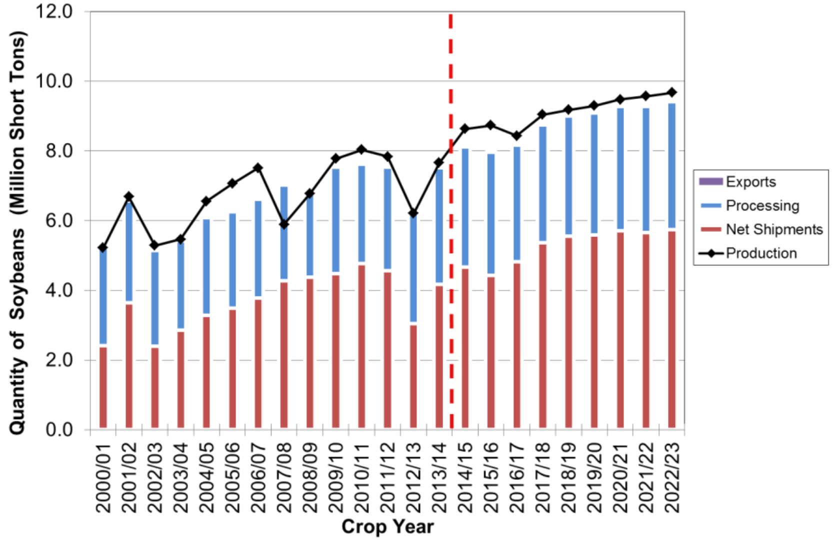
- Soybean production mostly in the eastern portion of the state, with production densities highest throughout the central eastern portion of the state.
- Nebraska is the largest producer out of the selected states for cattle, with nearly 7% of U.S. production.

Infrastructure

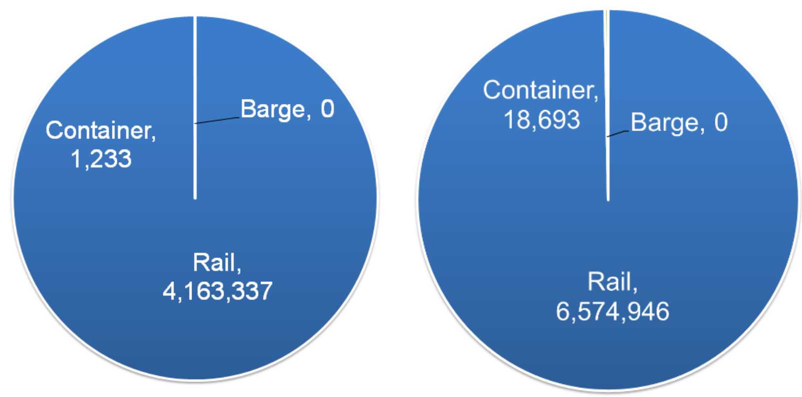
- Nebraska has 3,375 miles of rail lines, 482 miles of interstate, and 93,770 miles of roadways.
- Nebraska has 67 shuttle facilities, 4 soybean crush facilities, 26 ethanol facilities, 498 grain elevators, and 1 river elevator.

NEBRASKA

Soybean Surplus and Deficit Outlook



Soybean Movements by Mode (Short Tons)



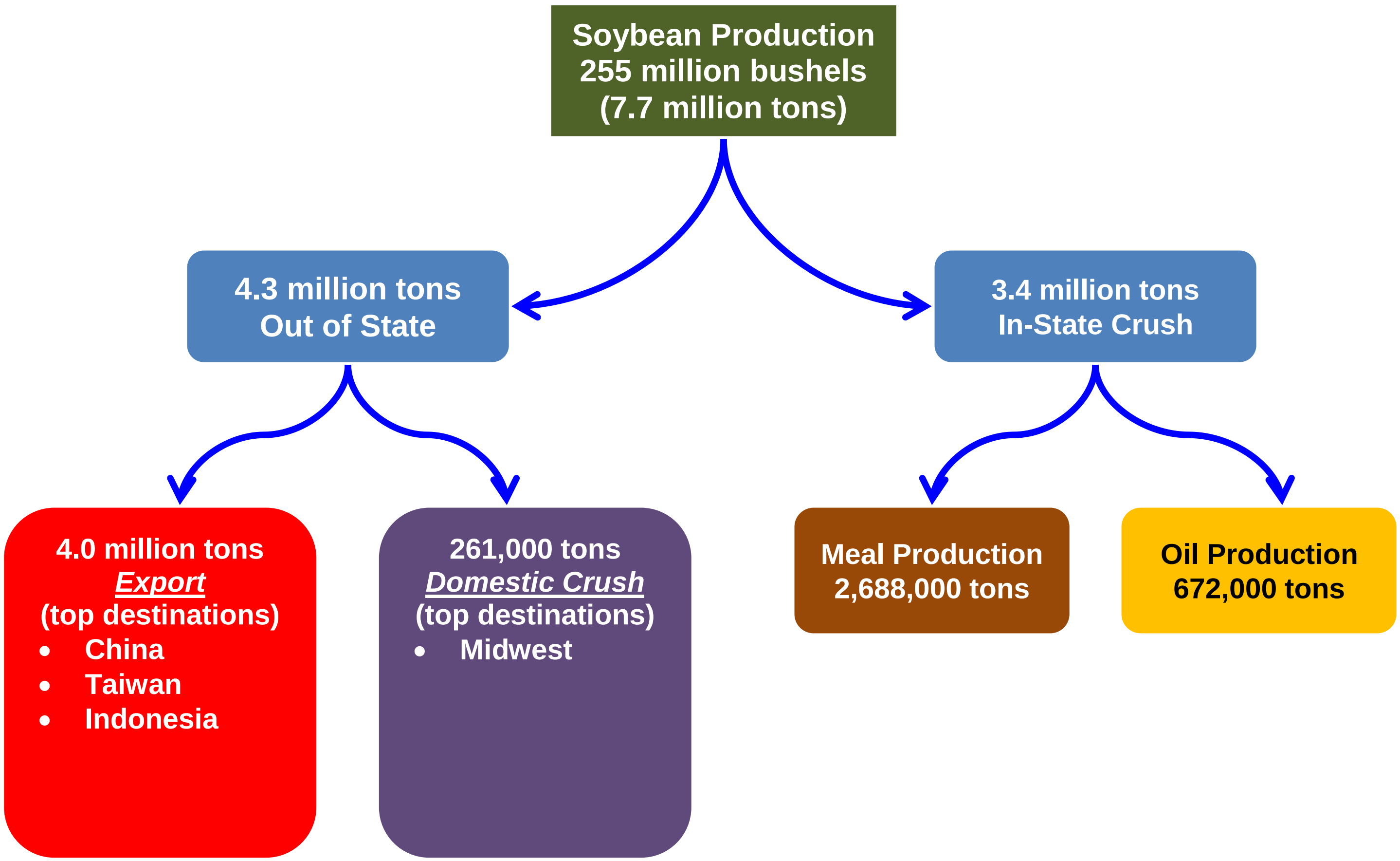
2013/14 **2022/23**

Agricultural Infrastructure: Crush, Ethanol Facilities, Livestock Processing, and Grain Storage		
Facility Type	**# of Facilities**	**Capacity/Size**
Soybean Crushers	4	9,943 MT/Day
Ethanol Facility* (operating)	26	2,015 MGY
Federally Inspected Livestock Slaughter/Processing Facilities	88	n/a
State Inspected Livestock Slaughter/Processing Facilities	0	n/a
Grain Elevators**	498	928,720 Thous. Bu. Storage
Shuttle Elevators	67	239,323 Thous. Bu. Storage
River Elevators	1	637 Thous. Bu. Storage

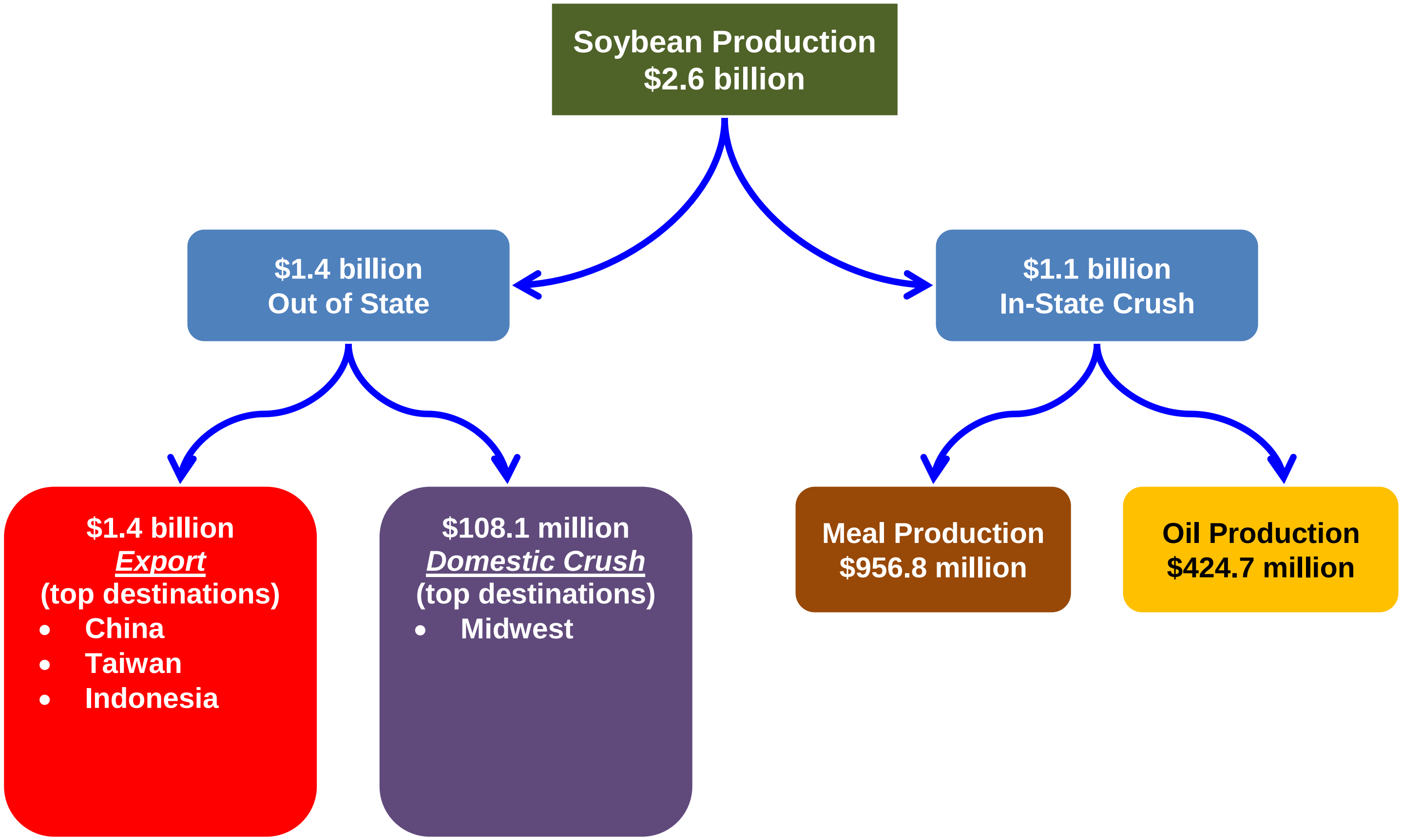
** 1 Cellulosic ethanol facility is included in ethanol facility database.*

*** Shuttle and river elevators are included in the list of grain elevators.*

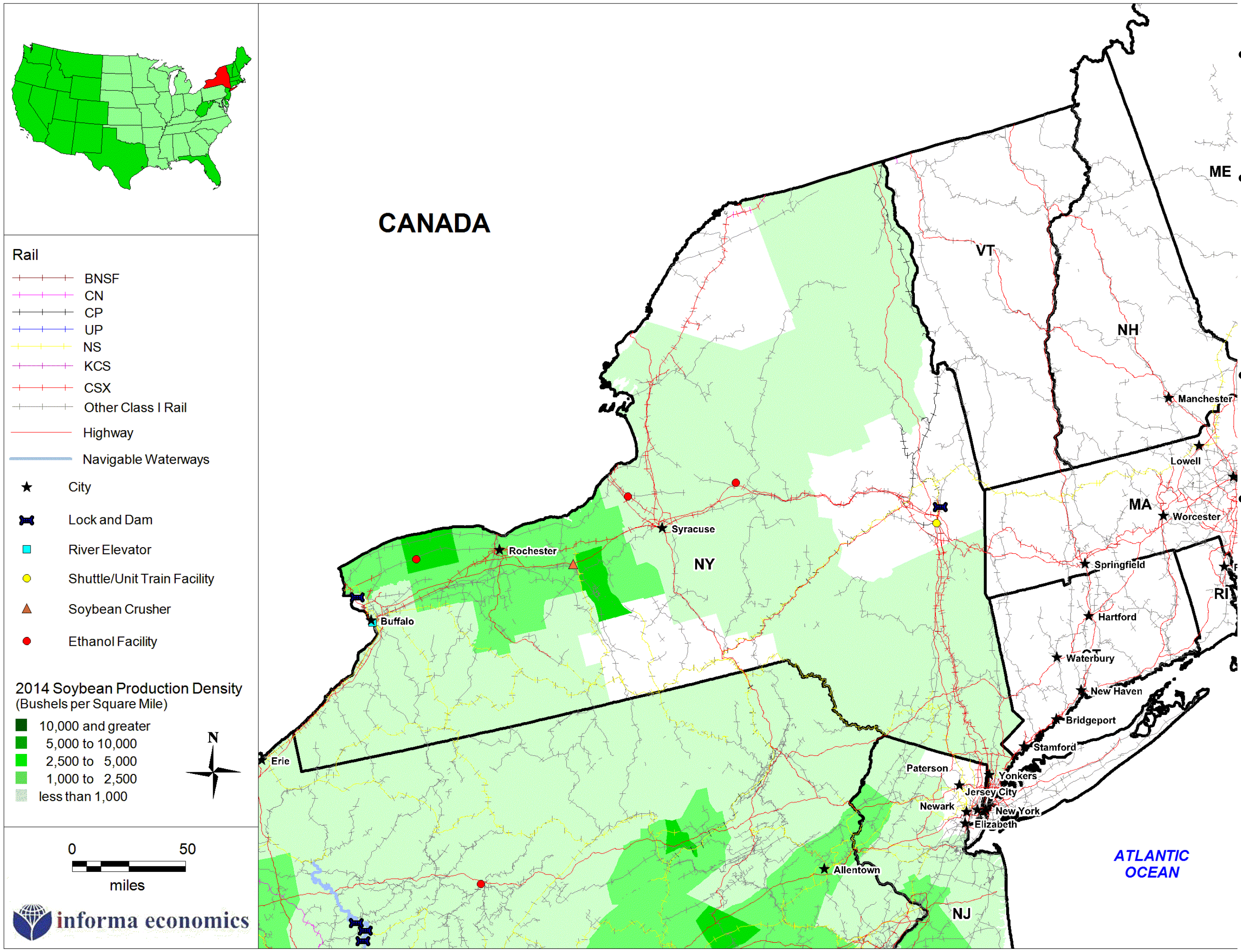
NEBRASKA FLOWCHART OF SOYBEAN MOVEMENTS (2013/14)



NEBRASKA FLOWCHART OF SOYBEAN VALUE (2013/14)



NEW YORK



Production

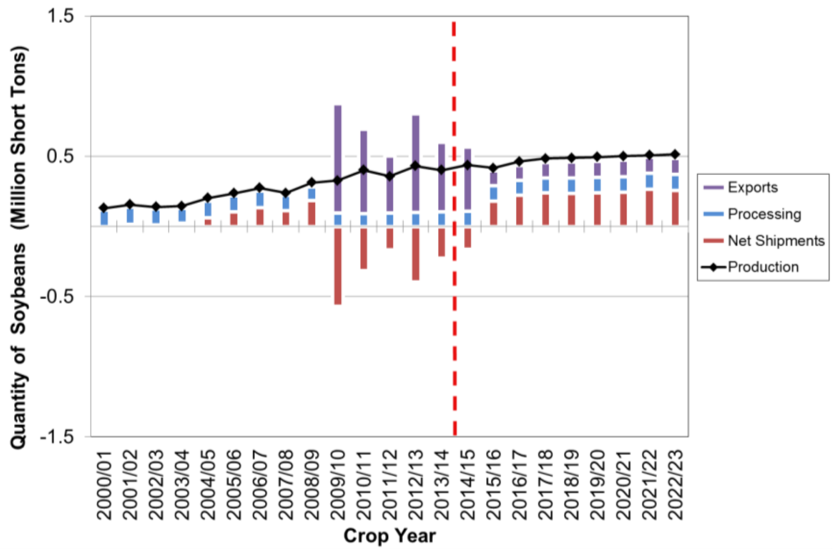
- Soybean production occurs mostly along the southwestern boarder of the state, along Lake Ontario.
- New York is a significant producer of dairy cattle, contributing 7% of the U.S. production.

Infrastructure

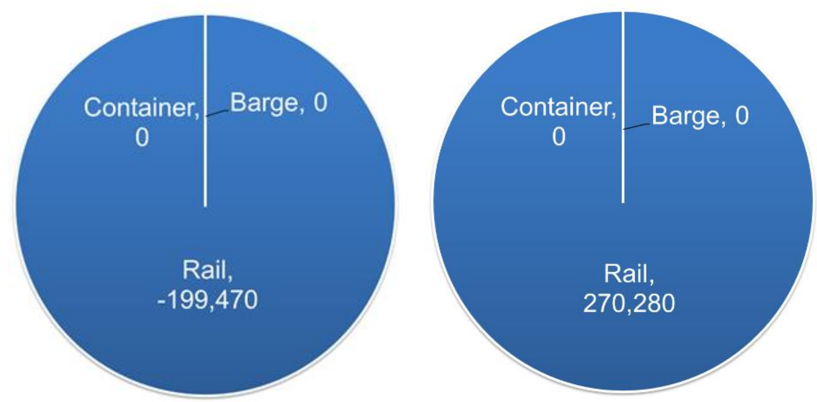
- New York has 3,447 miles of rail lines, 1,724 miles of interstate, and 114,728 total road miles.
- The state also has 1 shuttle facility, 1 soybean crush facility, 3 ethanol facilities, 19 grain elevators, and 1 river elevator.

NEW YORK

Soybean Surplus and Deficit Outlook



Soybean Movements by Mode (Short Tons)



2013/14 **2022/23**

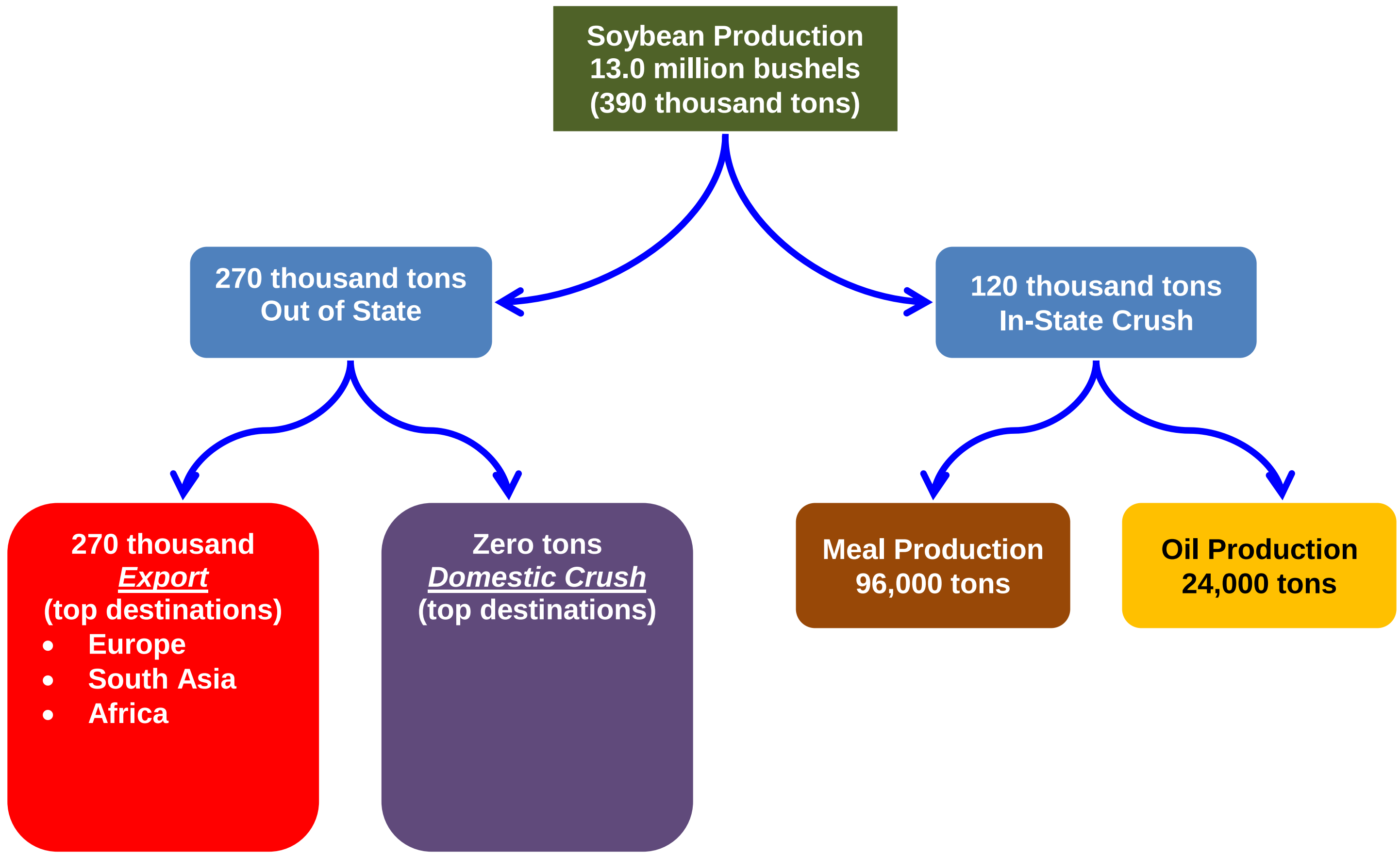
** A negative number indicates the state is a net inshipment*

Agricultural Infrastructure: Crush, Ethanol Facilities, Livestock Processing, and Grain Storage			
Facility Type	**# of Facilities**	**Capacity/Size**	
Soybean Crushers	1	219	MT/Day
Ethanol Facility* (operating)	3	165	MGY
Federally Inspected Livestock Slaughter/Processing Facilities	342	n/a	
State Inspected Livestock Slaughter/Processing Facilities	0	n/a	
Grain Elevators**	19	31,812	Thous. Bu. Storage
Shuttle Elevators	1	13,736	Thous. Bu. Storage
River Elevators	1	5,500	Thous. Bu. Storage

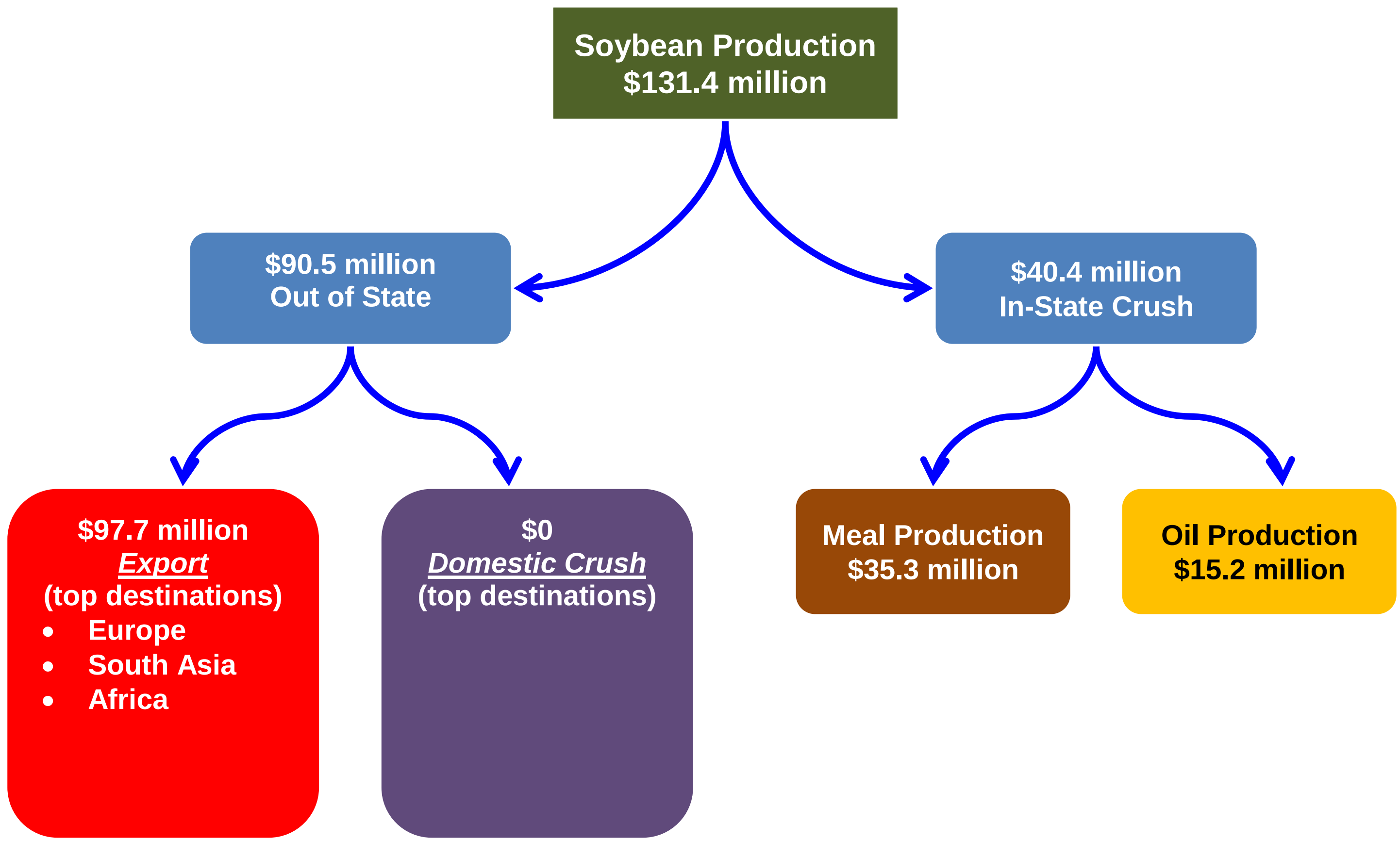
** 1 Cellulosic ethanol facility is included in ethanol facility database.*

*** Shuttle and river elevators are included in the list of grain elevators.*

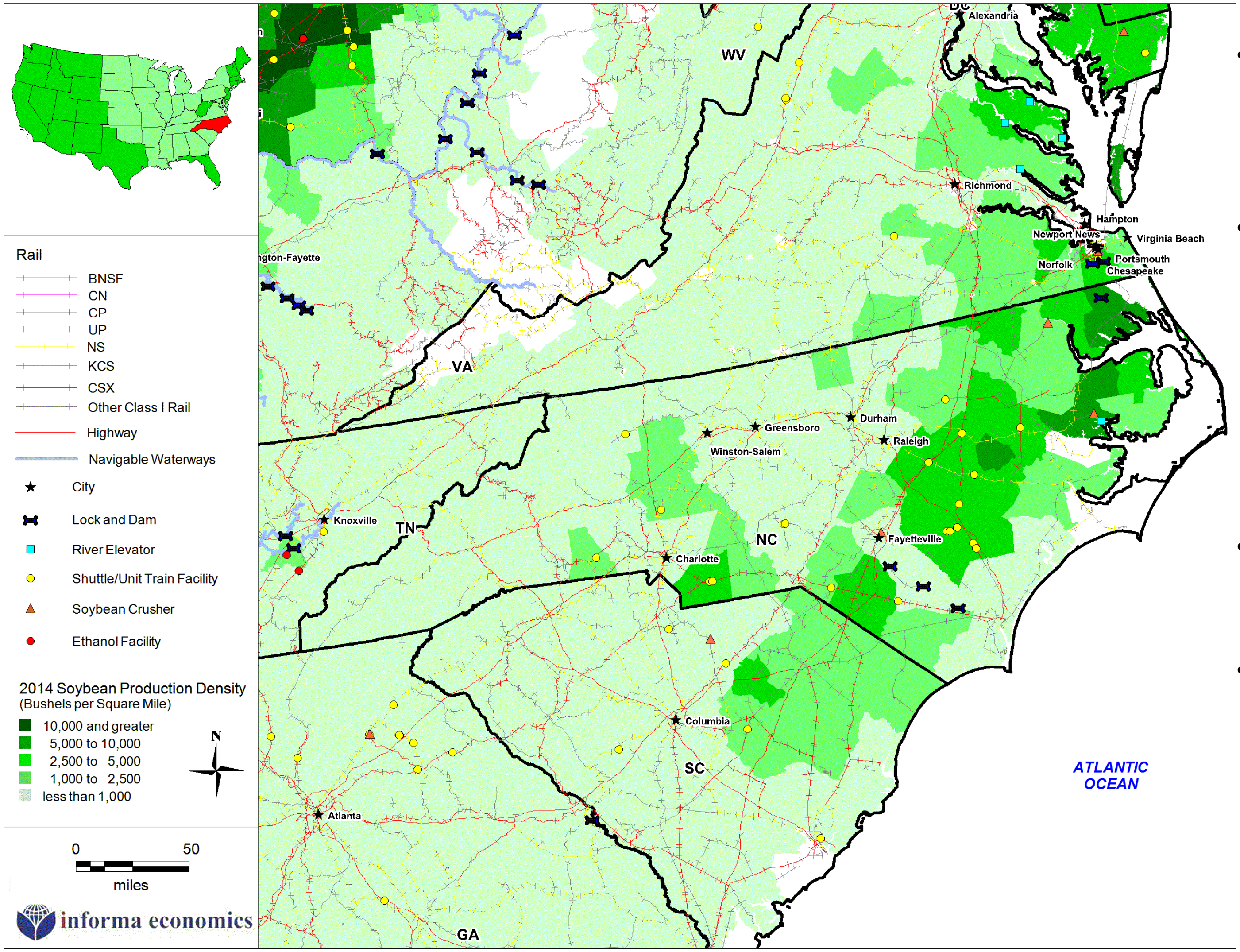
NEW YORK FLOWCHART OF SOYBEAN MOVEMENTS (2013/14)



NEW YORK FLOWCHART OF SOYBEAN VALUE (2013/14)



NORTH CAROLINA



Production

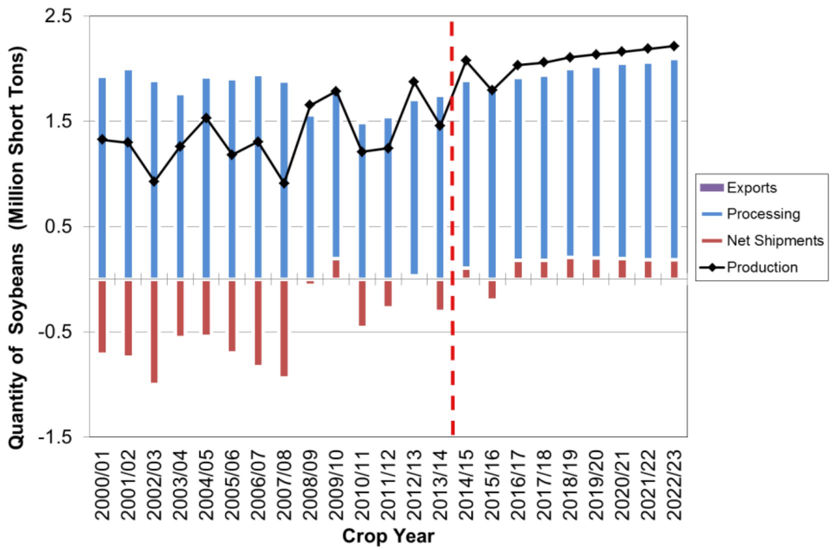
- Soybean production mostly in the eastern portion of the state, with production densities highest throughout the far eastern portion of the state.
- North Carolina is a significant producer of poultry, including both broilers and turkeys. The state accounts for 12% of the U.S. production. They are also a large producer of hogs, representing 14% of the U.S. production.

Infrastructure

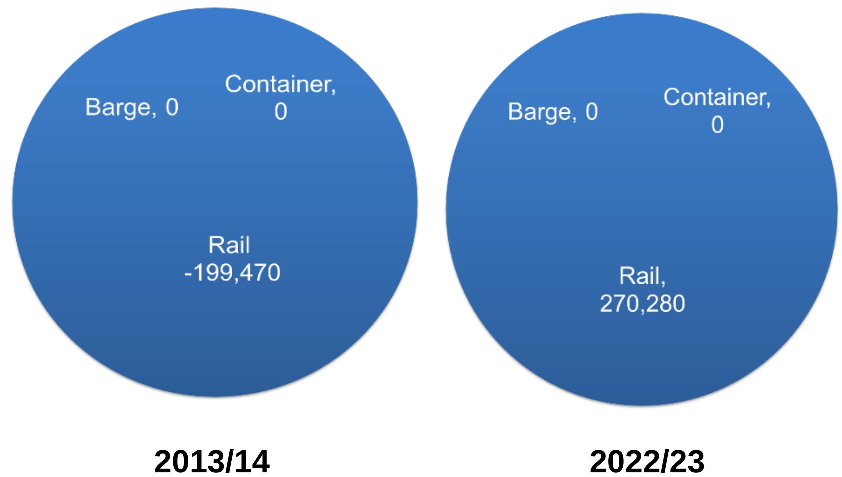
- North Carolina has 3,258 miles of rail lines, 1,255 miles of interstate, and 106,202 miles of roadways.
- North Carolina has 20 shuttle facilities, 3 soybean crush facilities, 208 grain elevators, and 1 river elevator.

NORTH CAROLINA

Soybean Surplus and Deficit Outlook



Soybean Movements by Mode (Short Tons)

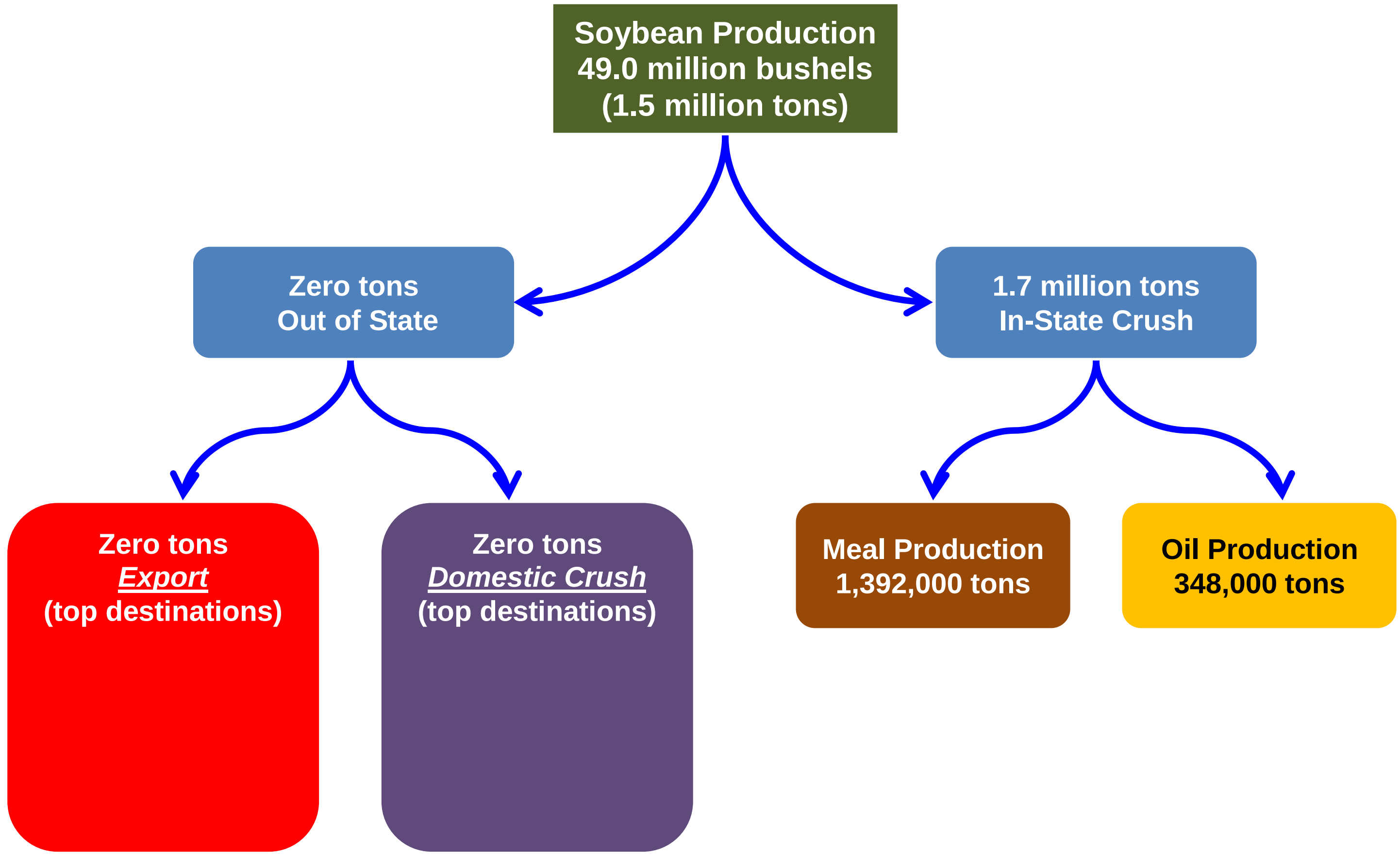


** A negative number indicates the state is a net inshipment*

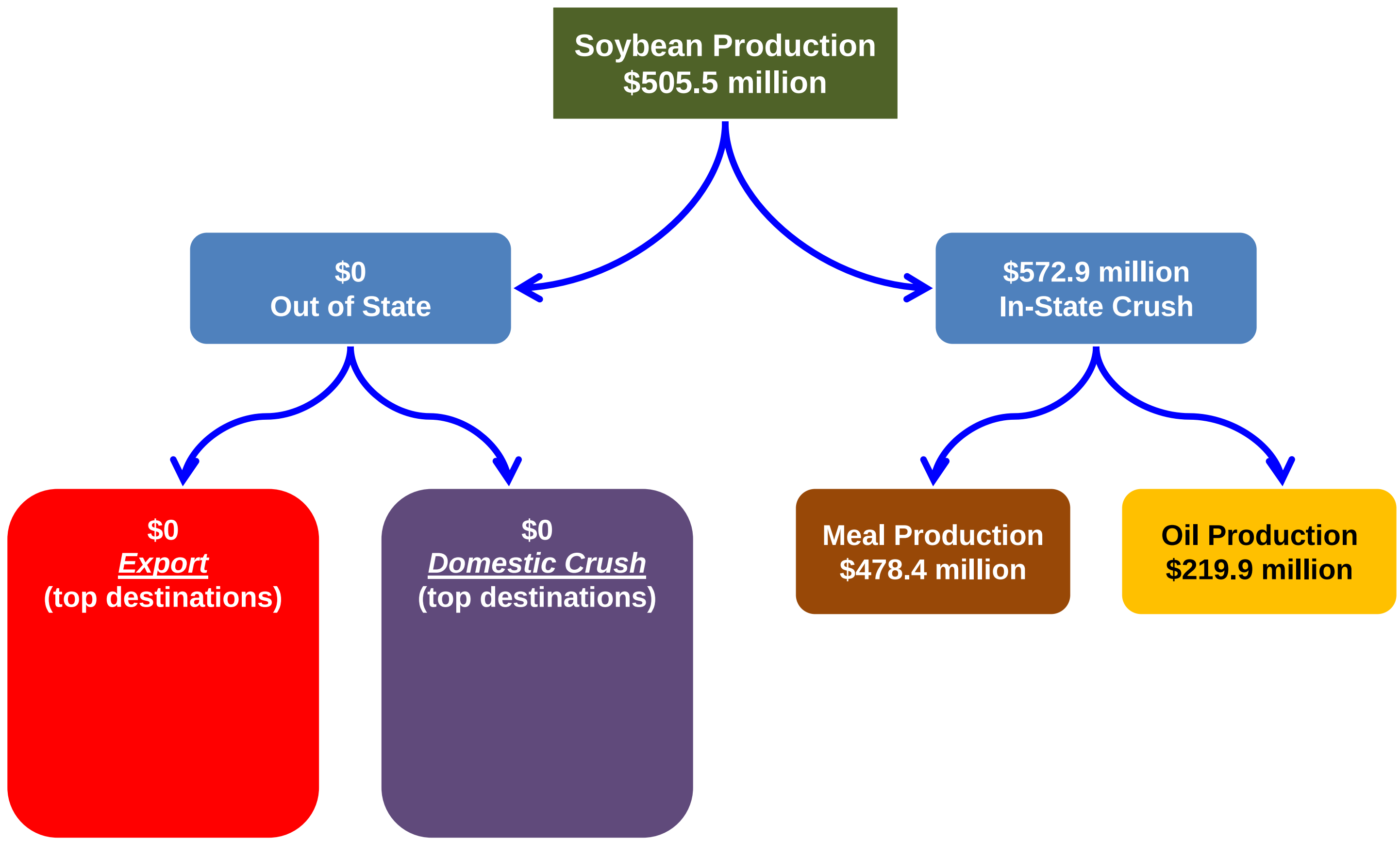
Agricultural Infrastructure: Crush, Ethanol Facilities, Livestock Processing, and Grain Storage			
Facility Type	# of Facilities	Capacity/Size	
Soybean Crushers	3	4,060	MT/Day
Ethanol Facility (operating)	0	-	MGY
Federally Inspected Livestock Slaughter/Processing Facilities	77	n/a	
State Inspected Livestock Slaughter/Processing Facilities	68	n/a	
Grain Elevators*	208	130,773	Thous. Bu. Storage
Shuttle Elevators	20	18,955	Thous. Bu. Storage
River Elevators	1	500	Thous. Bu. Storage

** Shuttle and river elevators are included in the list of grain elevators.*

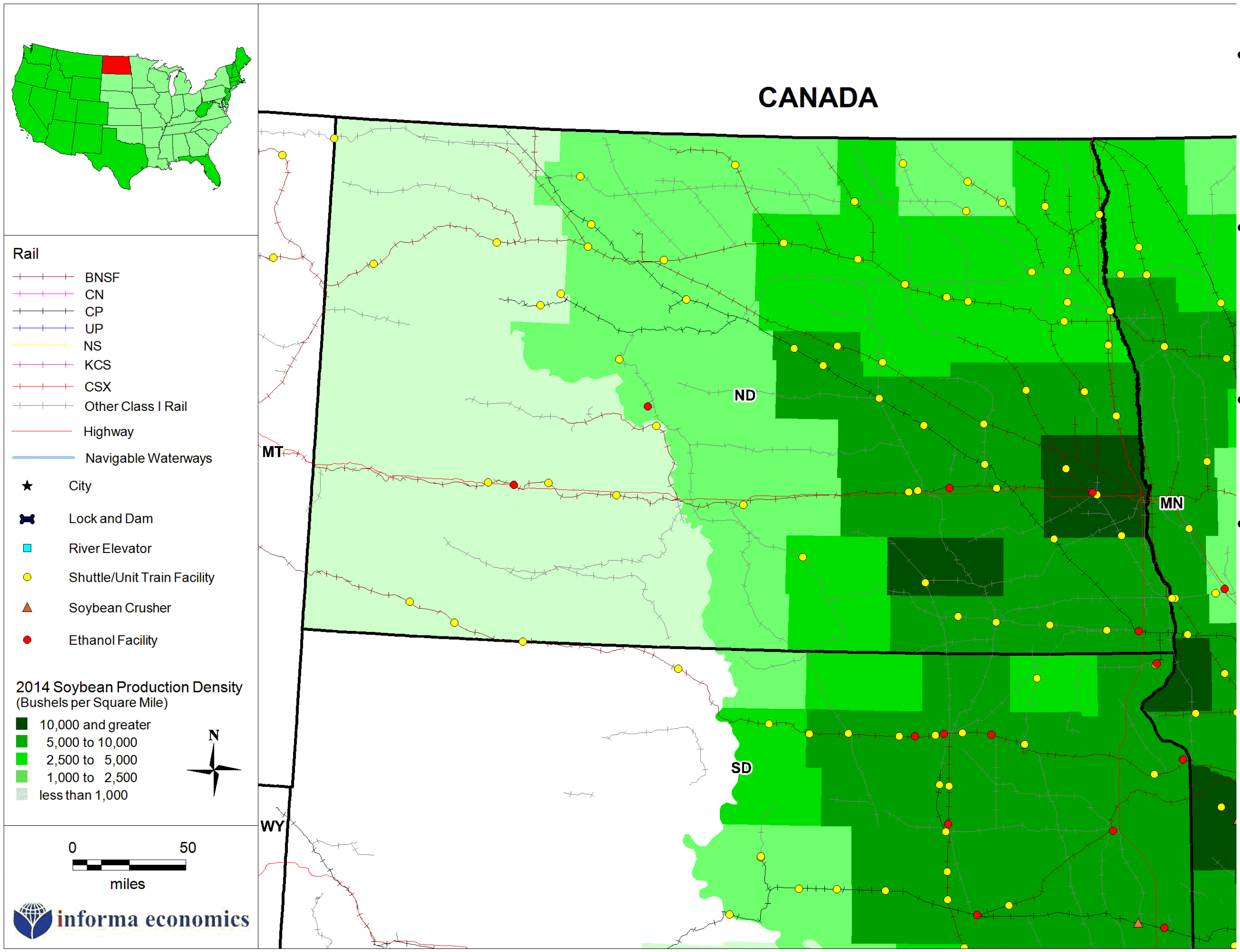
NORTH CAROLINA FLOWCHART OF SOYBEAN MOVEMENTS (2013/14)



NORTH CAROLINA FLOWCHART OF SOYBEAN VALUE (2013/14)



NORTH DAKOTA



Production

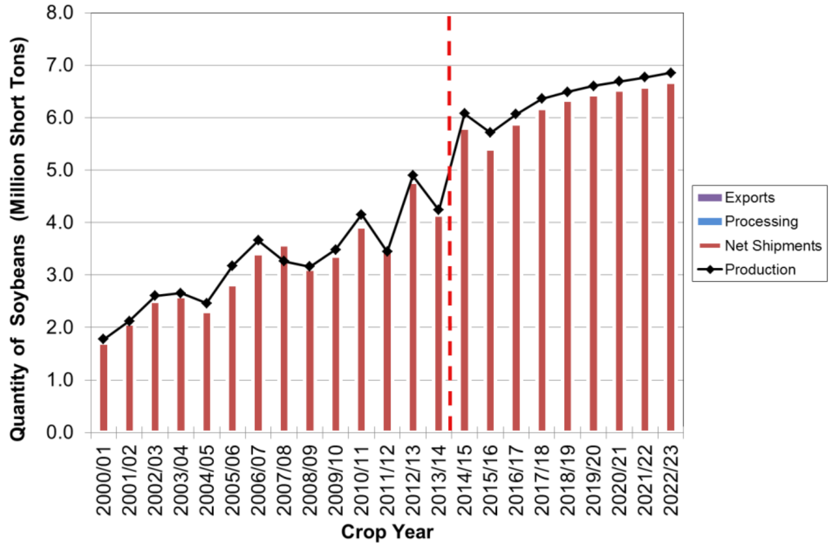
- Soybean production mostly in the eastern portion of the state, with production densities highest throughout the southeastern portion of the state.
- North Dakota's primary livestock inventory consists of cattle.

Infrastructure

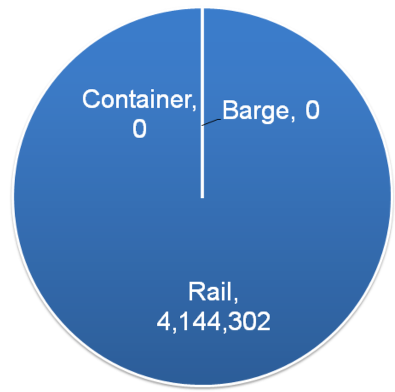
- North Dakota has 3,330 miles of rail lines, 571 miles of interstate, and 87,078 miles of roadways.
- North Dakota has 61 shuttle facilities, 0 soybean crushing facility, 5 ethanol facilities, 388 grain elevators, and 0 river elevator.

NORTH DAKOTA

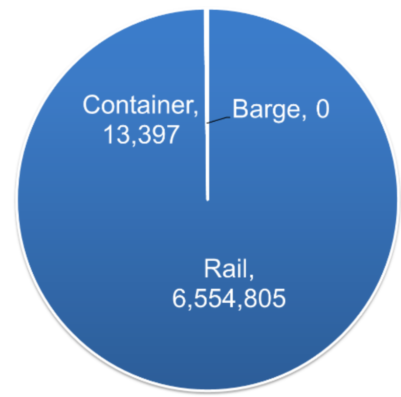
Soybean Surplus and Deficit Outlook



Soybean Movements by Mode (Short Tons)



2013/14



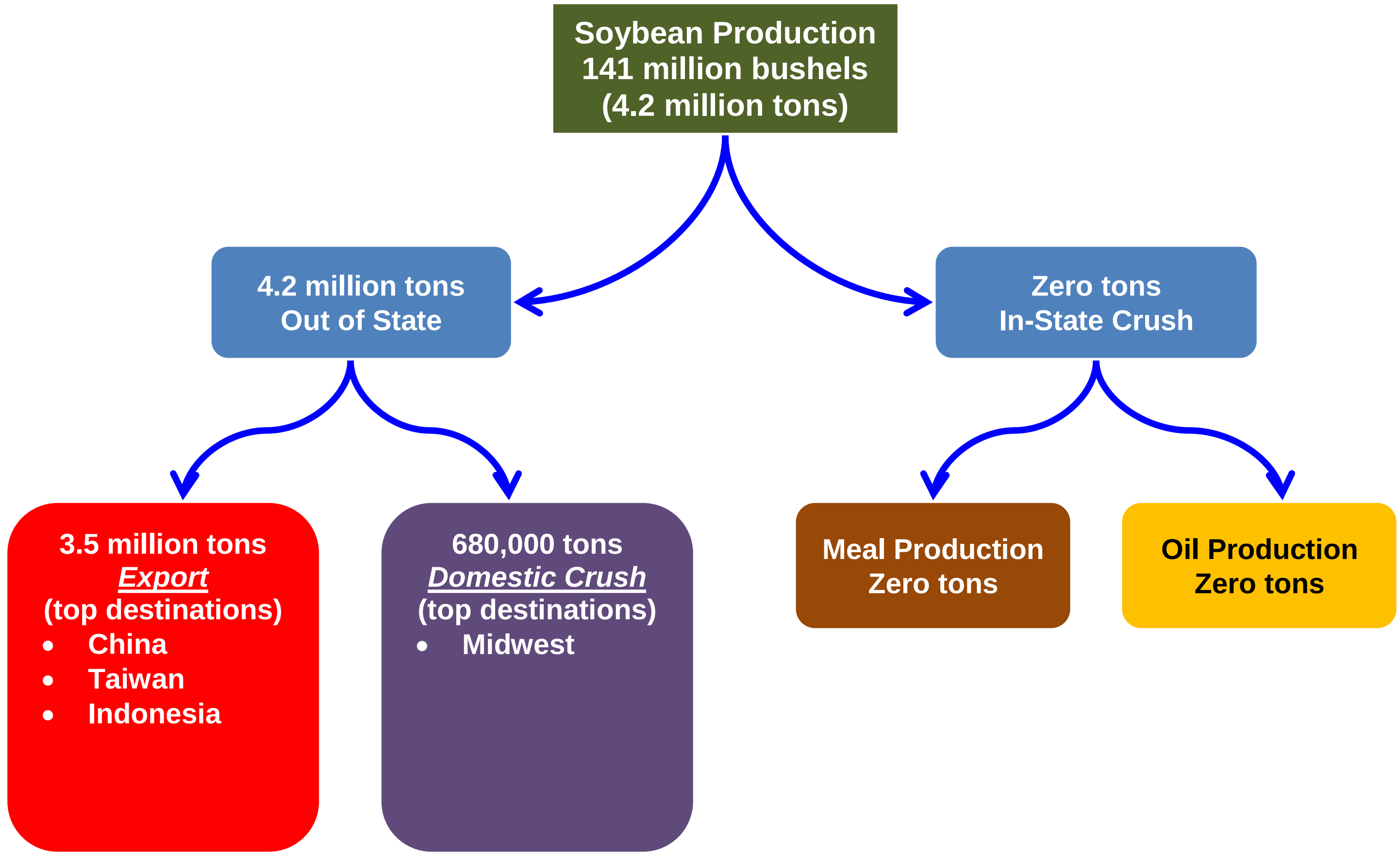
2022/23

Agricultural Infrastructure: Crush, Ethanol Facilities, Livestock Processing, and Grain Storage

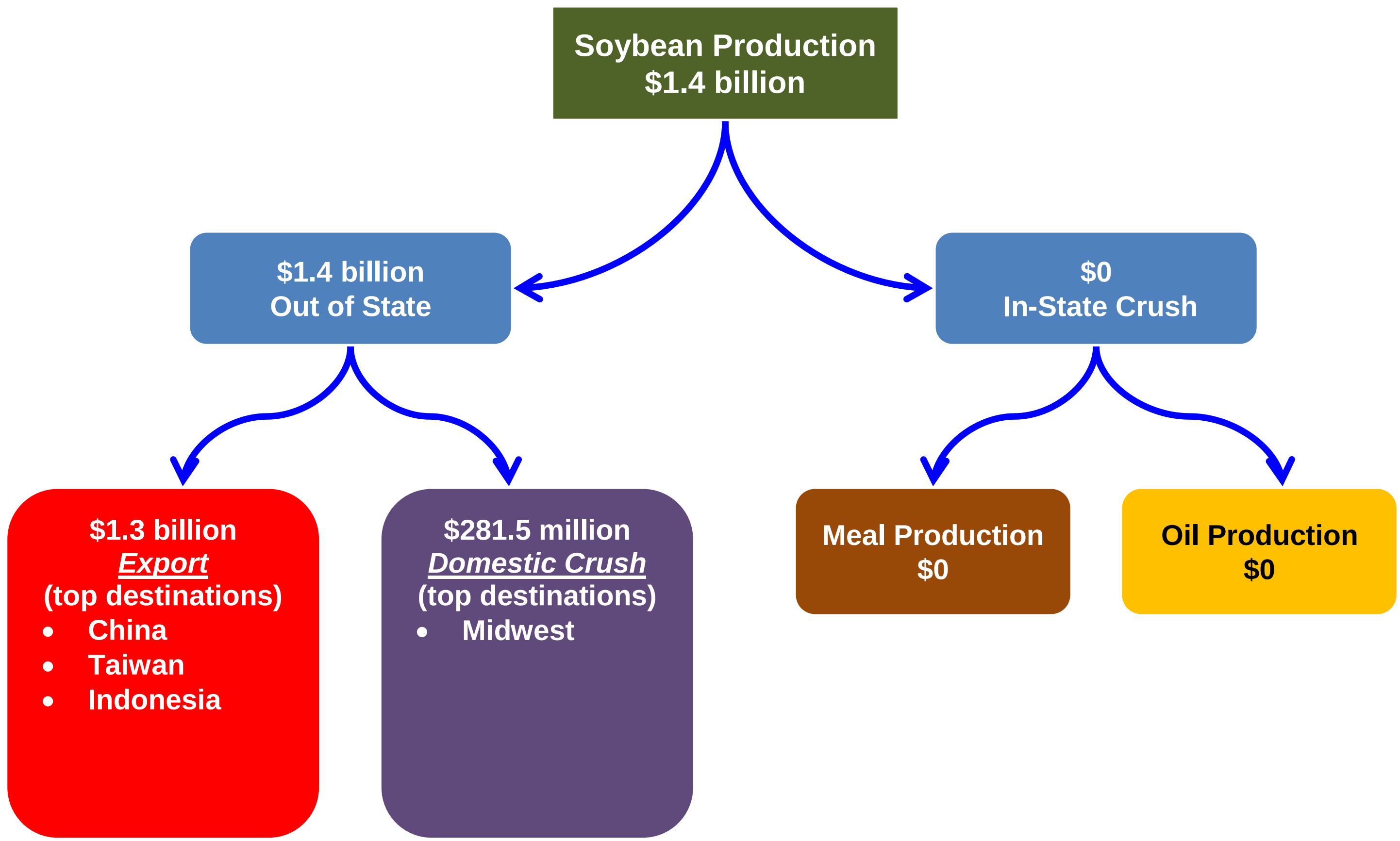
Facility Type	# of Facilities	Capacity/Size	
Soybean Crushers	0	-	MT/Day
Ethanol Facility (operating)	5	463	MGY
Federally Inspected Livestock Slaughter/Processing Facilities	23	n/a	
State Inspected Livestock Slaughter/Processing Facilities	18	n/a	
Grain Elevators*	388	399,944	Thous. Bu. Storage
Shuttle Elevators	61	133,981	Thous. Bu. Storage
River Elevators	0	-	Thous. Bu. Storage

** Shuttle and river elevators are included in the list of grain elevators.*

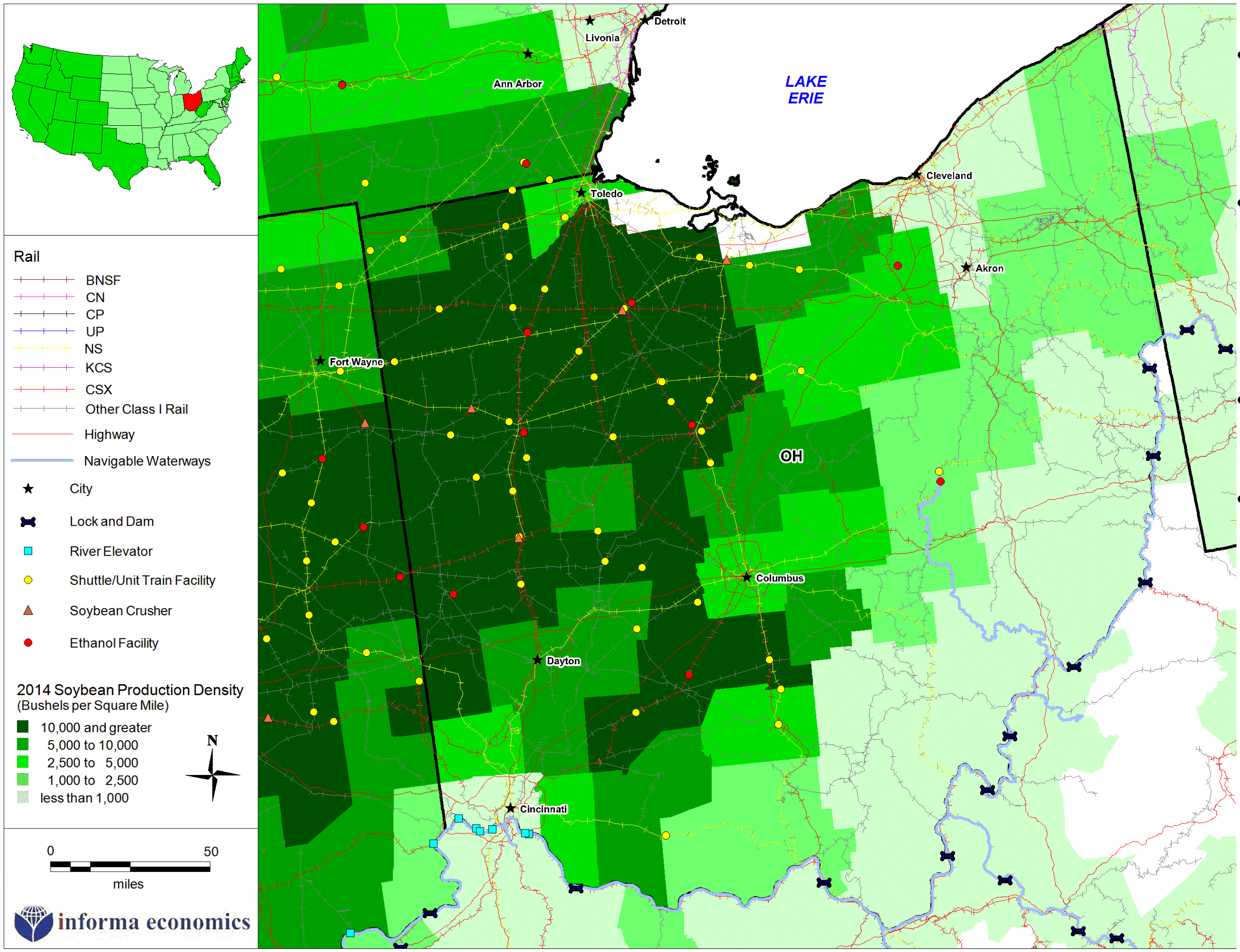
NORTH DAKOTA FLOWCHART OF SOYBEAN MOVEMENTS (2013/14)



NORTH DAKOTA FLOWCHART OF SOYBEAN VALUE (2013/14)



OHIO



Production

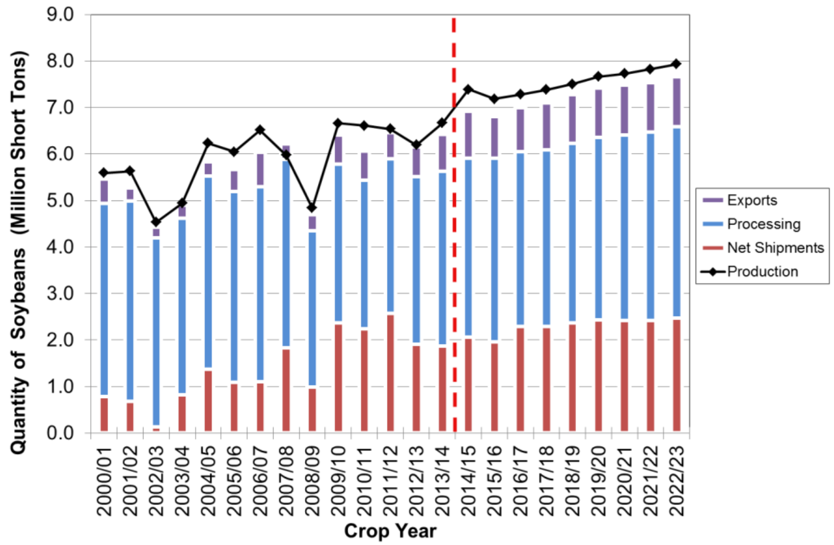
- Soybean production mostly in the north western portion of the state, with production densities highest in this region of the state.
- Ohio is a contributor of dairy cattle, hogs, and turkeys to U.S. production.

Infrastructure

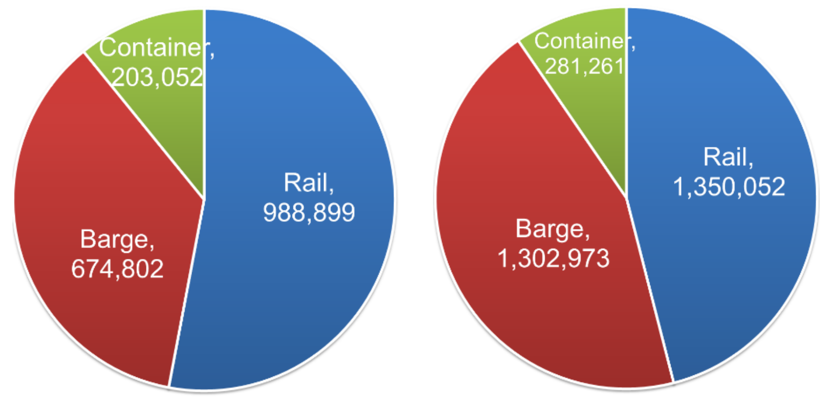
- Ohio has 5,288 miles of rail lines, 1,574 miles of interstate, and 123,297 miles of roadways.
- Ohio has 46 shuttle facilities, 4 soybean crush facilities, 8 ethanol facilities, 384 grain elevators, and 5 river elevators.

OHIO

Soybean Surplus and Deficit Outlook



Soybean Movements by Mode (Short Tons)

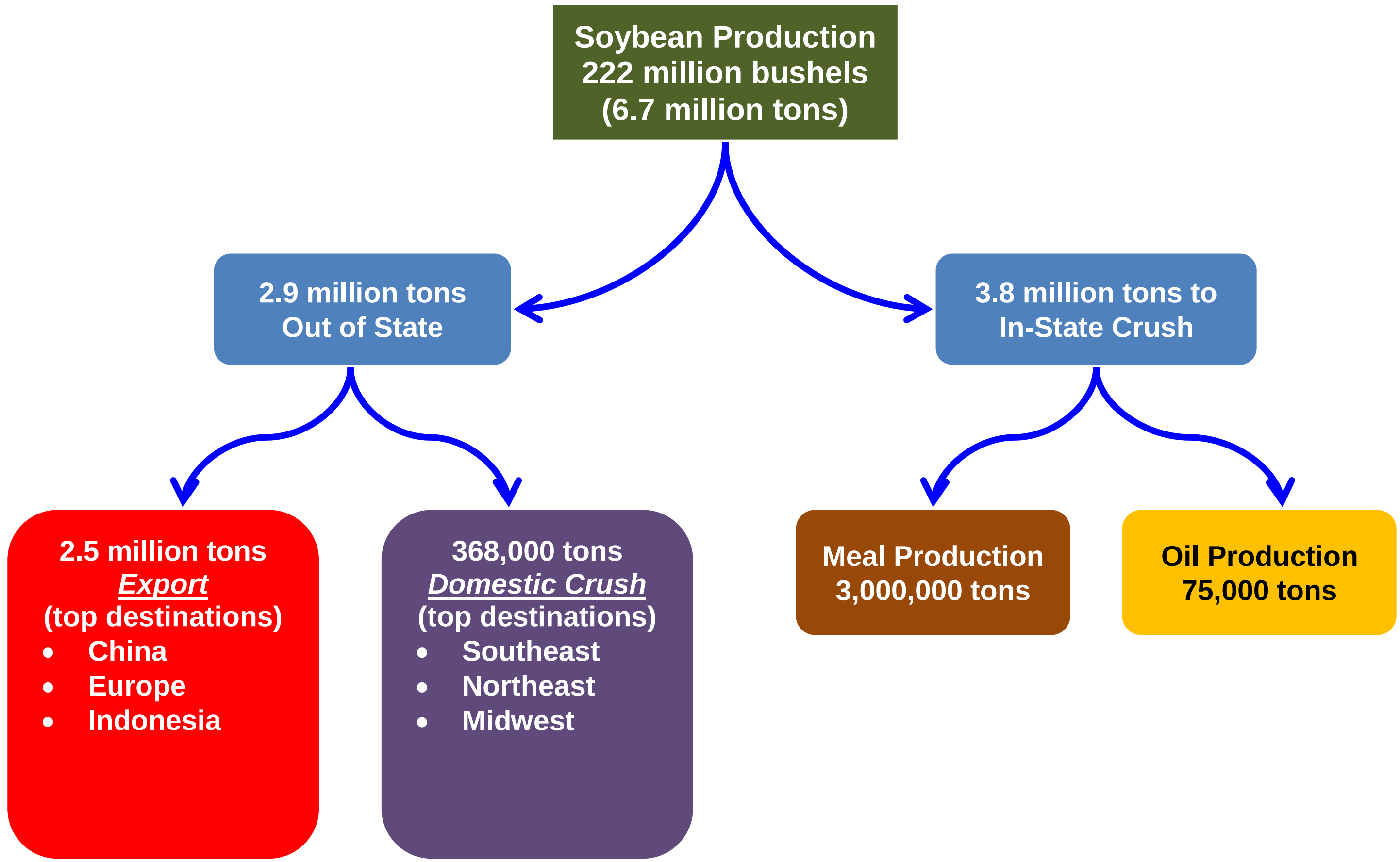


2013/14 **2022/23**

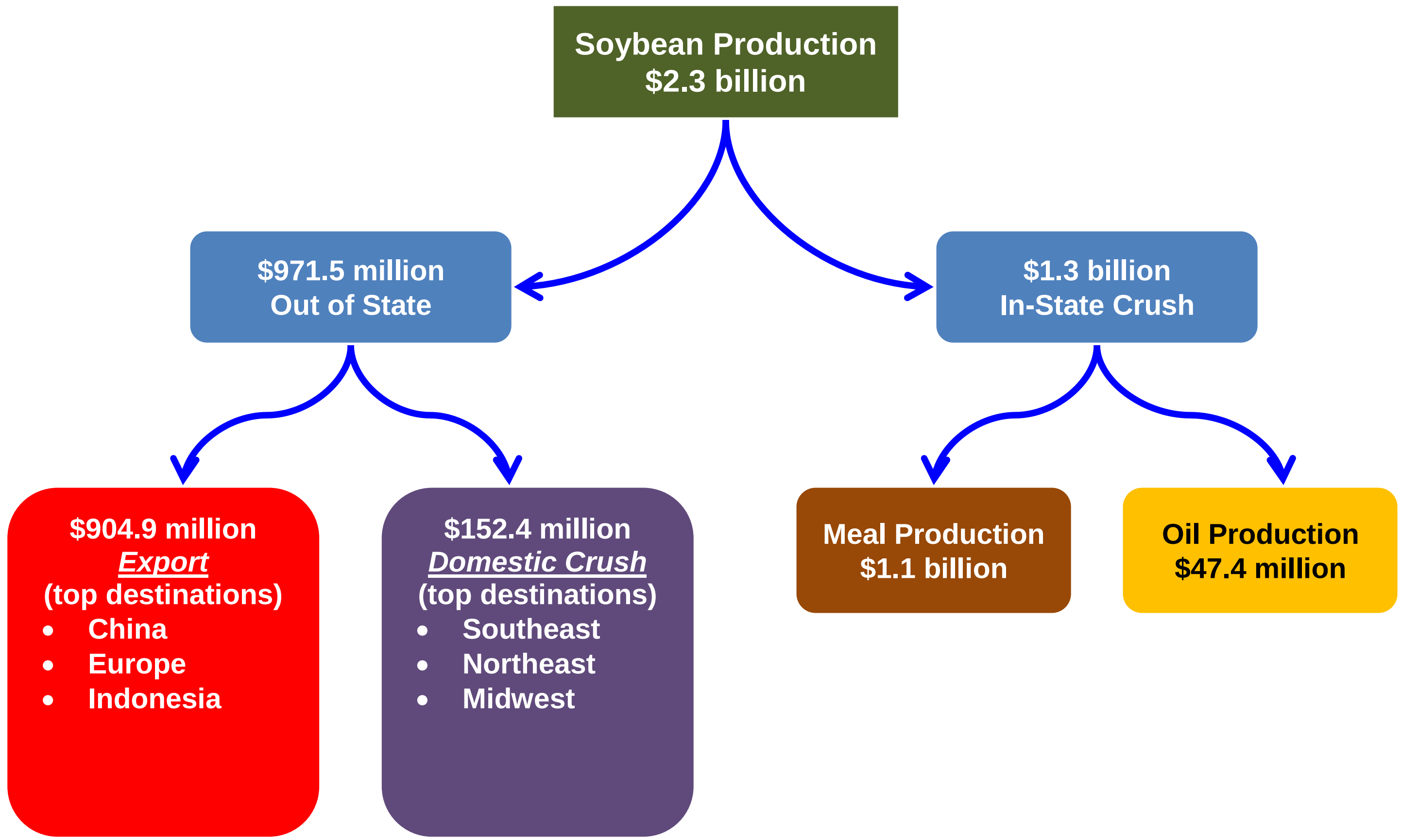
Agricultural Infrastructure: Crush, Ethanol Facilities, Livestock Processing, and Grain Storage			
Facility Type	**# of Facilities**	**Capacity/Size**	
Soybean Crushers	4	10,138	MT/Day
Ethanol Facility (operating)	8	525	MGY
Federally Inspected Livestock Slaughter/Processing Facilities	158	n/a	
State Inspected Livestock Slaughter/Processing Facilities	216	n/a	
Grain Elevators*	384	438,671	Thous. Bu. Storage
Shuttle Elevators	46	163,051	Thous. Bu. Storage
River Elevators	5	4,516	Thous. Bu. Storage

** Shuttle and river elevators are included in the list of grain elevators.*

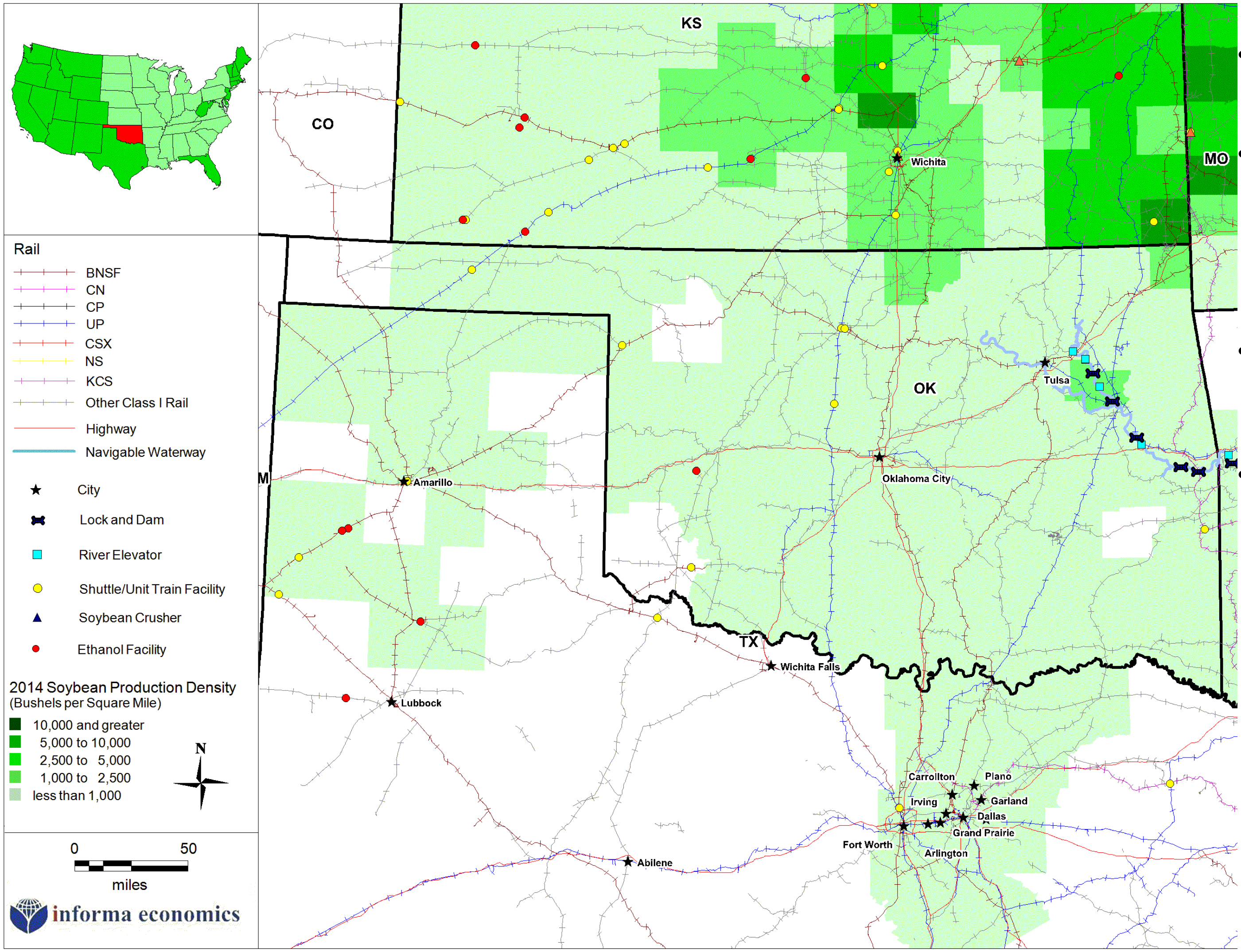
OHIO FLOWCHART OF SOYBEAN MOVEMENTS (2013/14)



OHIO FLOWCHART OF SOYBEAN VALUE (2013/14)



OKLAHOMA



Production

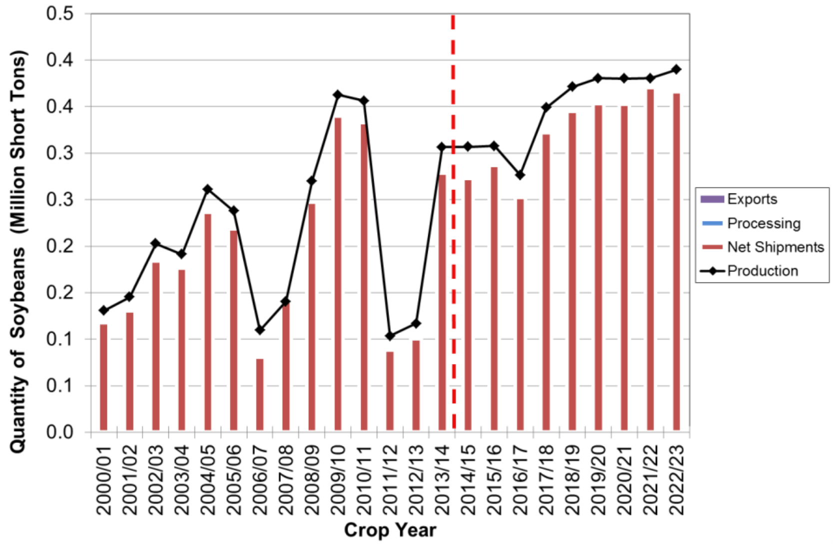
- Soybean production occurs mostly along the north eastern corner of the state.
- Oklahoma is a significant producer of beef cattle, representing 5% of the U.S. production.

Infrastructure

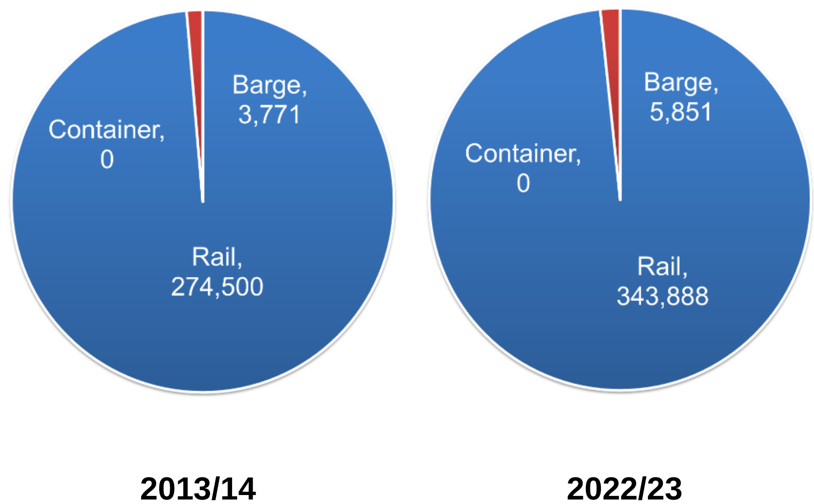
- Oklahoma has 3,273 miles of rail lines, 933 miles of interstate, and 112,940 total road miles.
- The state also has 7 shuttle facilities, 0 soybean crush facility, 1 ethanol facility, 182 grain elevators, and 5 river elevators.

OKLAHOMA

Soybean Surplus and Deficit Outlook



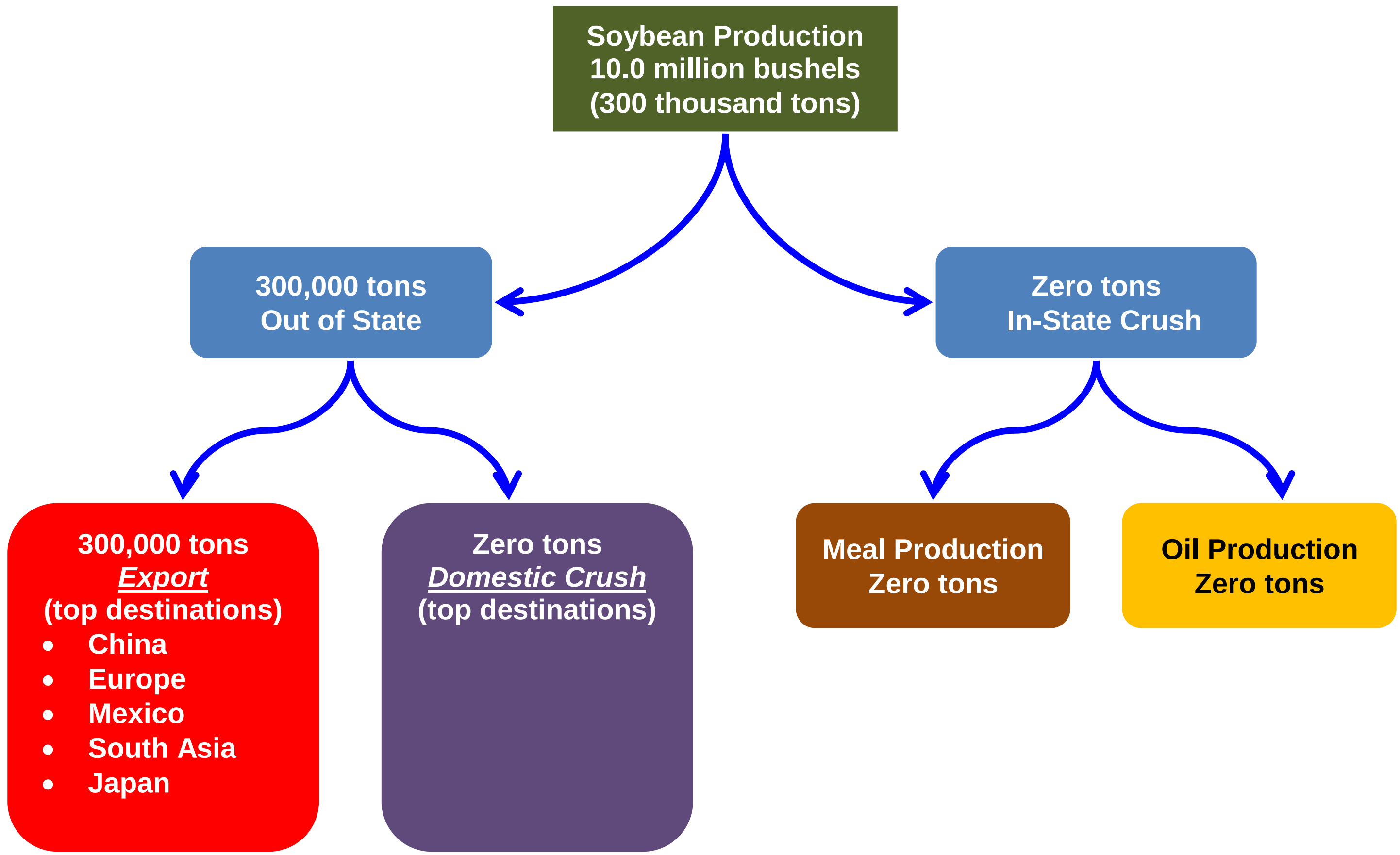
Soybean Movements by Mode (Short Tons)



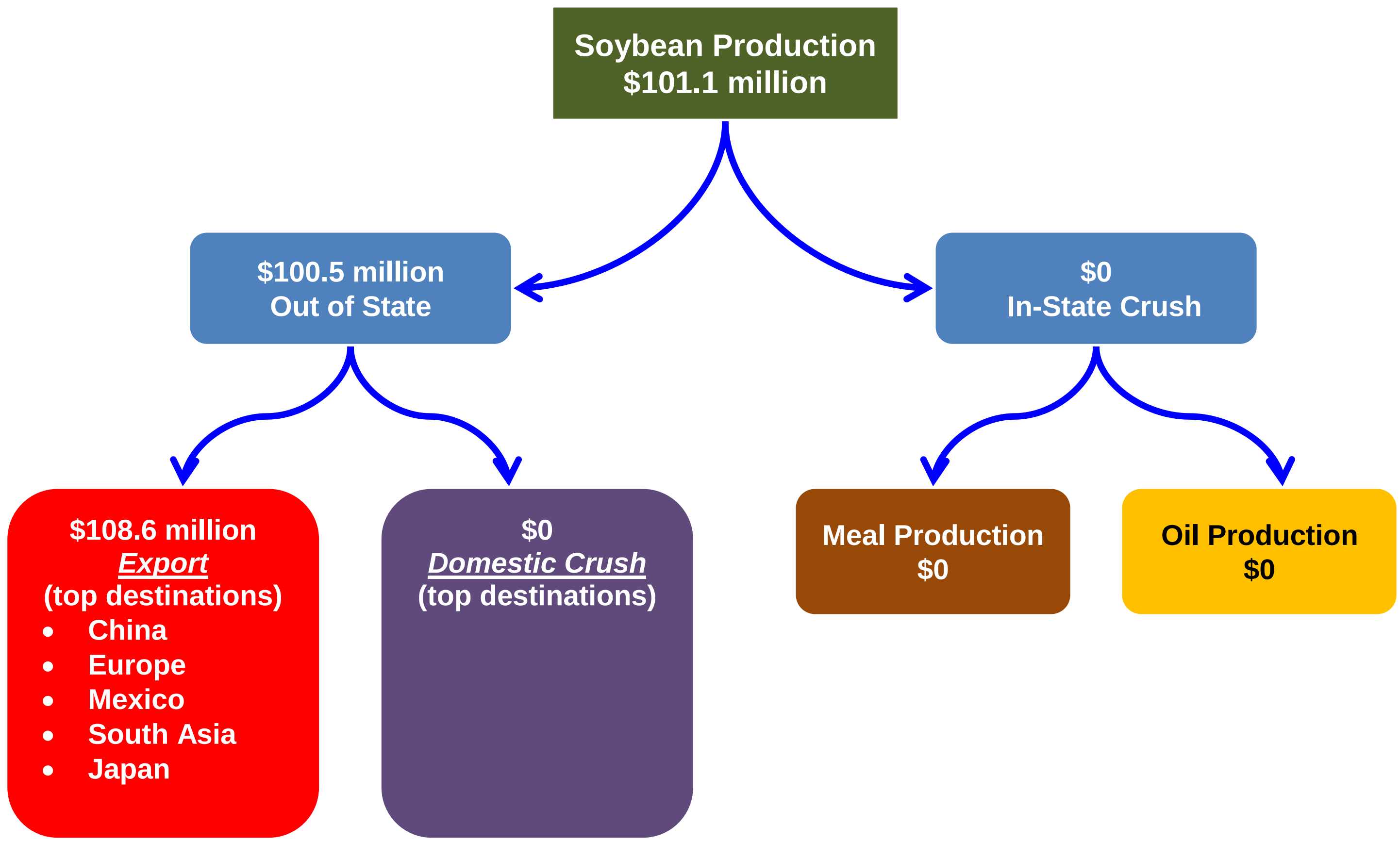
Agricultural Infrastructure: Crush, Ethanol Facilities, Livestock Processing, and Grain Storage			
Facility Type	# of Facilities	Capacity/Size	
Soybean Crushers	0	-	MT/Day
Ethanol Facility (operating)	1	2	MGY
Federally Inspected Livestock Slaughter/Processing Facilities	39	n/a	
State Inspected Livestock Slaughter/Processing Facilities	36	n/a	
Grain Elevators*	182	240,881	Thous. Bu. Storage
Shuttle Elevators	7	52,280	Thous. Bu. Storage
River Elevators	5	10,414	Thous. Bu. Storage

** Shuttle and river elevators are included in the list of grain elevators.*

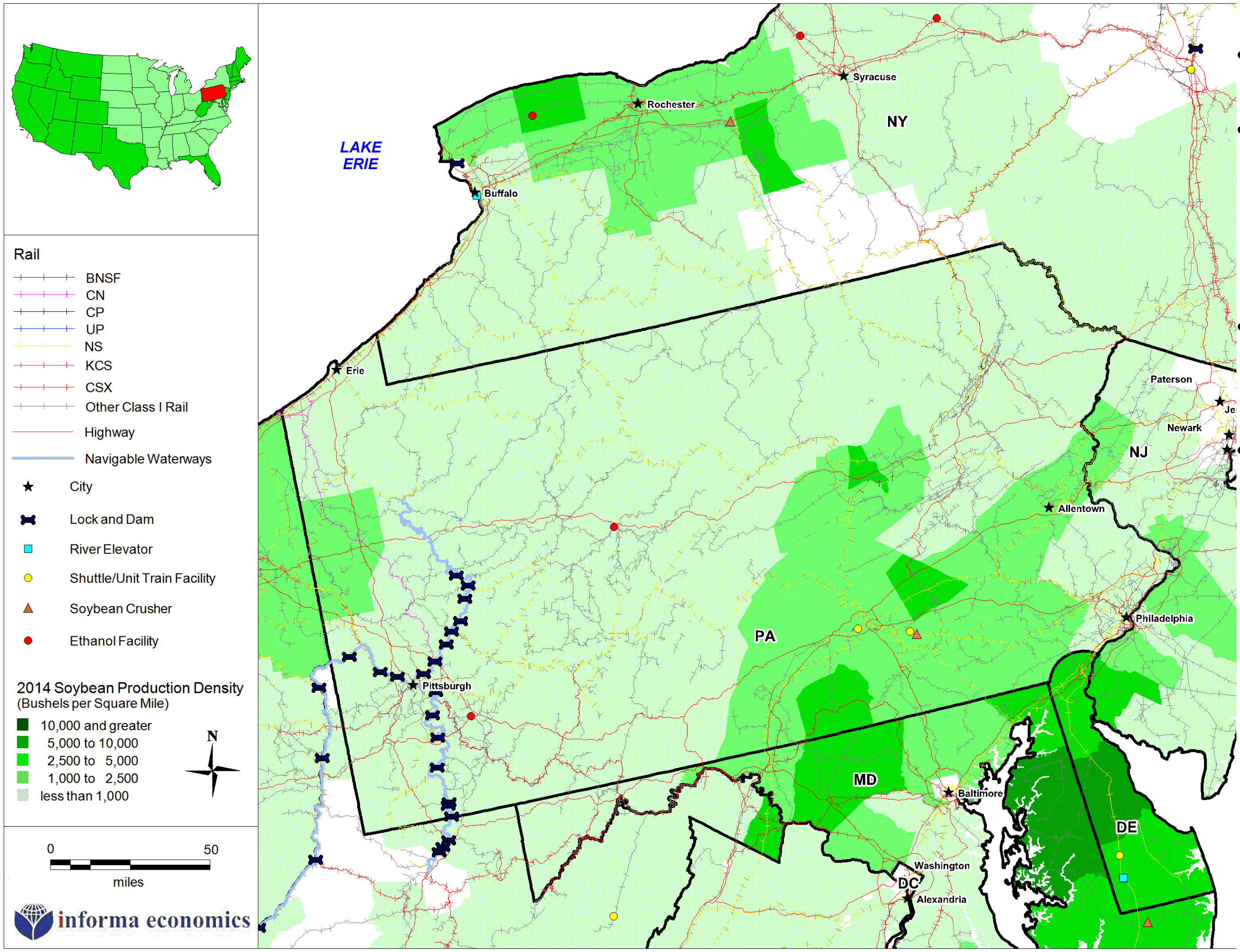
OKLAHOMA FLOWCHART OF SOYBEAN MOVEMENTS (2013/14)



OKLAHOMA FLOWCHART OF SOYBEAN VALUE (2013/14)



PENNSYLVANIA



Production

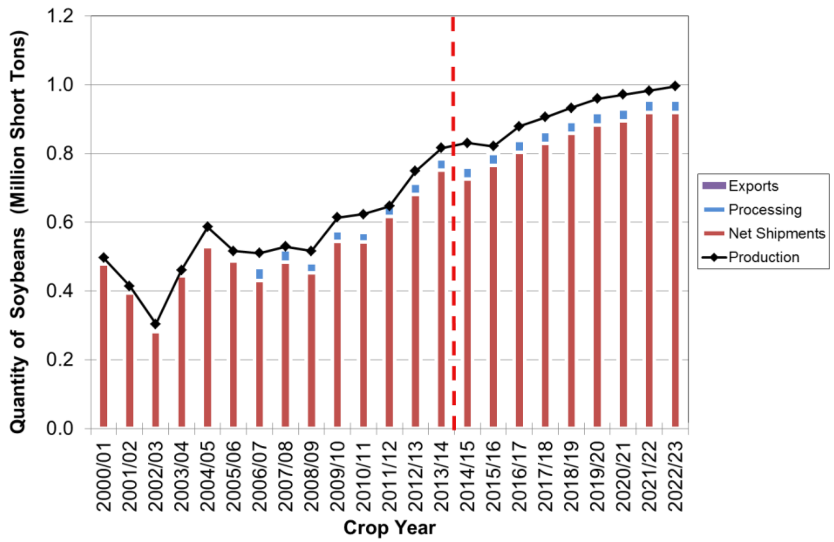
- Soybean production along the south eastern portion of the state.
- Pennsylvania is a significant producer of dairy cattle, representing 6% of the U.S. production.

Infrastructure

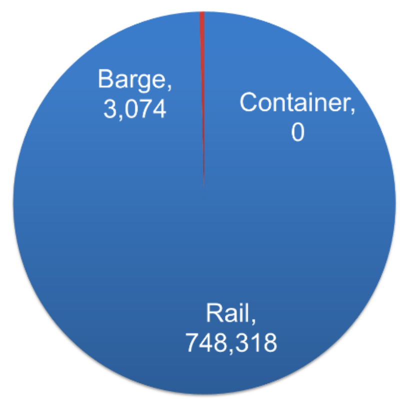
- Pennsylvania has 5,151 miles of rail lines, 1,857 miles of interstate, and 119,936 total road miles.
- The state also has 2 shuttle facilities, 1 soybean crush facility, 2 ethanol facilities, 42 grain elevators, and 0 river elevator.

PENNSYLVANIA

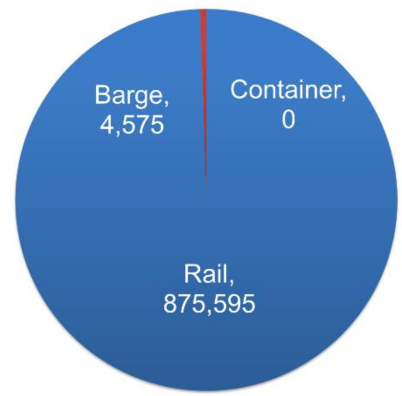
Soybean Surplus and Deficit Outlook



Soybean Movements by Mode (Short Tons)



2013/14



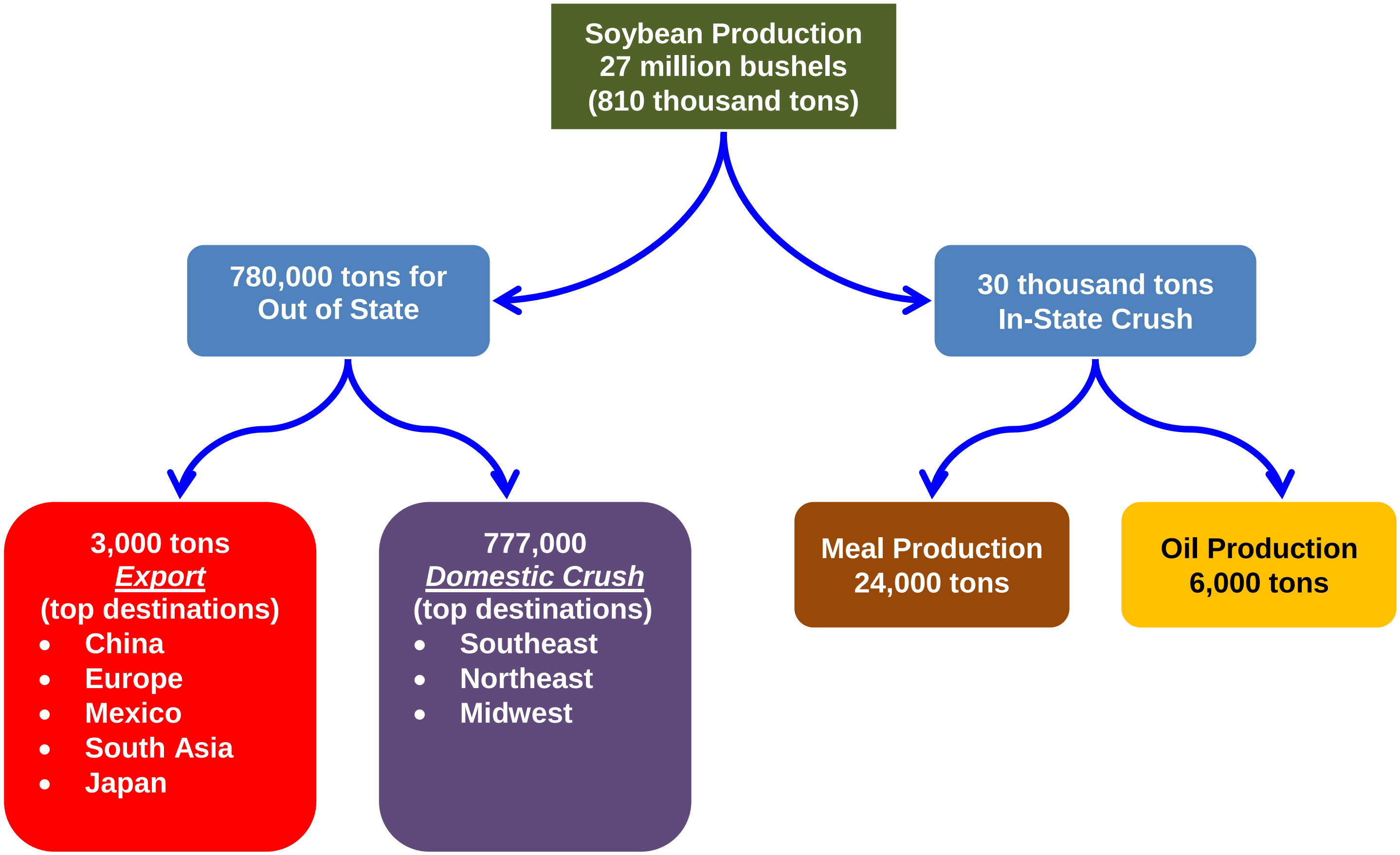
2022/23

Agricultural Infrastructure: Crush, Ethanol Facilities, Livestock Processing, and Grain Storage			
Facility Type	**# of Facilities**	**Capacity/Size**	
Soybean Crushers	1	100	MT/Day
Ethanol Facility* (operating)	2	110	MGY
Federally Inspected Livestock Slaughter/Processing Facilities	343	n/a	
State Inspected Livestock Slaughter/Processing Facilities	0	n/a	
Grain Elevators**	42	33,191	Thous. Bu. Storage
Shuttle Elevators	2	450	Thous. Bu. Storage
River Elevators	0	-	Thous. Bu. Storage

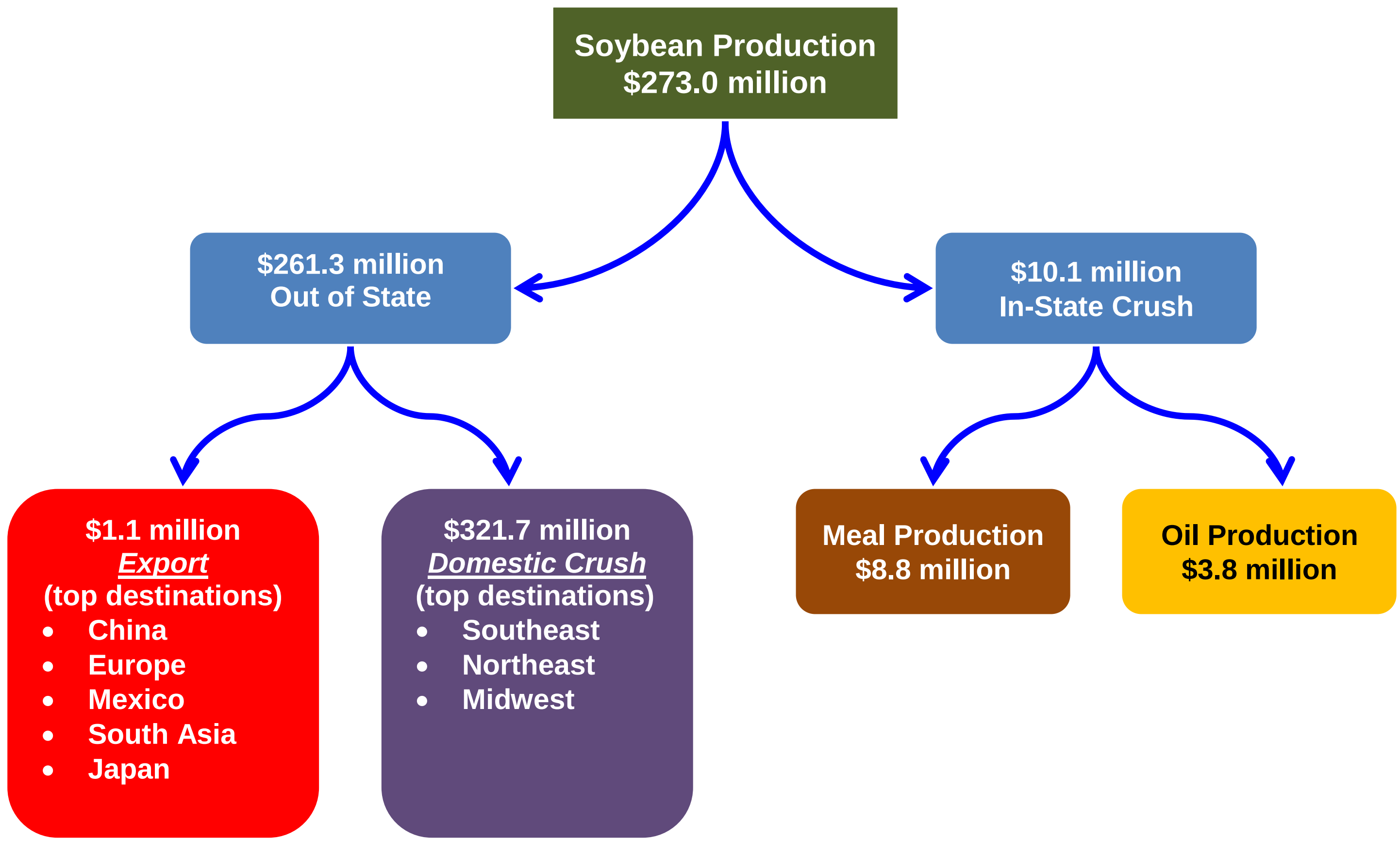
** 1 Cellulosic ethanol facility is included in ethanol facility database.*

*** Shuttle and river elevators are included in the list of grain elevators.*

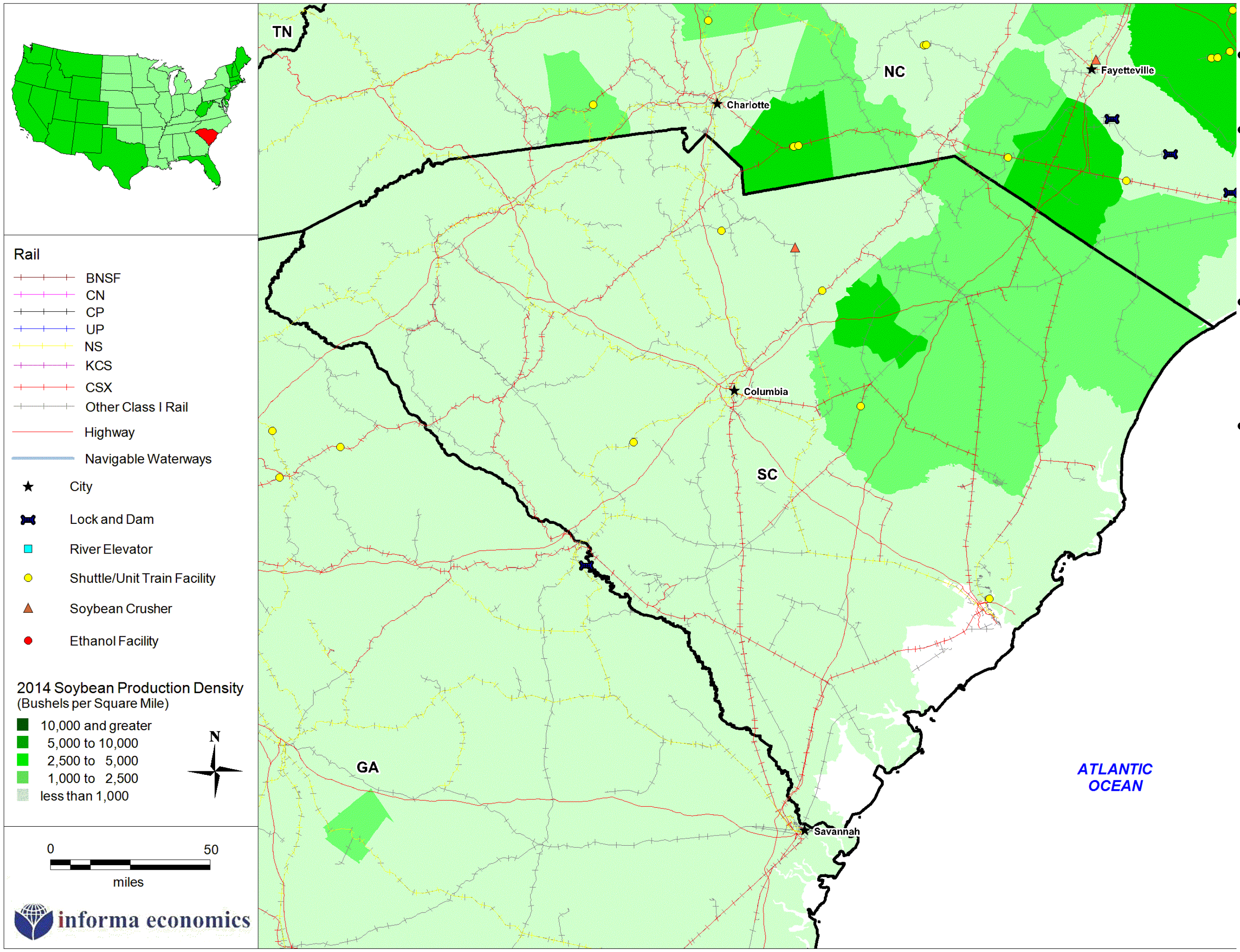
PENNSYLVANIA FLOWCHART OF SOYBEAN MOVEMENTS (2013/14)



PENNSYLVANIA FLOWCHART OF SOYBEAN VALUE (2013/14)



SOUTH CAROLINA



Production

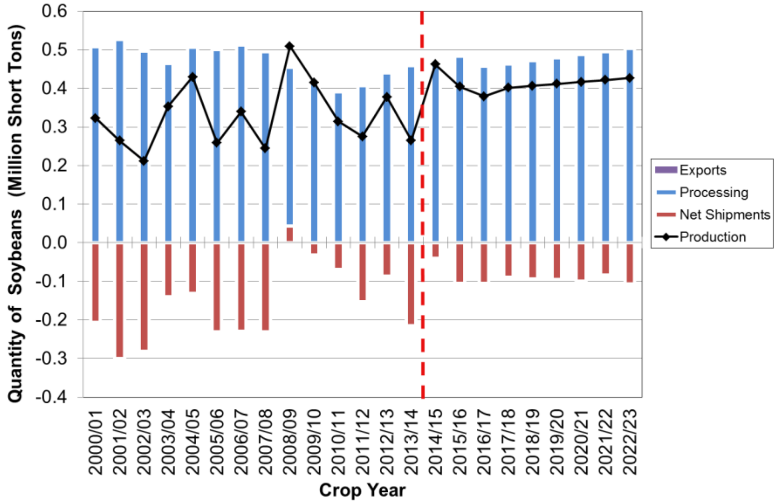
- Soybean production along the north eastern border of the state.
- South Carolina's livestock inventories consist of primarily broilers and turkeys.

Infrastructure

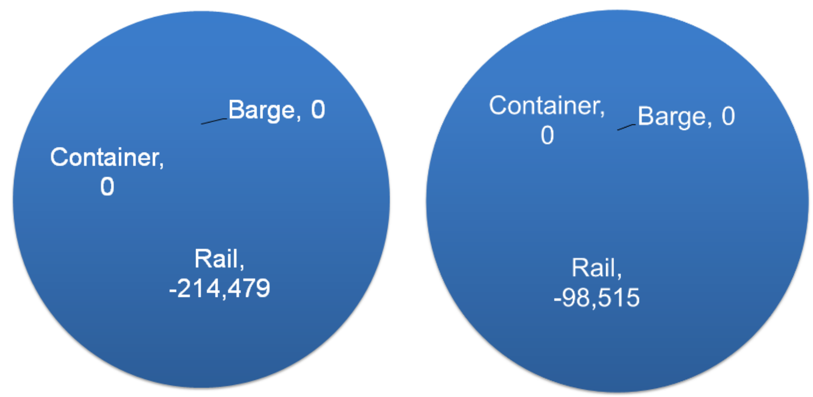
- South Carolina has 2,311 miles of rail lines, 851 miles of interstate, and 66,232 total road miles.
- The state also has 5 shuttle facilities, 1 soybean crush facility, 0 ethanol facility, 31 grain elevators, and 0 river elevator.

SOUTH CAROLINA

Soybean Surplus and Deficit Outlook



Soybean Movements by Mode (Short Tons)



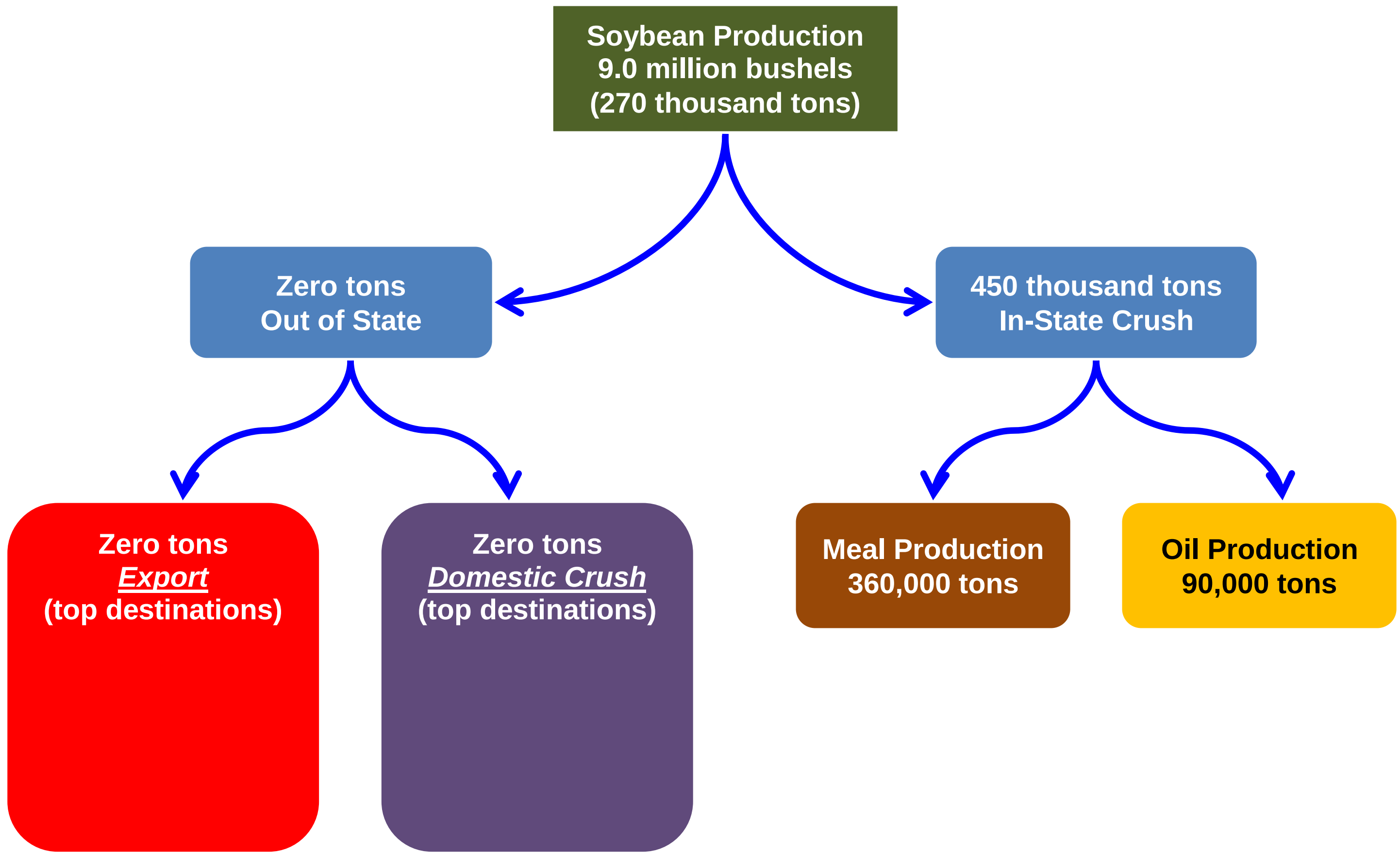
2013/14 **2022/23**

** A negative number indicates the state is a net inshipment*

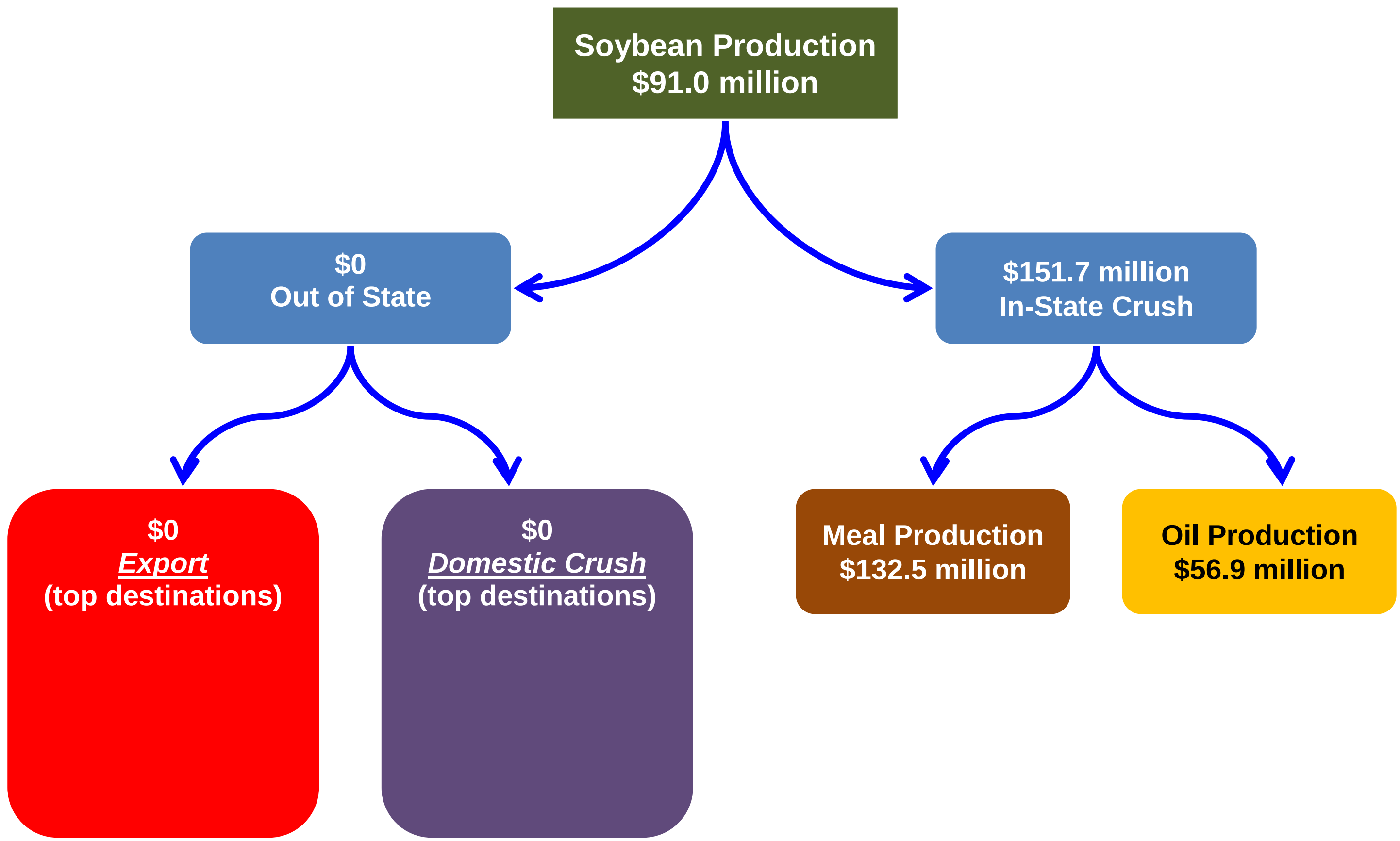
Agricultural Infrastructure: Crush, Ethanol Facilities, Livestock Processing, and Grain Storage			
Facility Type	**# of Facilities**	**Capacity/Size**	
Soybean Crushers	1	1,361	MT/Day
Ethanol Facility (operating)	0	-	MGY
Federally Inspected Livestock Slaughter/Processing Facilities	41	n/a	
State Inspected Livestock Slaughter/Processing Facilities	67	n/a	
Grain Elevators*	31	3,252	Thous. Bu. Storage
Shuttle Elevators	5	2,777	Thous. Bu. Storage
River Elevators	0	-	Thous. Bu. Storage

** Shuttle and river elevators are included in the list of grain elevators.*

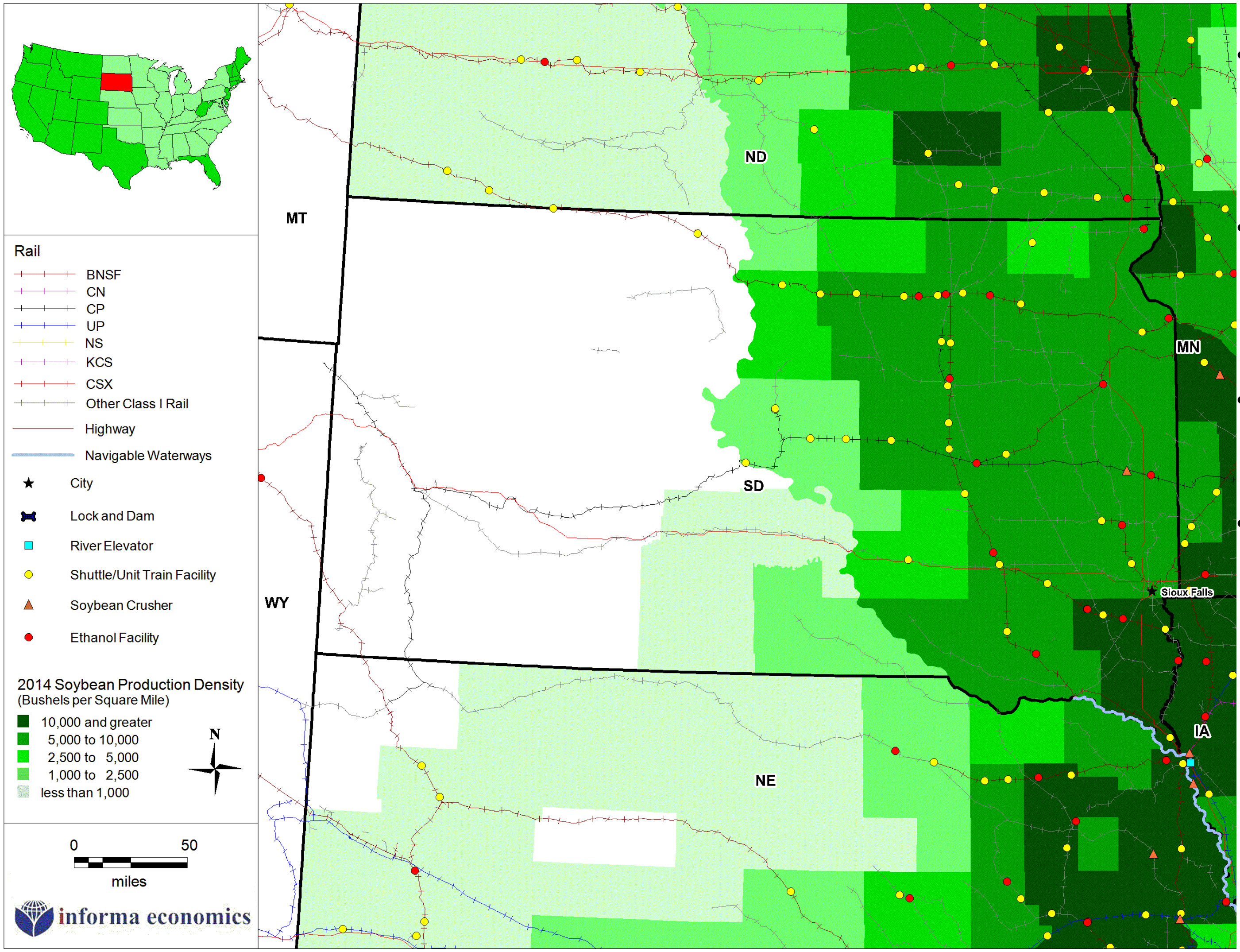
SOUTH CAROLINA FLOWCHART OF SOYBEAN MOVEMENTS (2013/14)



SOUTH CAROLINA FLOWCHART OF SOYBEAN VALUE (2013/14)



SOUTH DAKOTA



Production

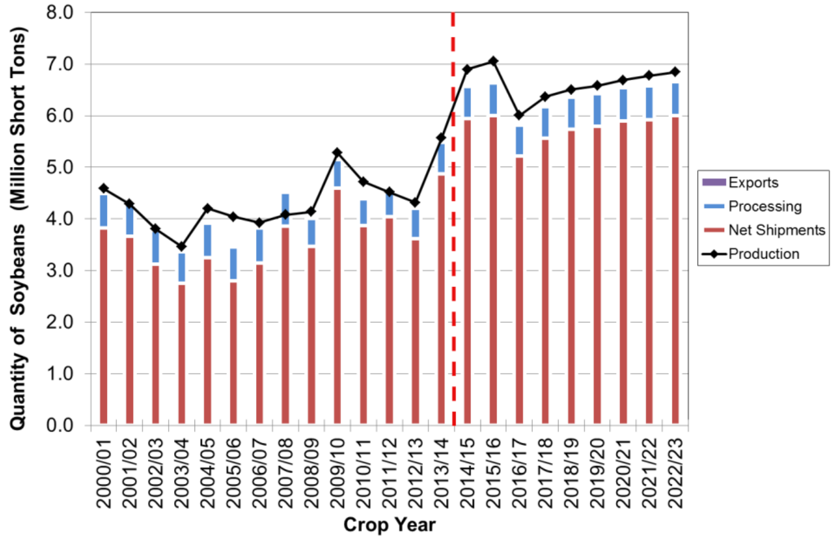
- Soybean production in the eastern portion of the state, with production densities highest in the southeastern region of the state.
- South Dakota's primary livestock inventories consist of cattle.

Infrastructure

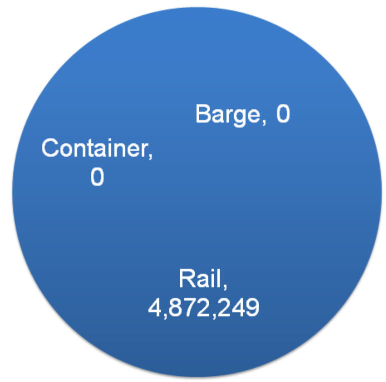
- South Dakota has 1,753 miles of rail lines, 679 miles of interstate, and 82,558 miles of roadways.
- South Dakota has 35 shuttle facilities, 1 soybean crush facility, 16 ethanol facilities, 210 grain elevators, and 0 river elevator.

SOUTH DAKOTA

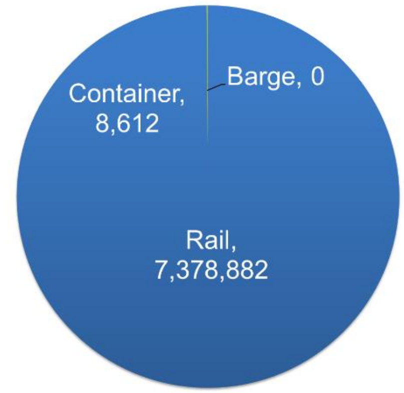
Soybean Surplus and Deficit Outlook



Soybean Movements by Mode (Short Tons)



2013/14



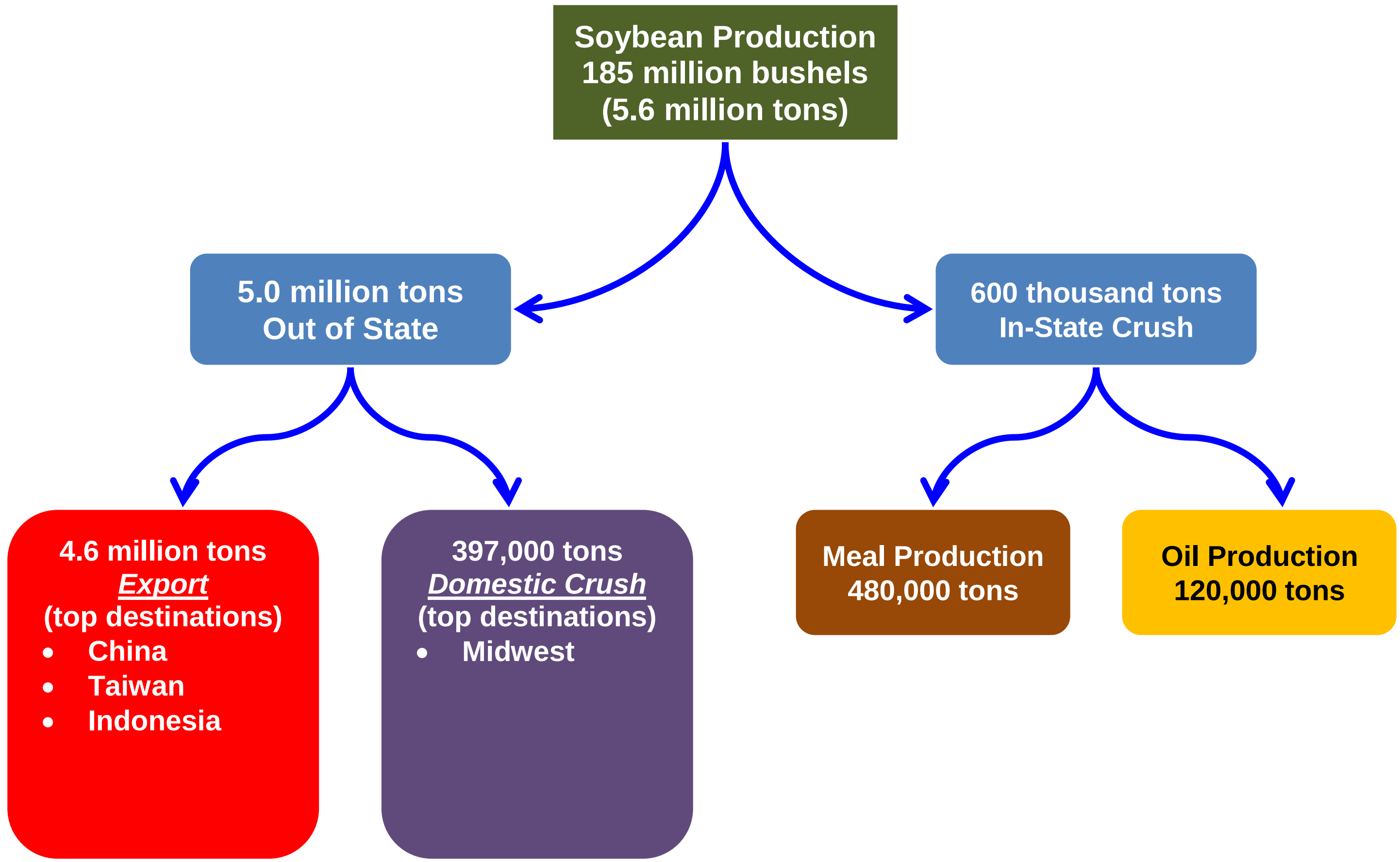
2022/23

Agricultural Infrastructure: Crush, Ethanol Facilities, Livestock Processing, and Grain Storage			
Facility Type	**# of Facilities**	**Capacity/Size**	
Soybean Crushers	1	1,796	MT/Day
Ethanol Facility* (operating)	16	1,012	MGY
Federally Inspected Livestock Slaughter/Processing Facilities	21	n/a	
State Inspected Livestock Slaughter/Processing Facilities	53	n/a	
Grain Elevators**	219	329,188	Thous. Bu. Storage
Shuttle Elevators	35	122,812	Thous. Bu. Storage
River Elevators	0	-	Thous. Bu. Storage

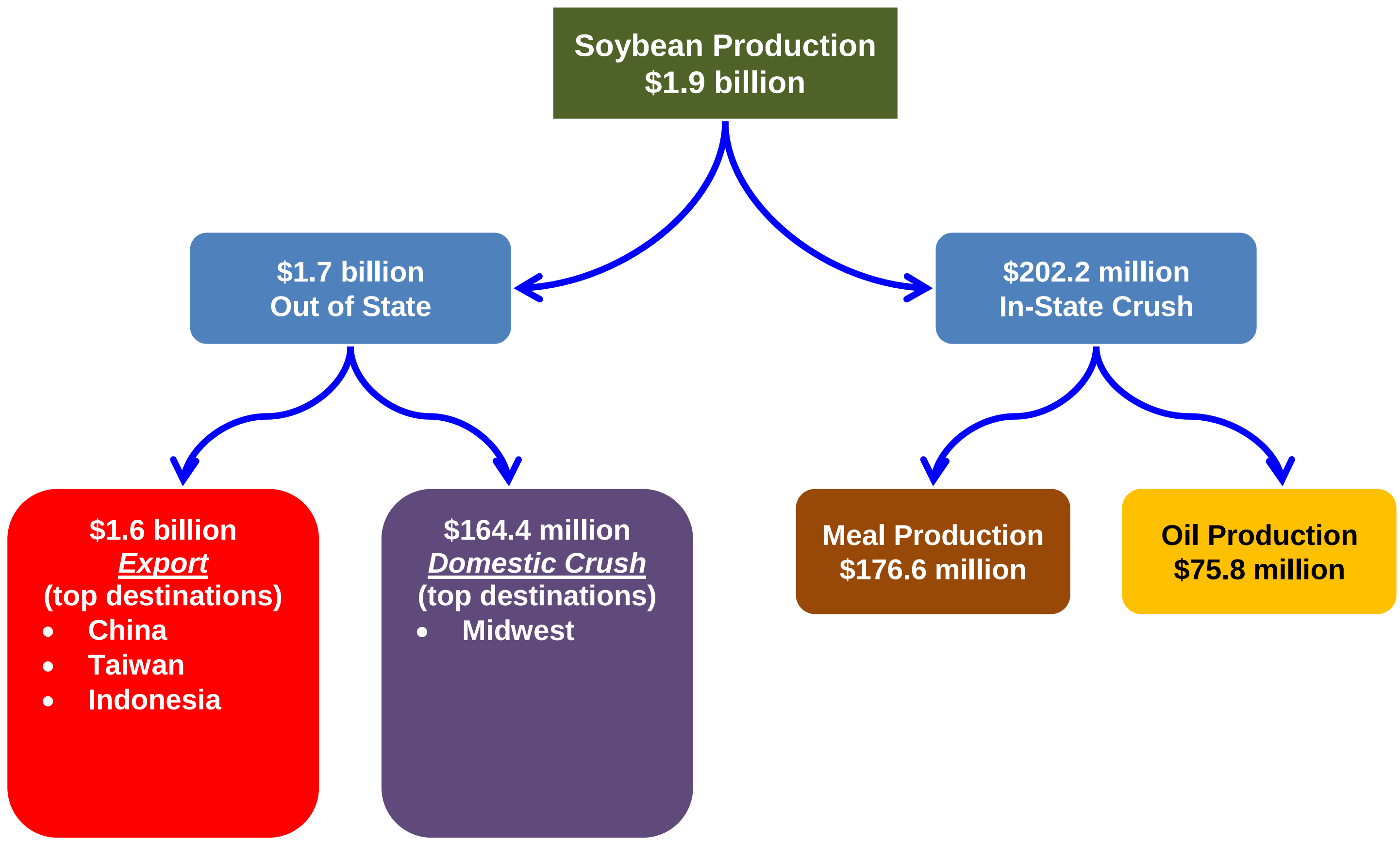
** 1 Cellulosic ethanol facility is included in ethanol facility database.*

*** Shuttle and river elevators are included in the list of grain elevators.*

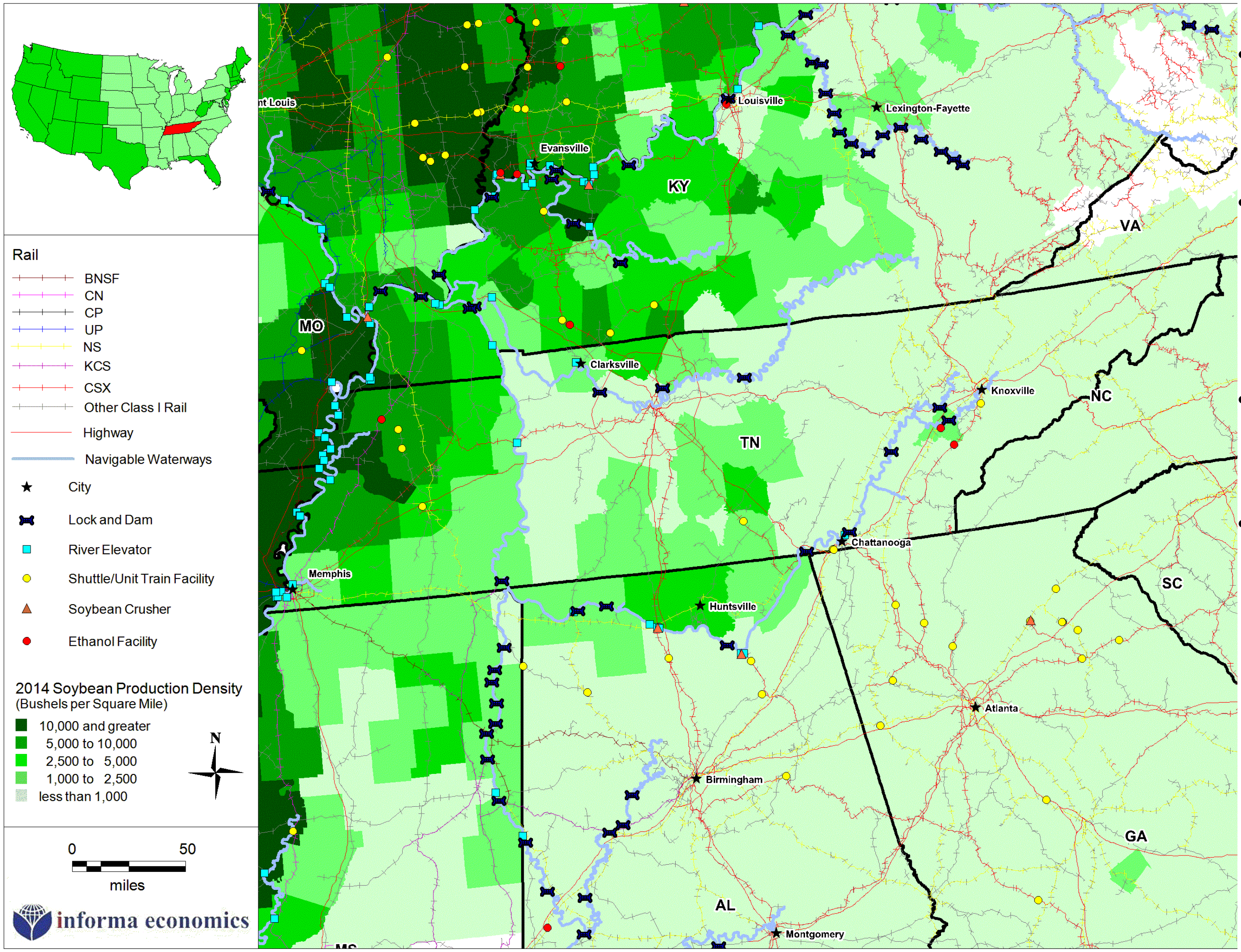
SOUTH DAKOTA FLOWCHART OF SOYBEAN MOVEMENTS (2013/14)



SOUTH DAKOTA FLOWCHART OF SOYBEAN VALUE (2013/14)



TENNESSEE



Production

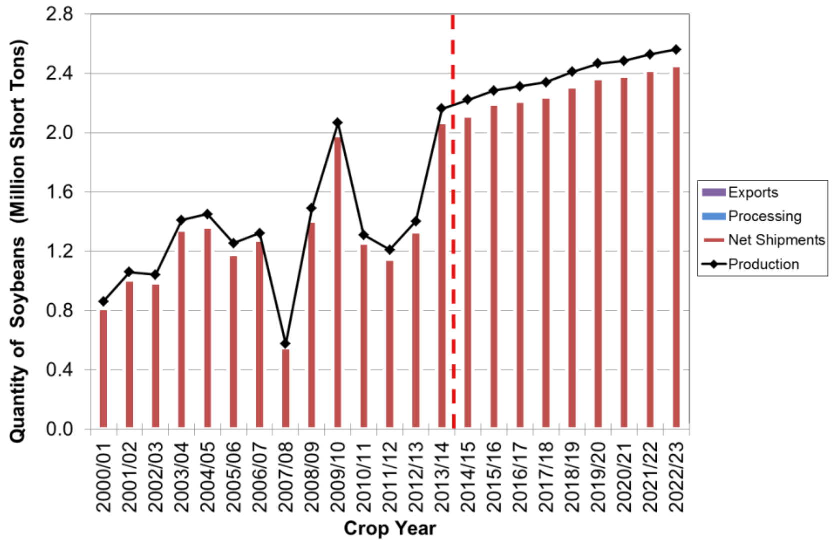
- Soybean production mostly in the western portion of the state, with production densities highest in this region of the state.
- Tennessee, while contributing small amounts, is a source of both cattle and broiler production in the U.S.

Infrastructure

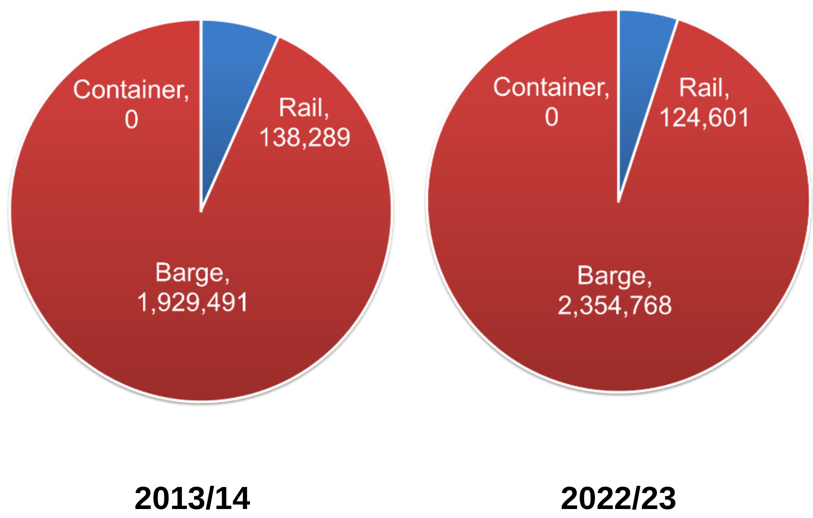
- Tennessee has 2,649 miles of rail lines, 1,104 miles of interstate, and 95,536 miles of roadways.
- Tennessee has 8 shuttle facilities 0 soybean crushing facility 3 ethanol facilities, 34 grain elevators, and 11 river elevators.

TENNESSEE

Soybean Surplus and Deficit Outlook



Soybean Movements by Mode (Short Tons)

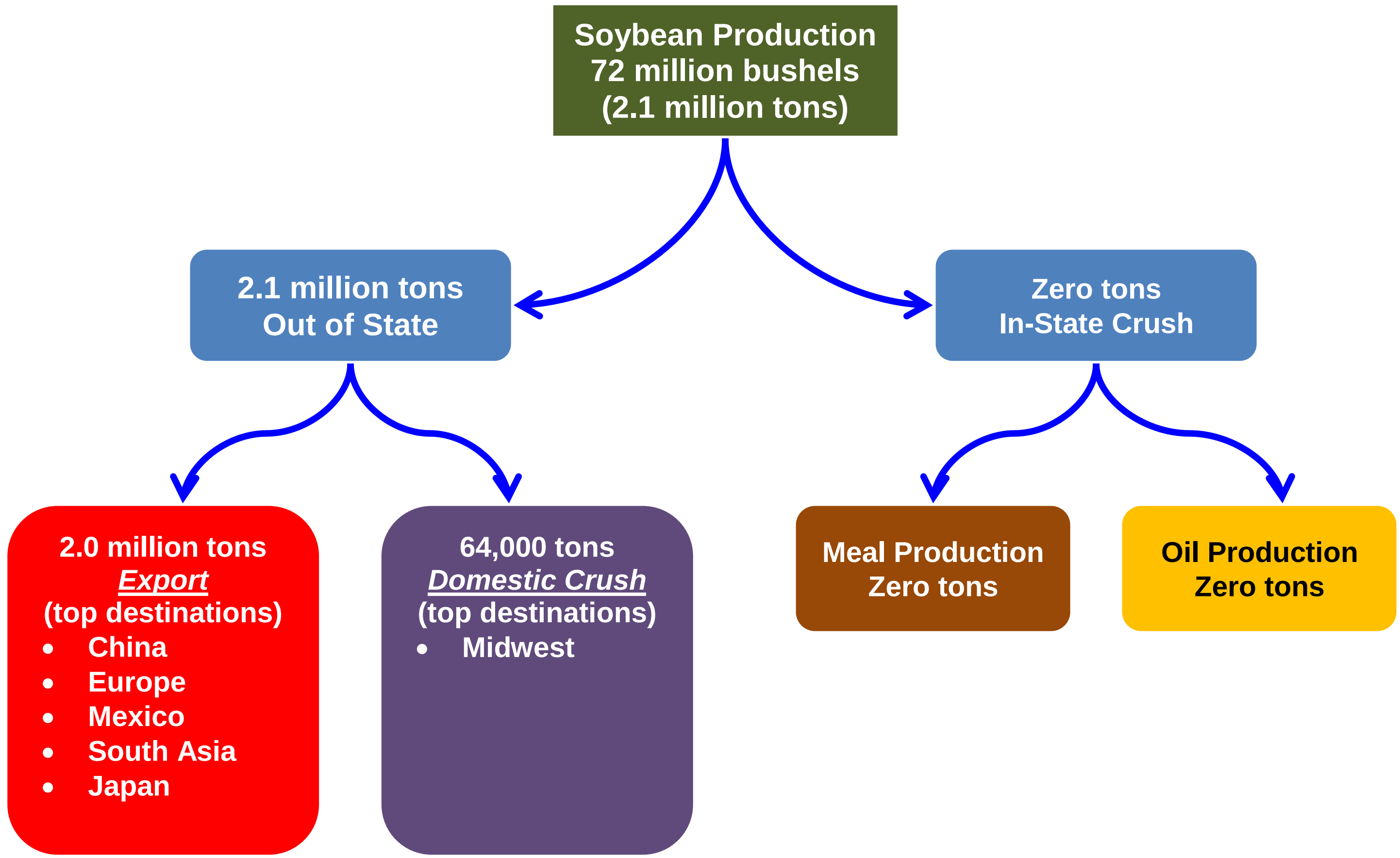


Agricultural Infrastructure: Crush, Ethanol Facilities, Livestock Processing, and Grain Storage			
Facility Type	# of Facilities	Capacity/Size	
Soybean Crushers	0	-	MT/Day
Ethanol Facility* (operating)	3	187	MGY
Federally Inspected Livestock Slaughter/Processing Facilities	105	n/a	
State Inspected Livestock Slaughter/Processing Facilities	0	n/a	
Grain Elevators**	34	57,561	Thous. Bu. Storage
Shuttle Elevators	8	5,240	Thous. Bu. Storage
River Elevators	11	19,332	Thous. Bu. Storage

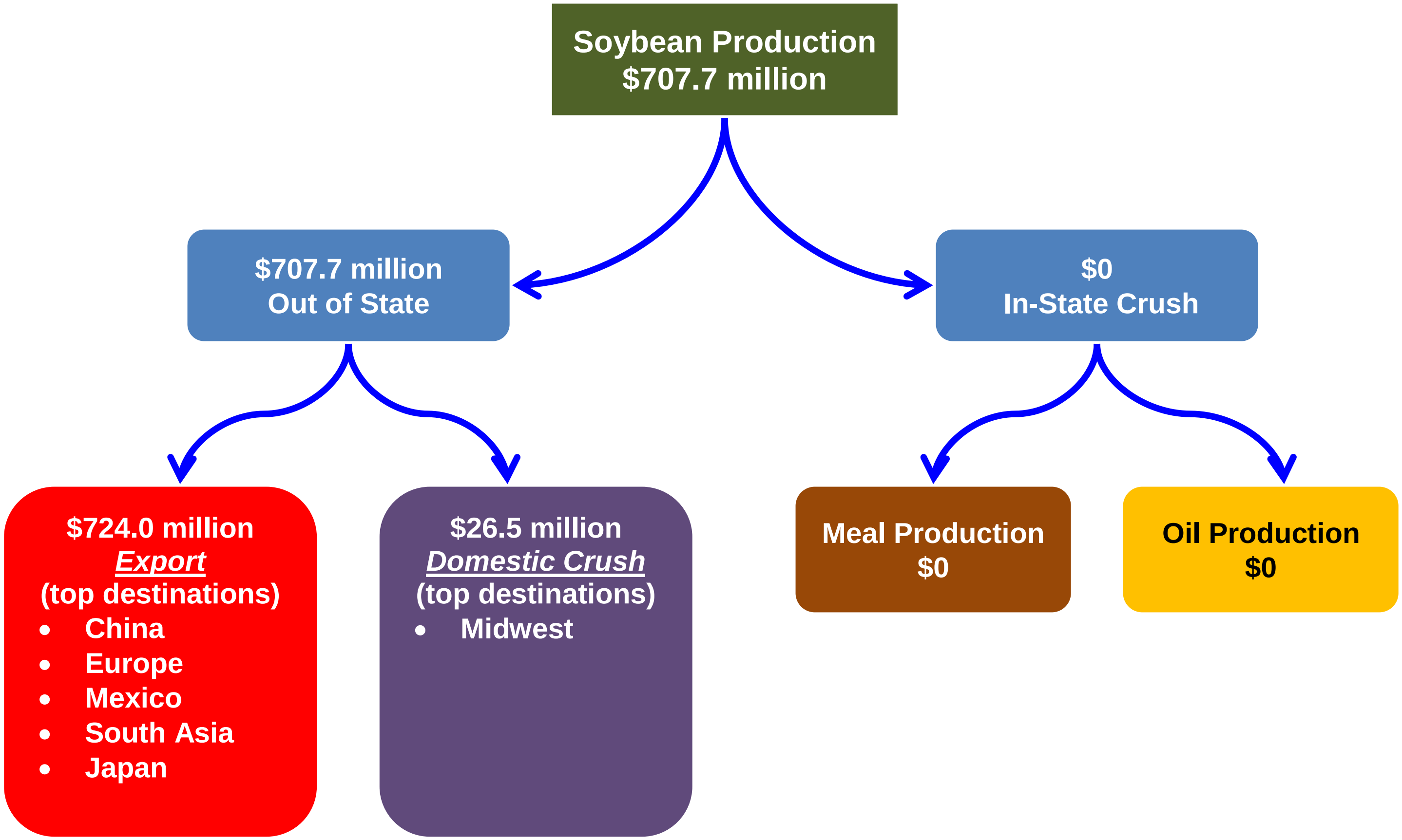
** 1 Cellulosic ethanol facility is included in ethanol facility database.*

*** Shuttle and river elevators are included in the list of grain elevators.*

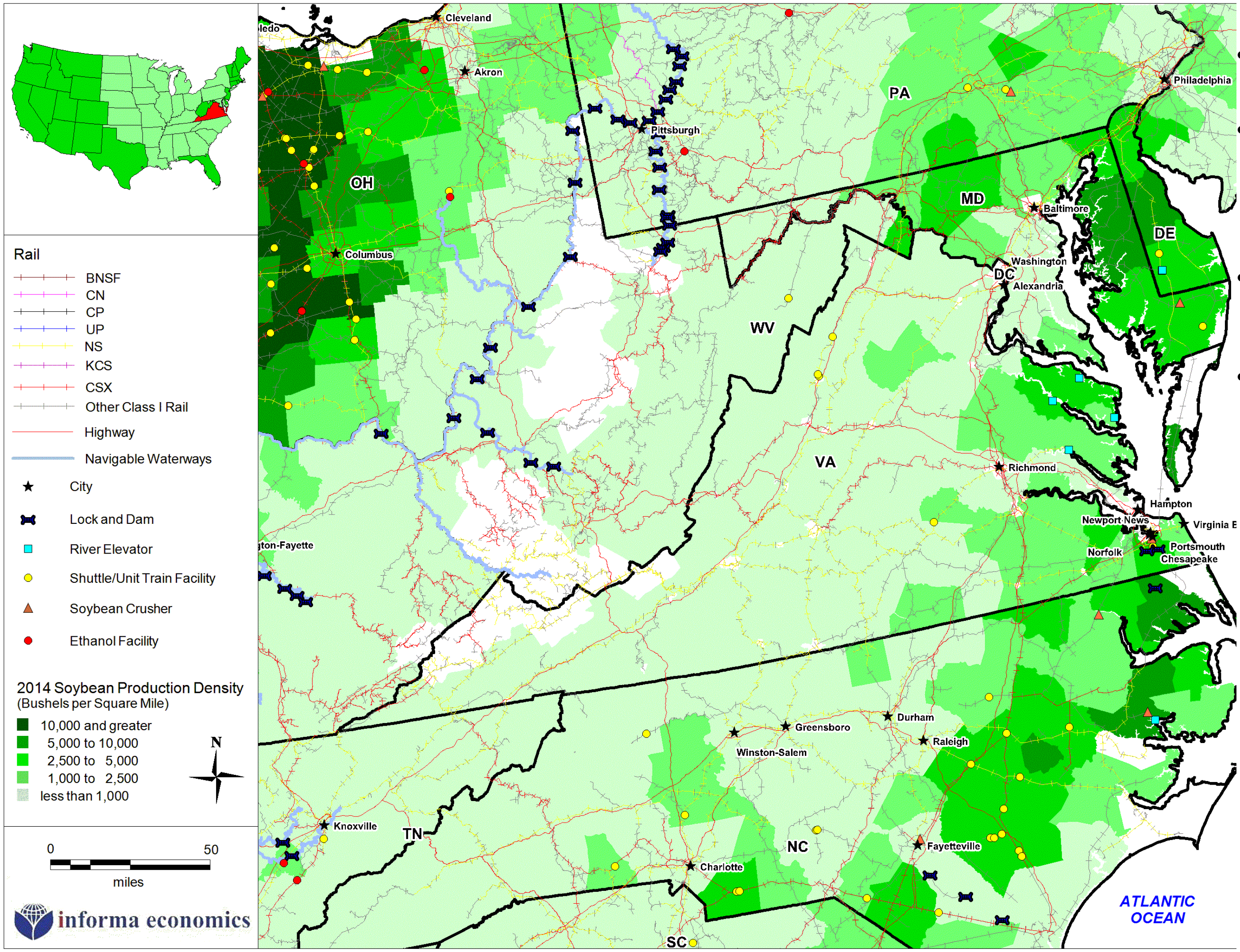
TENNESSEE FLOWCHART OF SOYBEAN MOVEMENTS (2013/14)



TENNESSEE FLOWCHART OF SOYBEAN VALUE (2013/14)



VIRGINIA



Production

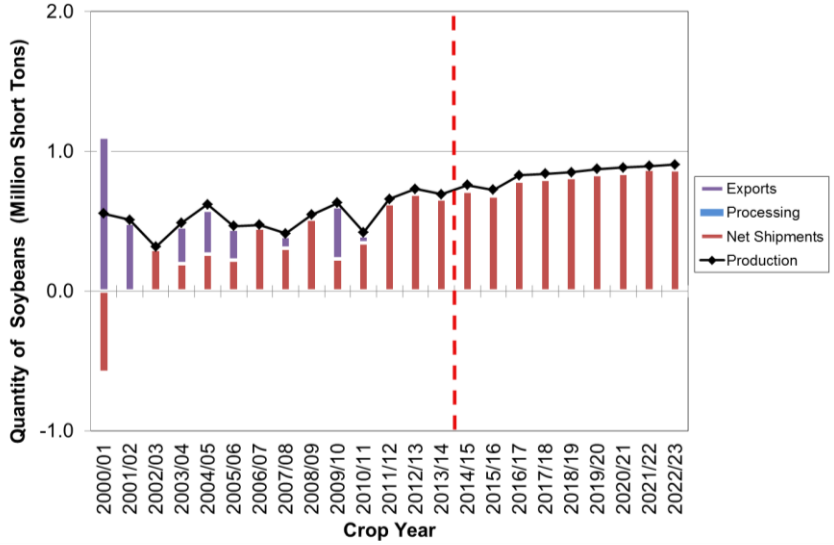
- Soybean production along the eastern coast of the state.
- Virginia's livestock inventories consist of broilers and turkeys.

Infrastructure

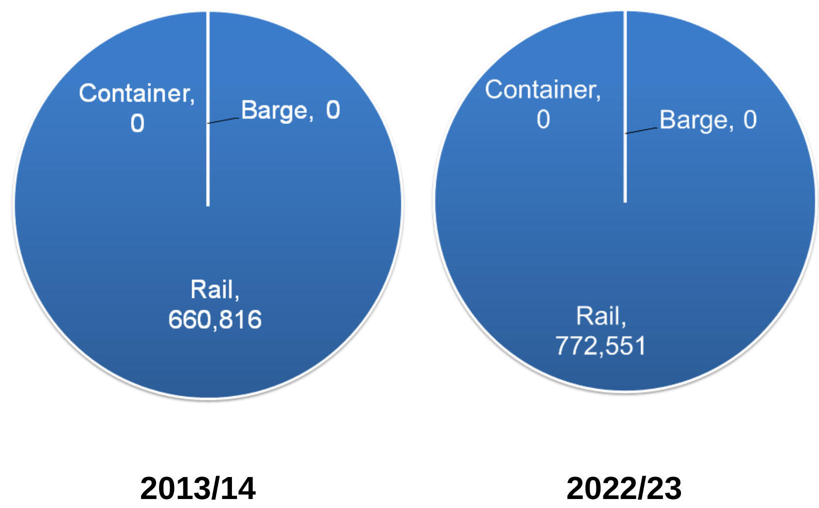
- Virginia has 3,215 miles of rail lines, 1,119 miles of interstate, and 74,748 total road miles.
- The state also has 5 shuttle facilities, 1 soybean crush facility 0 ethanol facility 82 grain elevators, and 4 river elevators.

VIRGINIA

Soybean Surplus and Deficit Outlook



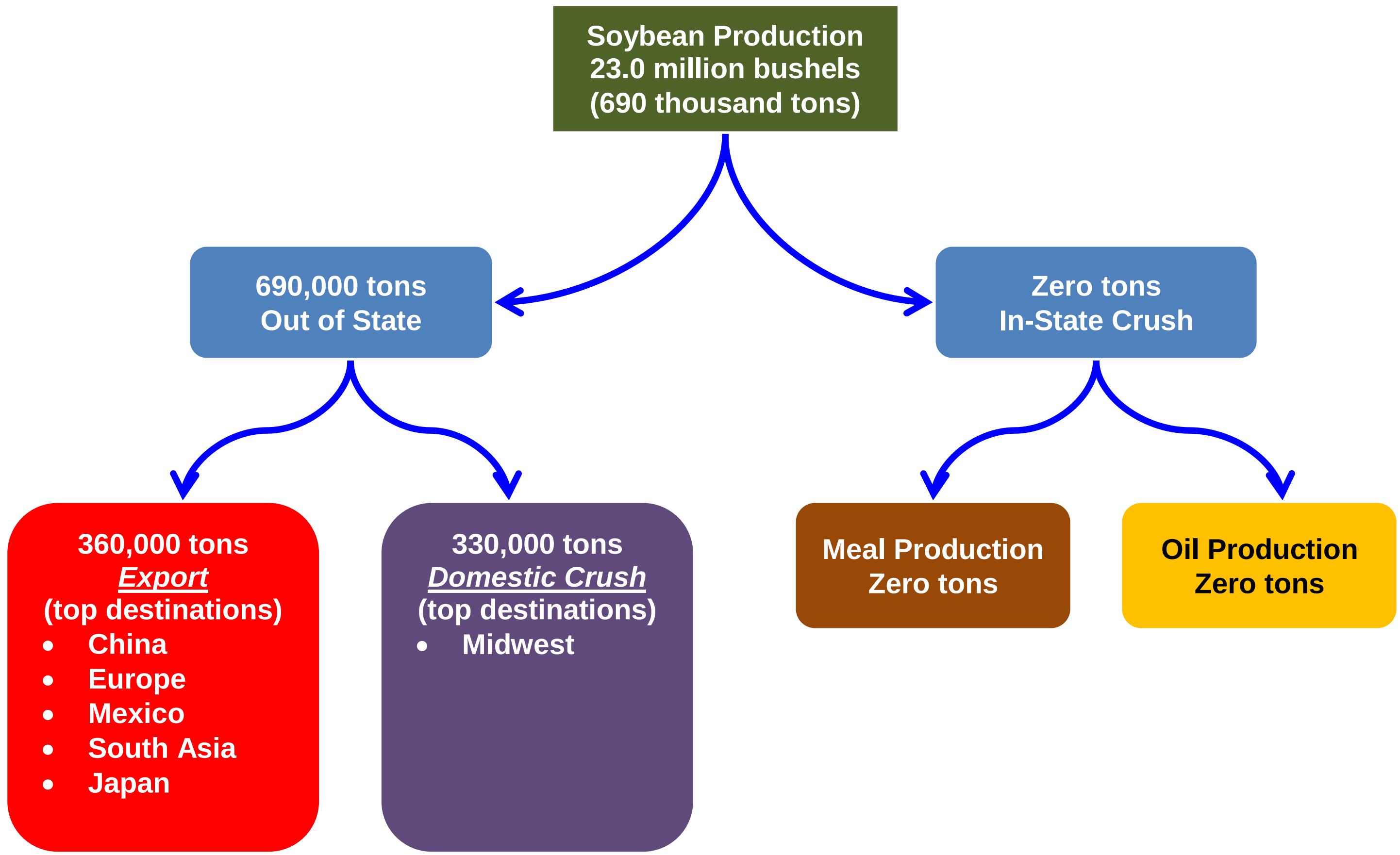
Soybean Movements by Mode (Short Tons)



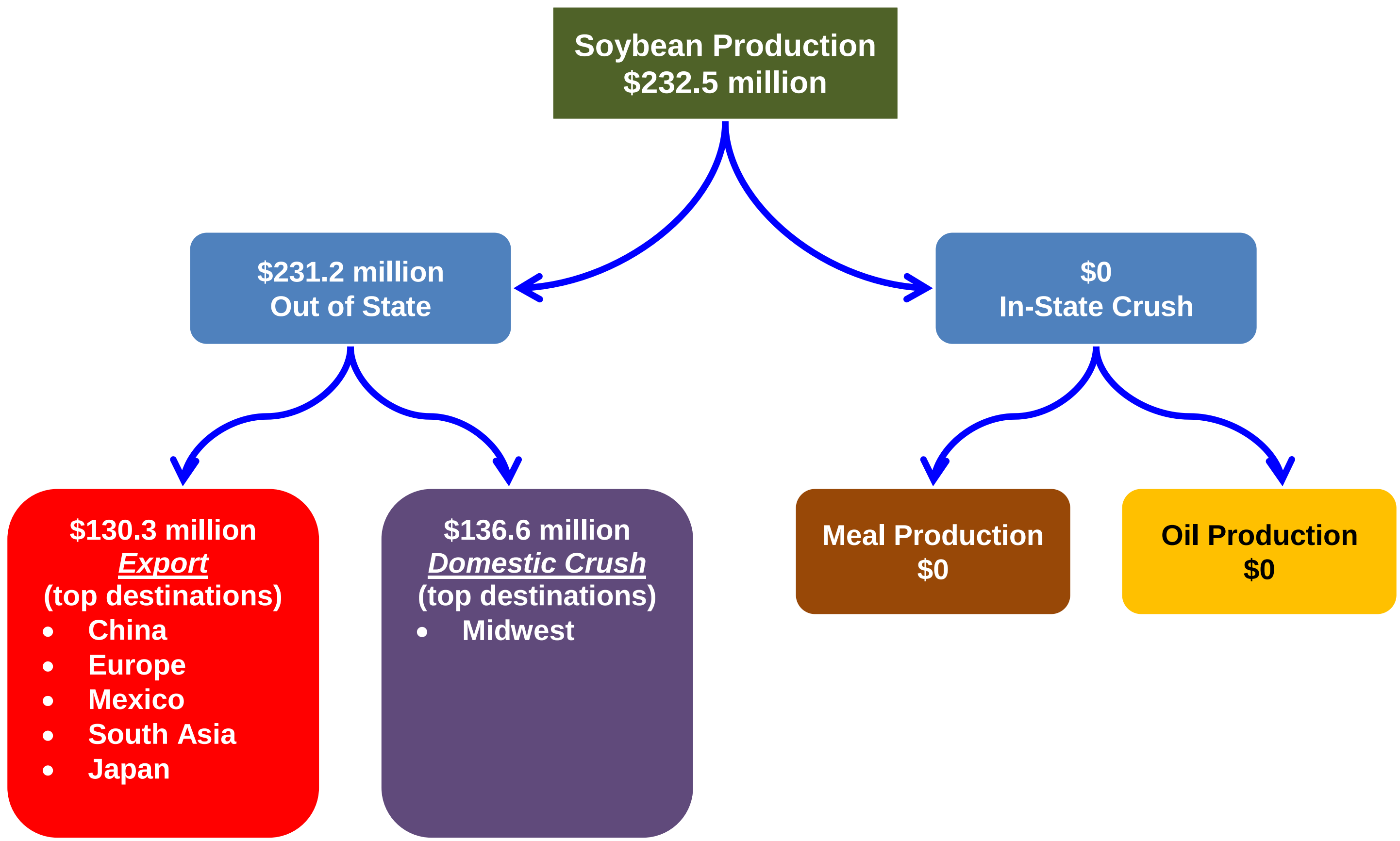
Agricultural Infrastructure: Crush, Ethanol Facilities, Livestock Processing, and Grain Storage			
Facility Type	# of Facilities	Capacity/Size	
Soybean Crushers	1	51	MT/Day
Ethanol Facility (operating)	0	-	MGY
Federally Inspected Livestock Slaughter/Processing Facilities	46	n/a	
State Inspected Livestock Slaughter/Processing Facilities	15	n/a	
Grain Elevators*	82	64,708	Thous. Bu. Storage
Shuttle Elevators	5	3,290	Thous. Bu. Storage
River Elevators	4	6,246	Thous. Bu. Storage

** Shuttle and river elevators are included in the list of grain elevators.*

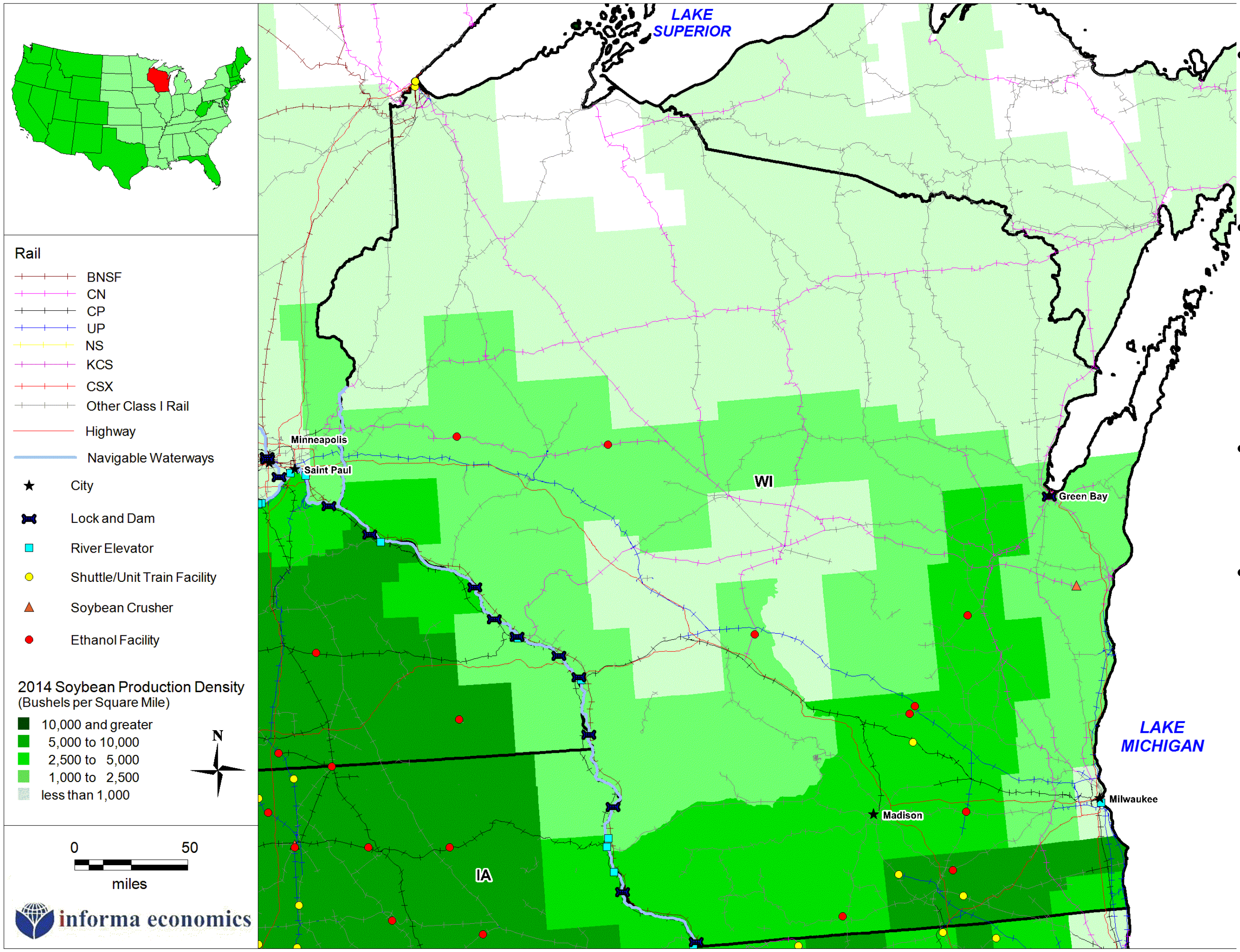
VIRGINIA FLOWCHART OF SOYBEAN MOVEMENTS (2013/14)



VIRGINIA FLOWCHART OF SOYBEAN VALUE (2013/14)



WISCONSIN



Production

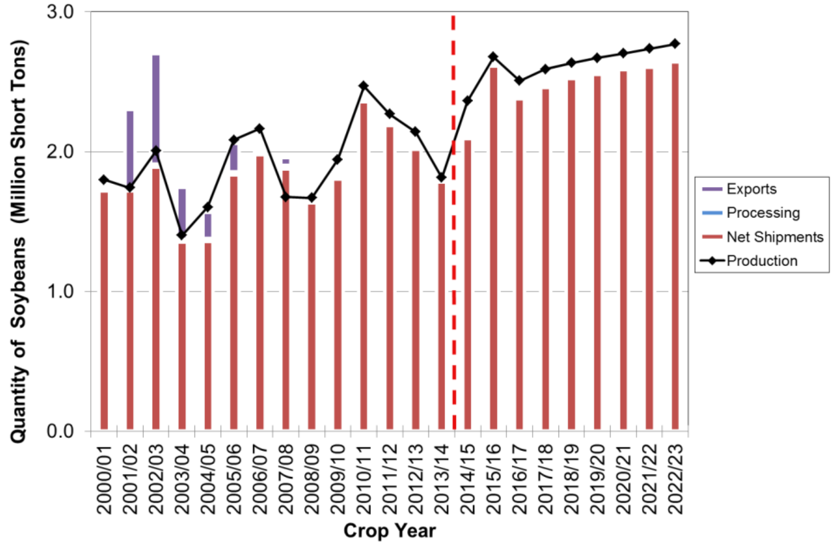
- Soybean production mostly in the southern portion of the state, with production densities highest in the southeastern region of the state.
- Wisconsin is the primary contributor of U.S. dairy cattle production, representing 14% of the U.S. production.

Infrastructure

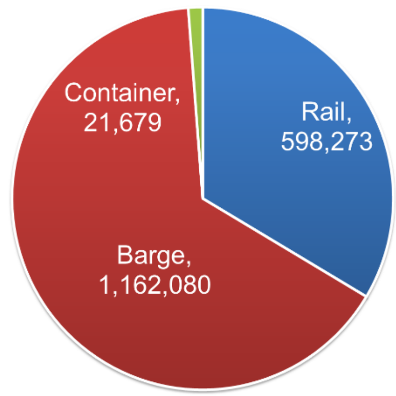
- Wisconsin has 3,449 miles of rail lines, 743 miles of interstate, and 115,145 miles of roadways.
- Wisconsin has 4 shuttle facilities, 1 soybean crush facility, 9 ethanol facilities, 237 grain elevators, and 3 river elevators.

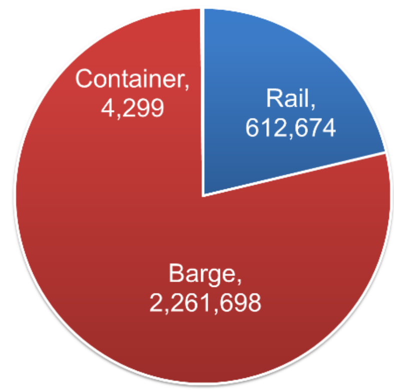
WISCONSIN

Soybean Surplus and Deficit Outlook



Soybean Movements by Mode (Short Tons)

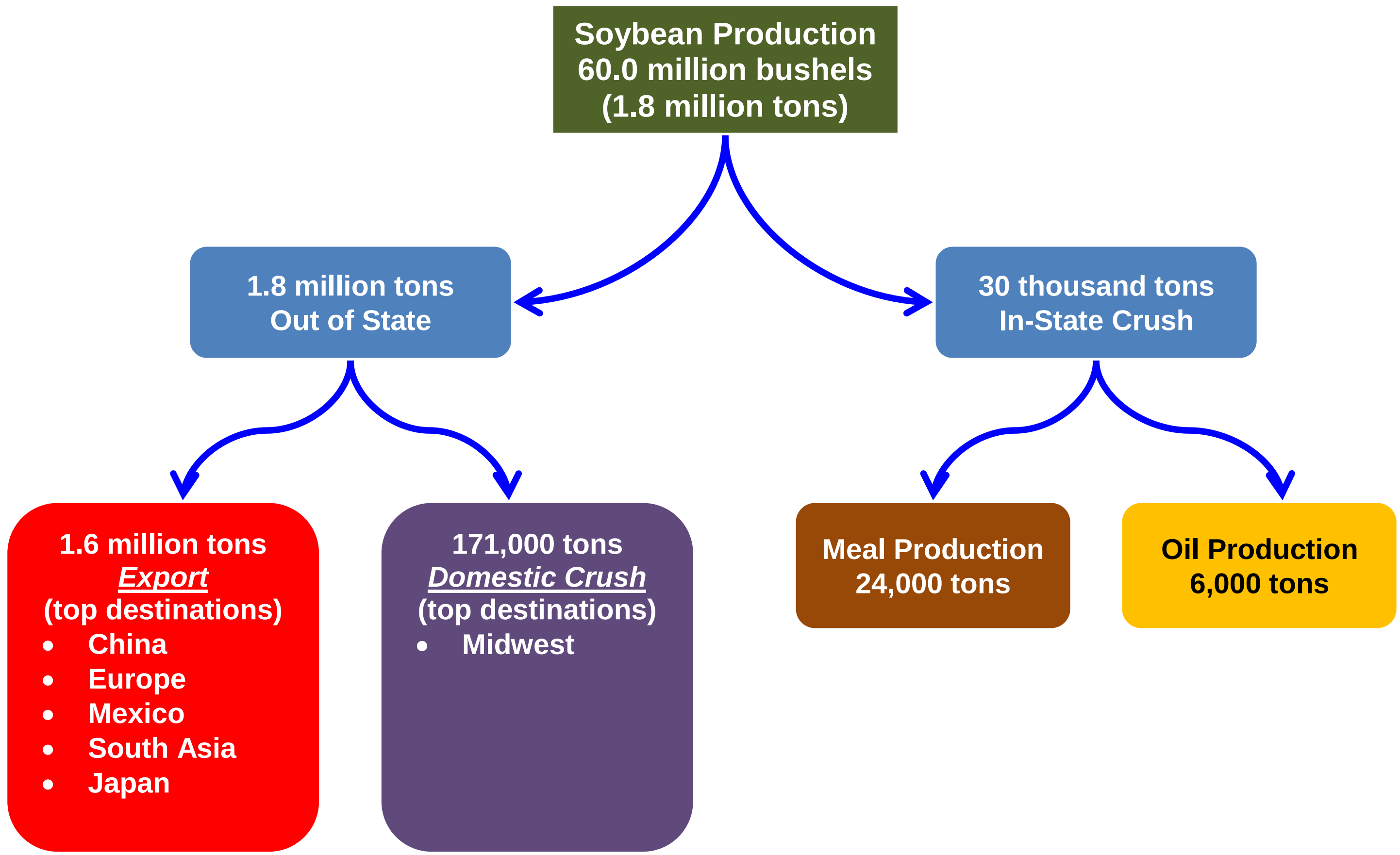




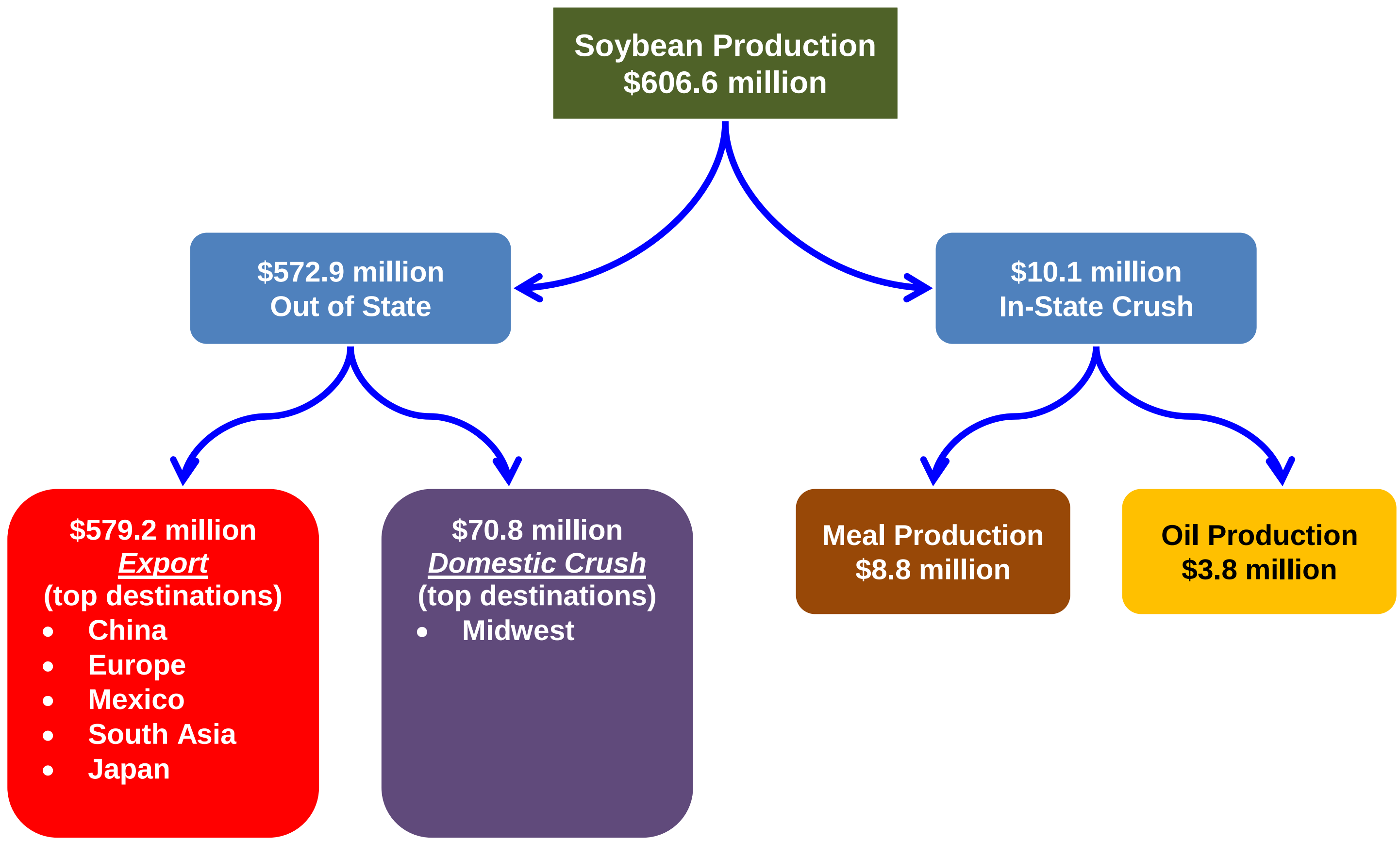
Agricultural Infrastructure: Crush, Ethanol Facilities, Livestock Processing, and Grain Storage		
Facility Type	# of Facilities	Capacity/Size
Soybean Crushers	1	64 MT/Day
Ethanol Facility (operating)	9	513 MGY
Federally Inspected Livestock Slaughter/Processing Facilities	140	n/a
State Inspected Livestock Slaughter/Processing Facilities	285	n/a
Grain Elevators*	237	288,514 Thous. Bu. Storage
Shuttle Elevators	4	20,651 Thous. Bu. Storage
River Elevators	3	3,540 Thous. Bu. Storage

** Shuttle and river elevators are included in the list of grain elevators.*

WISCONSIN FLOWCHART OF SOYBEAN MOVEMENTS (2013/14)



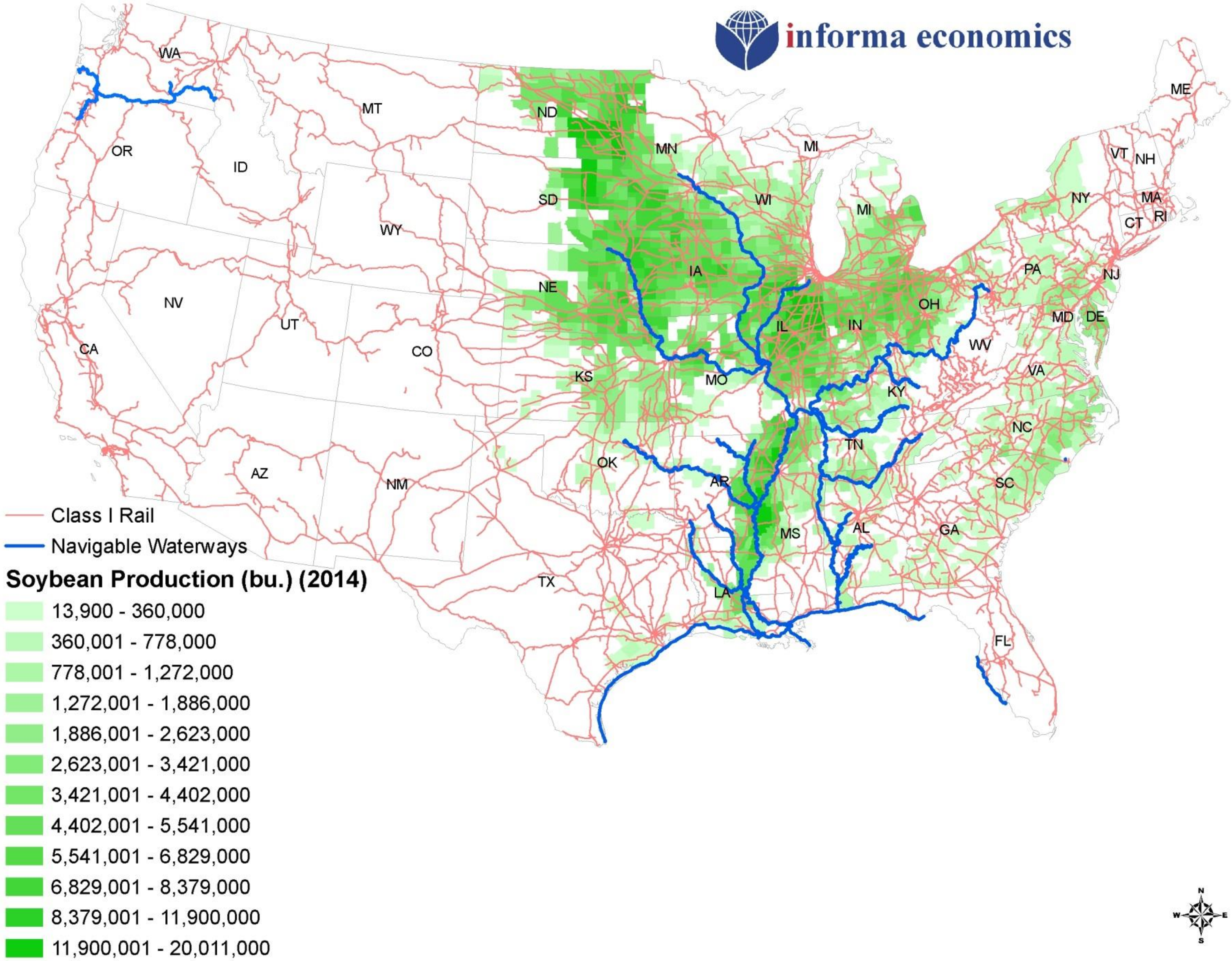
WISCONSIN FLOWCHART OF SOYBEAN VALUE (2013/14)



V. U.S. Transportation System Accommodating Agricultural Products

With soybean production expected to expand over the next decade, it is very important that the transportation infrastructure system be able to accommodate the movement of soybeans and products. The geographic depiction of the U.S. navigable waterways and Class I railroads overlaid on the density of soybean production is shown Figure 65. This section evaluates the movement of soybeans and product by mode, elaborating on modal developments, and the outlook for movements by mode. Earlier in the report, each of the 26 states' storage capacity was shown for different agricultural facilities. This section includes more in-depth analysis of the expected production of corn, soybeans, wheat and sorghum compared with the grain storage capacity of each state as well as the river system, shuttle and export elevator network in the U.S.

Figure 65: U.S. Navigable Waterways and Class I Railroad Network and Soybean Production Density



- The modal share of soybean movements shifts as the split between exports and crush change.
    - The combined modal shares for rail and barge increased from 40% in 2005 to 52% in 2010, while truck declined.
    - An increasing number of soybeans grown in the southern U.S. are used to immediately fill the pipeline. The shift is increasing the number of soybeans shipped by truck and barge to end markets.
    - The modal share for barge has rebounded as the Center Gulf has become more competitive with the PNW. The expansion of the Panama Canal should help the Center Gulf maintain overall market share.
    - However, in the PNW, a number of export elevator enhancements have been completed and provides more throughput capability and capacity to keep throughput options flexible between major port areas.
    - The exports of soybeans have been compressed into a narrow timeframe that employs all export spouts to be running simultaneously.
        - Rail has been gaining share as soybean production expanded further west and north, and as the PNW has become more competitive with the Center Gulf. Western railroads and grain shippers have expanded their respective rail loading capabilities with highly efficient shuttle loaders.
    - The modal share of soybean movement by rail, barge, and truck, to export and domestic positions, and overall the past eighteen years are shown in Figure 66, based on USDA modal share analysis through 2013.

- Meanwhile, the volume of soybeans transported by long haul moves to export position has increased from more than 28 million tons in 2005/06 to 35 million in 2013/14, increasing 7% annually during that time.

- Soybean meal and oil exports have leveled off, as shown in Table 20.
    - The major growth for soybeans has been in rail to export positions, as shown in Figure 67. Going forward, the compressed window to export soybeans is holding export port market shares in place.

Figure 66: U.S. Soybean Modal Shares by Market Position

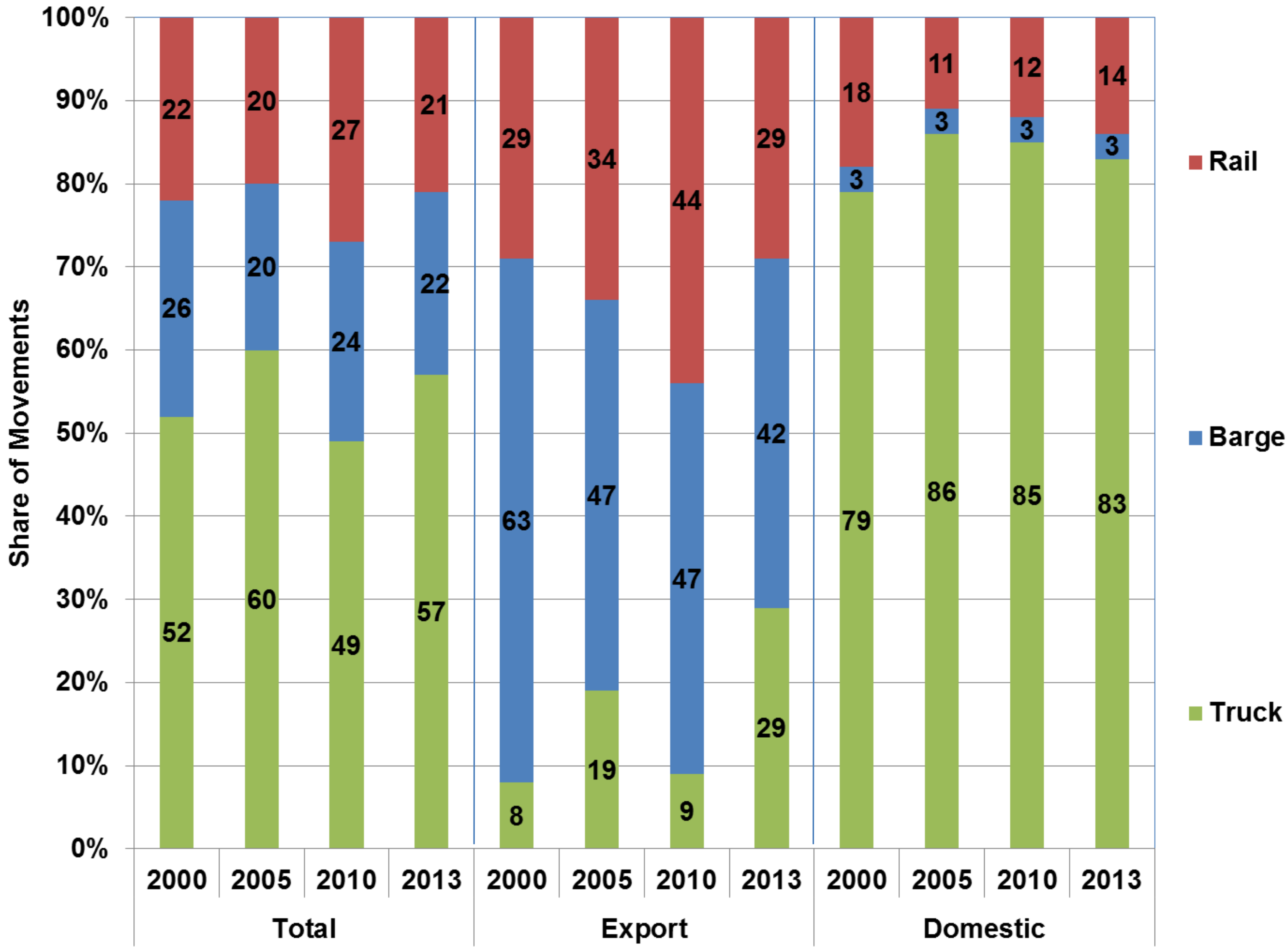


Table 20: Movement of Soybeans and Soybean Products to Domestic and Export Positions

Short Tons		2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2012/13	2013/14
Soybean	Domestic	3,071,812	2,362,039	4,581,611	3,074,981	2,932,561	3,019,790	2,298,582	2,697,327
	Export	24,857,019	27,636,985	25,628,161	28,125,602	35,433,249	35,098,636	24,181,487	32,105,317
	Total	27,928,831	29,999,024	30,209,772	31,200,583	38,365,810	38,118,426	26,480,069	34,802,644
Soybean Meal	Domestic	16,552,779	17,062,055	16,914,256	15,214,673	14,853,086	13,983,596	14,645,106	14,230,928
	Export	3,748,190	3,273,261	3,717,218	3,445,528	5,851,700	5,509,145	5,769,762	5,606,587
	Total	20,300,969	20,335,316	20,631,474	18,660,201	20,704,786	19,492,742	20,414,868	19,837,515
Soybean Oil	Domestic	6,086,234	5,927,097	5,595,294	5,209,964	5,451,771	5,245,540	5,453,161	5,475,952
	Export	1,781,926	1,816,083	2,154,170	1,342,744	1,405,064	1,351,913	1,405,422	1,411,296
	Total	7,868,160	7,743,180	7,749,464	6,552,708	6,856,835	6,597,453	6,858,583	6,887,247

Figure 67: Volume of Soybeans Transported to Long Haul Market Position by Barge and Rail

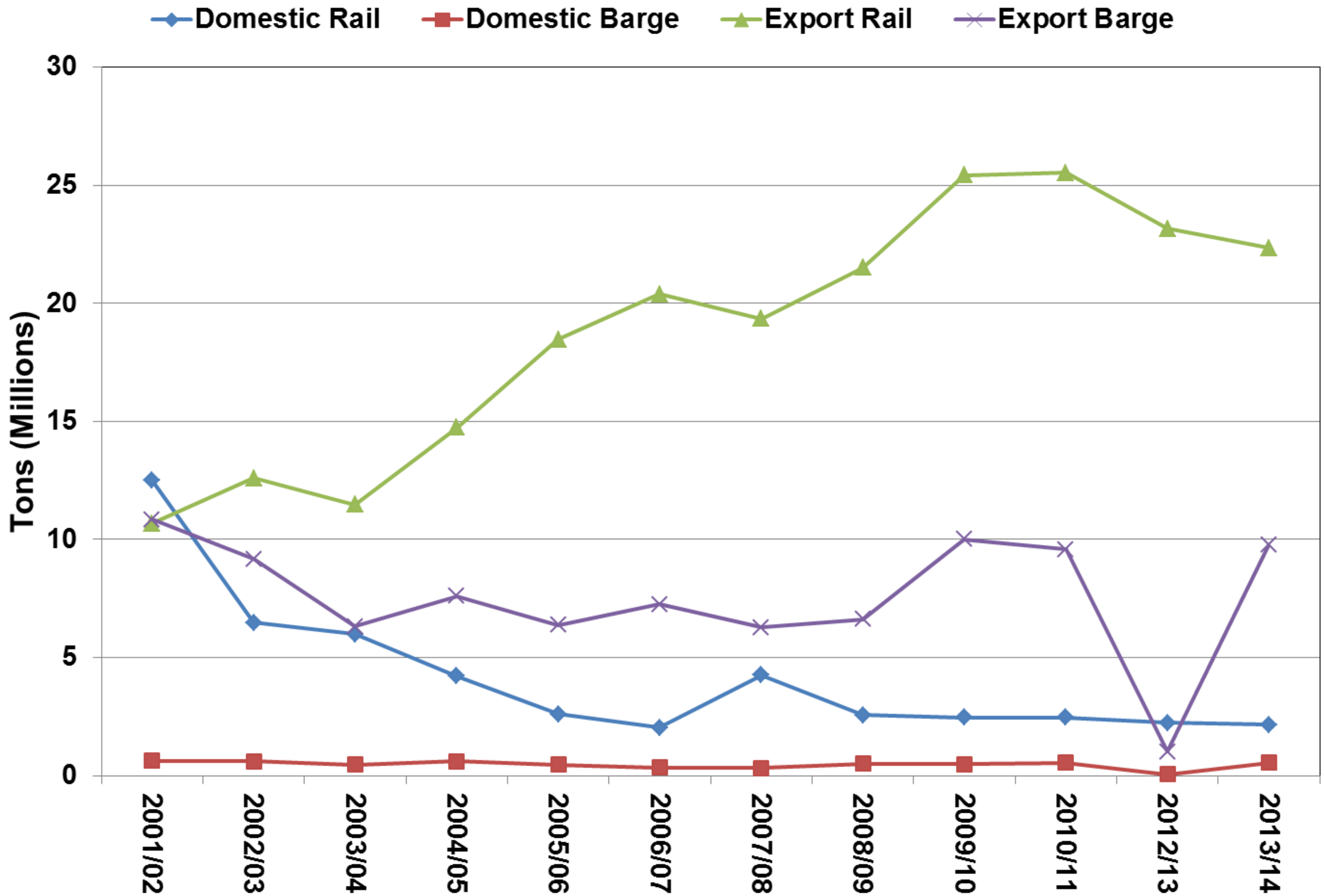


Table 21: Volume of Soybeans Transported to Market Position by Barge and Rail

Soybean Tons		2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2012/13	2013/14
Total	Production	92,040,000	95,910,000	80,313,510	89,010,210	100,827,930	99,939,180	92,915,370	91,261,320
	Rail	21,088,640	22,414,633	23,613,940	24,072,728	27,882,308	27,992,569	25,393,666	24,497,964
	Barge	6,840,191	7,584,391	6,595,832	7,127,855	10,483,502	10,125,857	1,086,403	10,304,680
Domestic	Rail	2,612,388	2,027,117	4,263,242	2,572,979	2,456,012	2,465,725	2,236,800	2,157,903
	Barge	459,424	334,923	318,369	502,002	476,549	554,065	61,781	539,424
Export	Rail	18,476,252	20,387,516	19,350,698	21,499,749	25,426,296	25,526,844	23,156,865	22,340,061
	Barge	6,380,767	7,249,468	6,277,463	6,625,853	10,006,953	9,571,792	1,024,622	9,765,255

Table 22: Volume of Soybean Meal Transported to Market Position by Barge and Rail

Soybean Meal Tons		2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2012/13	2013/14
Total	Production	41,244,000	43,032,000	42,284,000	39,102,000	41,707,000	39,265,500	41,123,000	39,960,000
	Rail	20,300,969	20,335,316	20,631,474	18,660,201	20,704,786	19,492,742	20,414,868	19,837,515
	Barge	-	-	-	-	-	-	-	-
Domestic	Rail	16,552,779	17,062,055	16,914,256	15,214,673	14,853,086	13,983,596	14,645,106	14,230,928
	Barge	-	-	-	-	-	-	-	-
Export	Rail	3,748,190	3,273,261	3,717,218	3,445,528	5,851,700	5,509,145	5,769,762	5,606,587
	Barge	-	-	-	-	-	-	-	-

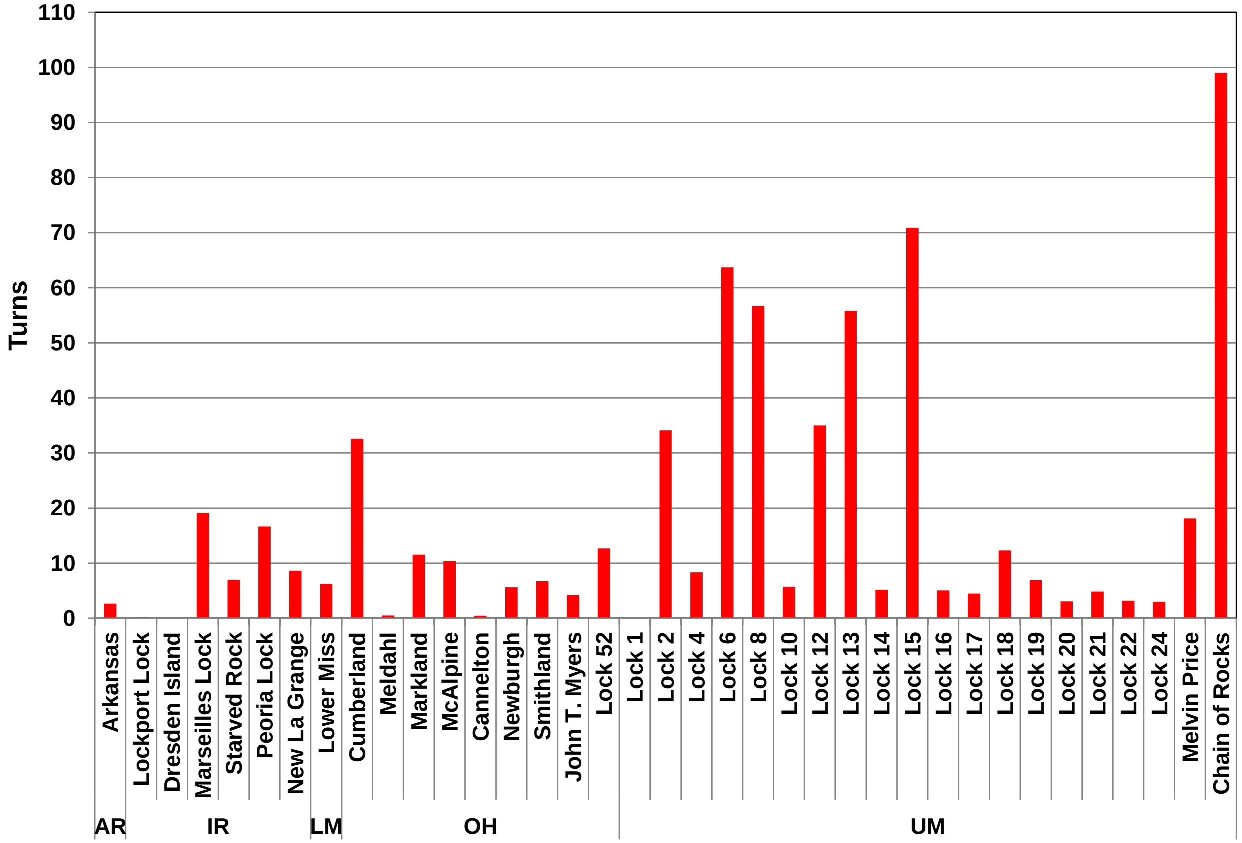
Table 23: Volume of Soybean Oil Transported to Market Position by Barge and Rail

Soybean Oil Tons		2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2012/13	2013/14
Total	Production	10,193,500	10,244,500	10,290,000	9,372,500	9,807,500	9,436,500	9,810,000	9,851,000
	Rail	7,868,160	7,743,180	7,749,464	6,552,708	6,856,835	6,597,453	6,858,583	6,887,247
	Barge	-	-	-	-	-	-	-	-
Domestic	Rail	6,086,234	5,927,097	5,595,294	5,209,964	5,451,771	5,245,540	5,453,161	5,475,952
	Barge	-	-	-	-	-	-	-	-
Export	Rail	1,781,926	1,816,083	2,154,170	1,342,744	1,405,064	1,351,913	1,405,422	1,411,296
	Barge	-	-	-	-	-	-	-	-

- Using the Lock Performance Monitoring System data from the Army Corps of Engineers, information on river elevators, information compiled from multiple sources, and Informa's own monitoring system, Informa was able to derive the turns per river segment.

- The term "turns" refers to the number of times an elevator empties its static storage capacity. This was measured on an annual basis.
    - The three-year average pool level grain volume of each river segment was divided by the total static storage capacity of each river segment (the stretch of the river from one lock to another). The average river elevator on the inland navigation system turns its capacity 17 times annually. Some segments of the inland navigation system have small storage capacity, but high grain volume coming off the river; as a result, the turns on these segments are very high as shown in Figure 68.

Figure 68: Average River Elevator Turns by River and River Segment on Locking Rivers



- Using the average turns per river elevator and multiplying by the total storage capacity of the river terminals, the total throughput of grain volume exceeds 2.1 billion bushels. The average turns for shuttle elevators were developed through industry surveys. Information on facility throughput at grain export elevators was prepared using industry storage information and export volume by port range. Export elevators have high throughput capabilities, turning the facilities an average of 15 times. The average throughput by elevator type is summarized in Table 24. For an export elevator classified as a shuttle receiving facility, the average annual turn rate is approximately 35. Export elevators in the PNW have higher throughput than those on the Great Lakes, as these facilities are used more for storage.

Table 24: Average Grain Throughput by Elevator Type (million bushels)

Type of Facility	Static Capacity	Annual Throughput	Average Turns
River Elevator	404,364	6,874,189	17
Shuttle (Eastern)	498,825	2,992,950	6
Shuttle (Western)	1,137,802	11,378,016	10
Shuttle (Export)	81,665	2,858,275	35
Total Export Capacity	284,930	4,202,858	15

- Using the crop production forecast for corn, soybeans, wheat, and sorghum, and the current commercial and on-farm storage of each of the 26 focus states, not surprisingly, the southern states have the least amount of grain storage relative to its overall future production, as shown by the storage to future production ratio in Table 25.
  - States that harvest first have an economic incentive to push the production into the marketing chain before harvest pressure lowers the price. States that harvest last have an economic incentive to store the production until prices rebound.
  - Since commercial elevators will turn their capacity up to 10 times, depending on the type of elevator and the geography of the facility, a ratio over 100% is not a major factor in deciding if a state will be able to meet the demands of grain storage requirements. What is critical is that grain elevator managers and farmers need to strategically move the grain in ways that allow for the production to be stored and then transported efficiently in sort of a game of musical chairs for grain flows.

Table 25: Forecast Crop Production and Current Grain Storage Situation by Focus State (1,000 bushels)

State	Production 2022/23					Base Year Storage 2013/14			Current Storage to Forecast Production Ratio
	Corn	Soybeans	Wheat	Sorghum	Total Production	Off-Farm Storage	On-Farm Storage	Total Storage	
Alabama	35,582	21,851	13,483	331	71,246	35,000	35,000	70,000	102%
Arkansas	94,354	156,254	16,457	13,018	280,084	281,000	205,000	486,000	58%
Georgia	62,067	12,893	9,396	1,695	86,052	52,000	60,000	112,000	77%
Illinois	2,140,199	571,610	42,597	3,652	2,758,058	1,451,000	1,460,000	2,911,000	95%
Indiana	940,802	311,677	21,621	-	1,274,100	478,700	800,000	1,278,700	100%
Iowa	2,551,958	541,186	750	-	3,093,893	1,400,000	2,050,000	3,450,000	90%
Kansas	582,454	166,174	363,189	203,430	1,315,247	1,000,000	380,000	1,380,000	95%
Kentucky	252,307	94,793	33,890	979	381,969	74,000	200,000	274,000	139%
Louisiana	73,471	75,883	6,552	14,271	170,178	115,000	10,000	125,000	136%
Maryland	83,879	25,186	17,888	308	127,261	49,000	10,000	59,000	216%
Michigan	378,182	103,145	41,207	-	522,533	210,000	290,000	500,000	105%
Minnesota	1,499,008	370,639	76,344	-	1,945,991	690,000	1,450,000	2,140,000	91%
Mississippi	102,642	117,726	9,518	6,650	236,535	63,900	110,000	173,900	136%
Missouri	511,984	263,356	39,517	6,354	821,211	245,000	510,000	755,000	109%
Nebraska	1,715,728	322,462	63,528	15,418	2,117,135	885,130	1,150,000	2,035,130	104%
New York	101,279	17,125	6,868	-	125,272	37,600	120,000	157,600	79%
North Carolina	98,884	73,798	37,937	688	211,307	88,000	100,000	188,000	112%
North Dakota	346,188	228,466	358,409	-	933,063	380,000	880,000	1,260,000	74%
Ohio	592,142	264,458	41,352	-	897,951	425,200	530,000	955,200	94%
Oklahoma	37,342	12,994	107,590	12,349	170,276	235,000	75,000	310,000	55%
Pennsylvania	158,170	33,180	10,495	232	202,077	38,000	160,000	198,000	102%
South Carolina	30,250	14,229	8,648	345	53,471	18,700	10,000	28,700	186%
South Dakota	796,950	228,187	110,345	11,997	1,147,479	310,000	690,000	1,000,000	115%
Tennessee	131,253	85,329	29,420	1,811	247,814	61,000	80,000	141,000	176%
Virginia	62,577	30,224	15,480	270	108,550	35,000	55,000	90,000	121%
Wisconsin	541,757	92,369	16,815	-	650,941	10,000	288,000	298,000	218%
Subtotal	13,885,829	4,213,340	1,485,812	293,468	19,878,448	8,633,230	11,673,000	20,306,230	98%
Total U.S.	14,760,000	4,270,000	2,260,000	450,000	21,740,000	10,430,400	13,010,000	23,440,400	93%

- Grain and soybean storage requirements have led to a renaissance in storage capacity expansion both at on- and off-farm locations. Total grain storage capacity has expanded 17% since 2000 to nearly 22.9 billion bushels during 2011. Over the same time frame, on farm storage increased 14% to nearly 12.8 billion bushels while off farm capacity grew 21% to more than 10.1 billion bushels, as shown in Figure 69. The expansion in storage capacity has been led by increased crop production associated with the changing cropping patterns, higher yields and opportunities holding crops in storage.

- The requirements for storage capacity can be compared to December 1 grain and soybean inventories, as shown in Figure 70 and Figure 71. The expansion of storage capacity has increased in a commensurate pace with the expected volume of grain and soybean inventories on December 1.
  - The comparisons were then made by holding storage fixed at 2013 levels and compare it to projected grain and soybean inventories on December 1 to see how soybeans could be impacted.
  - Soybeans share of December 1 crop inventories is expected to remain steady at slightly less than 17% of the crops in storage through 2020, which was soybeans average share since 2000, while the share of corn will increase to 73% over the outlook, up from 68% since 2000.
  - The share of wheat under storage on December 1 is projected to average less than 8%, down from more than 11% since 2000.
  - Comparisons of December 1 crop storage and inventories by state, are shown in the Section I.VIII. Appendices B. State December 1 Crop Storage Capacity and Inventories.

- What emerges is an environment that has to take into account the changes in and the pace of soybean exports. Since 2000/2001 when soybean exports totaled about 1 billion bushels, exports represented slightly more than one-third of soybean production.
  - Exports as a share of soybean production has increased further to almost 50% (with record exports of 1.9 billion bushels in 2014/15) and export share will remain at 49%with exports forecasted to reach 2.2 billion bushels.

- There is less storage pressure on soybeans than other crops since more soybeans need to be moved through the system to export position faster and earlier than in the past.
  - The exports are being moved out of the U.S. ahead of when South America starts its soybean harvest and sending that harvest to the export market.
    - For example, the changing shipping patterns of when corn, soybeans and wheat are exported are show in Figure 72 through Figure 75.
    - Over the past decade, 75% of the soybean exports were reported during the first half of the marketing year.
      - In 2013/14, almost 90% of the soybeans were exported during the first half of the marketing year.
      - This phenomenon has affected the timing of exports of other crops where corn and sorghum are not as robust during the first half of the marketing year as they use to be given the surge in soybean exports.

- Because soybeans are the higher value crop and there are more international competitive pressures with respect to available supplies within the soybean industry as compared to corn and wheat, the logistics system that accommodates grain and oilseeds will prioritize soybeans ahead of other crops.
    - If production growth occurs among the leading commodities, the other commodities will generally make way for soybeans.

Figure 69: U.S. December 1 Crop Elevator Storage Capacity by Location

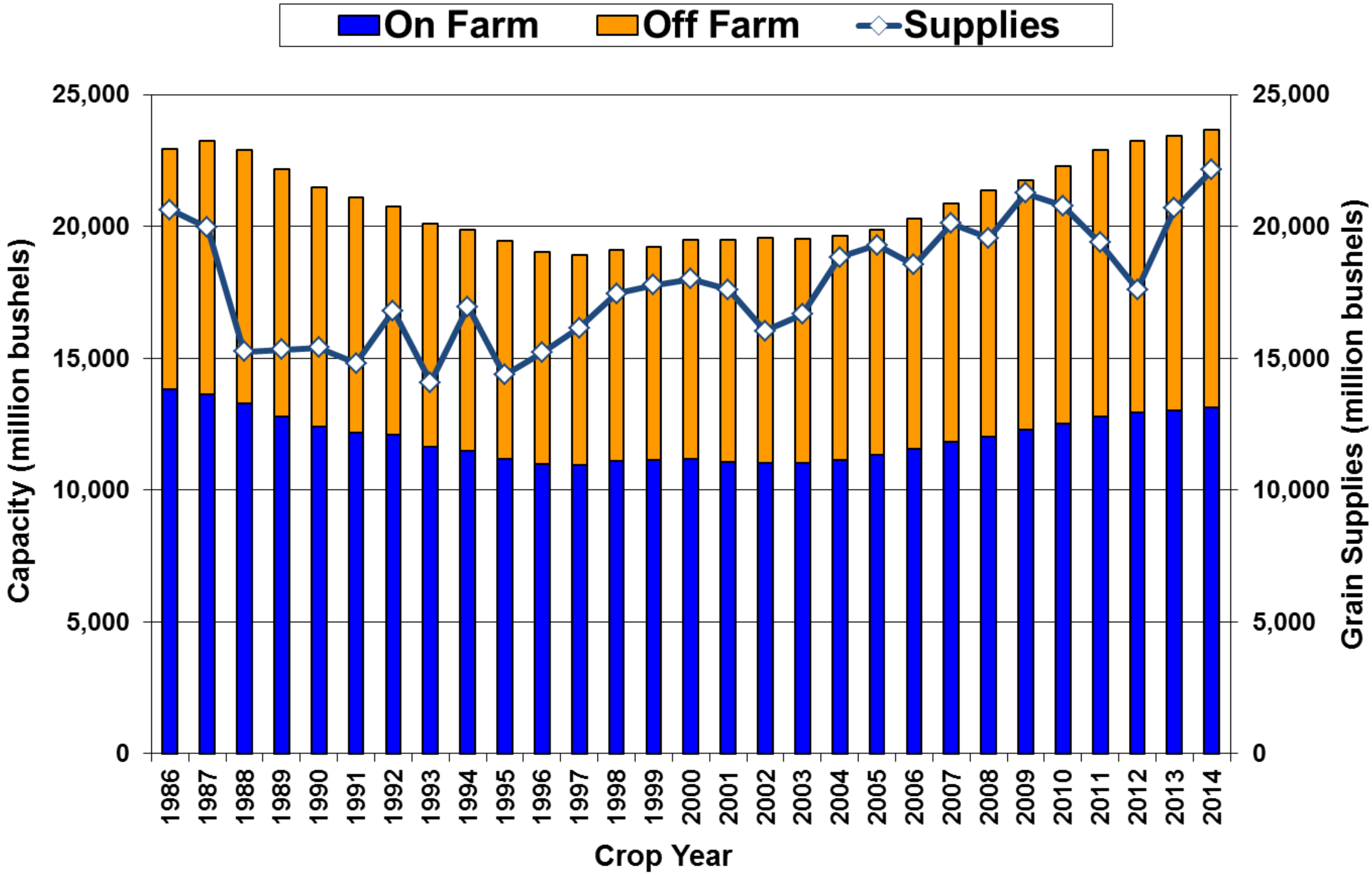


Figure 70: December 1 U.S. Crop Storage Capacity and Inventories

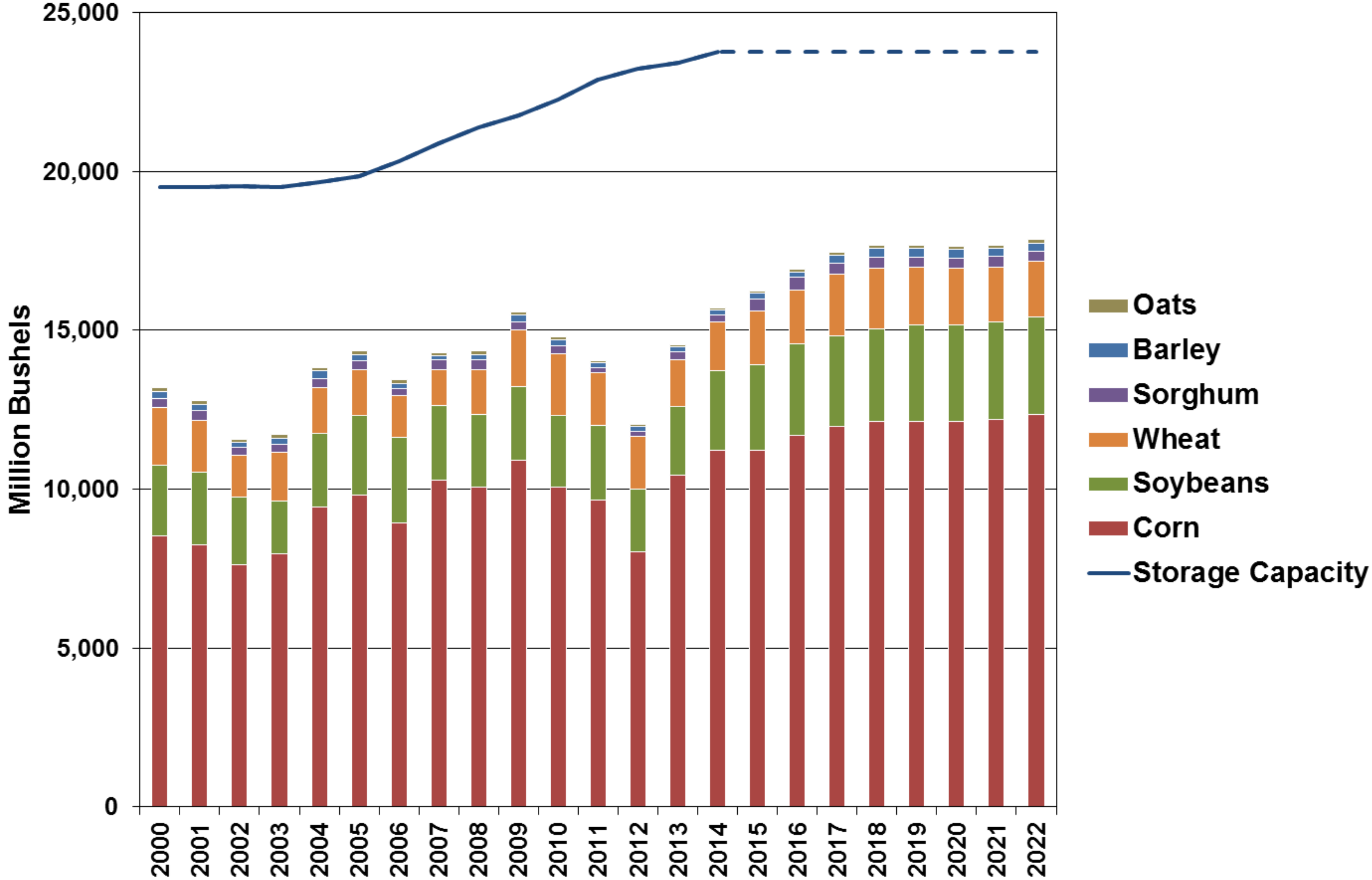


Figure 71: December 1 U.S. Crop Inventories

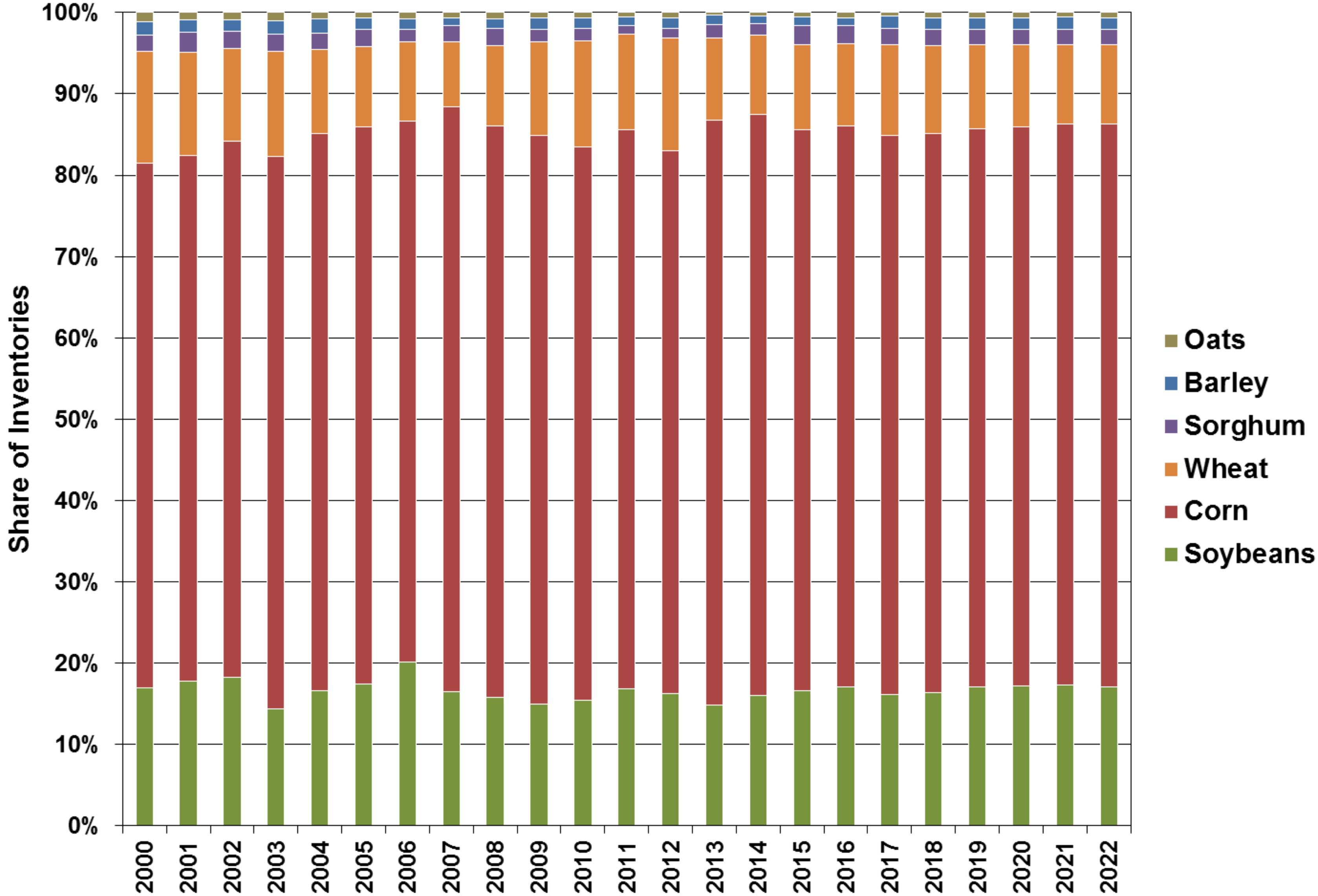


Figure 72: Quarterly Share of Export Inspections of Soybeans

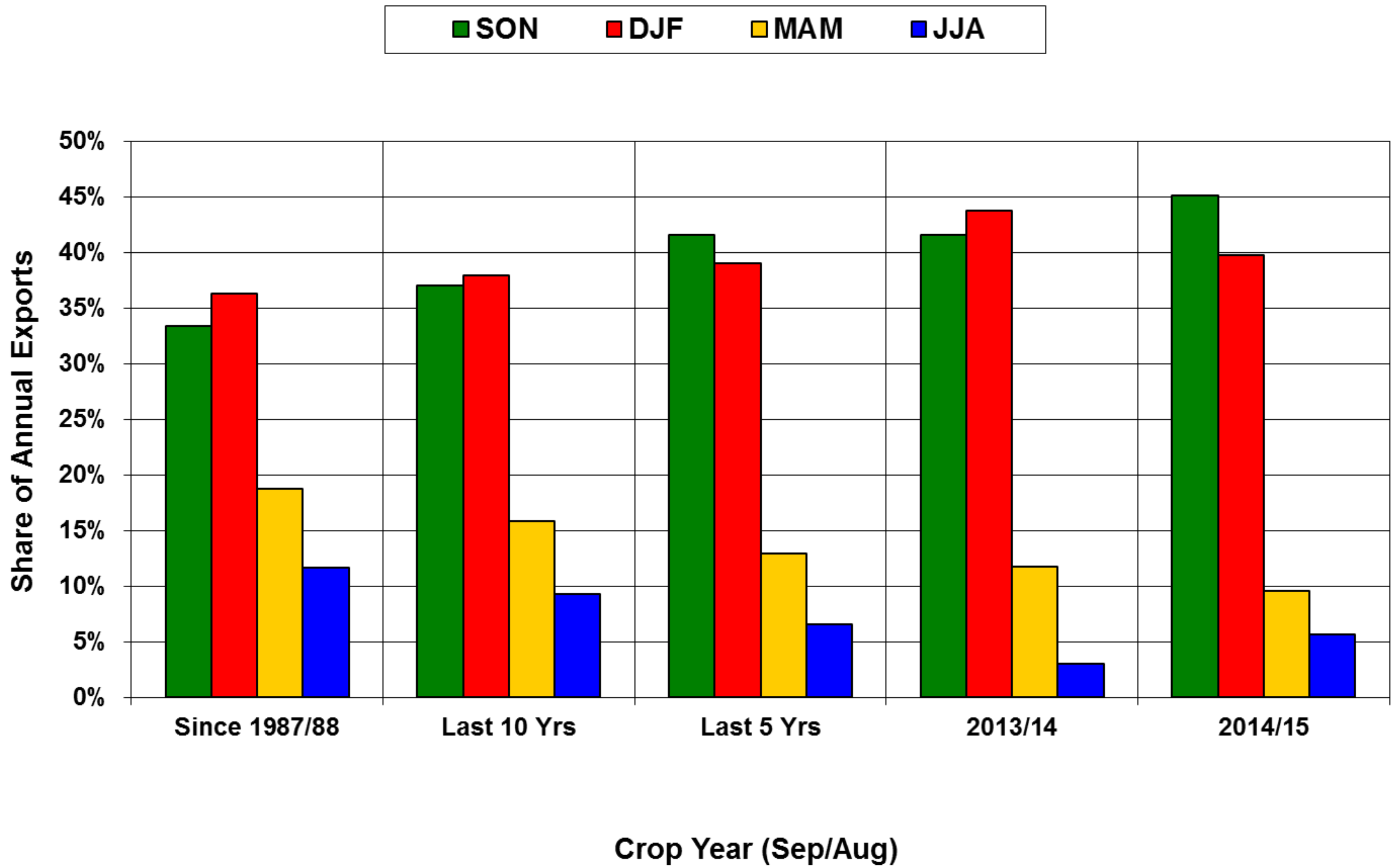


Figure 73: Quarterly Share of Export Inspections of Corn

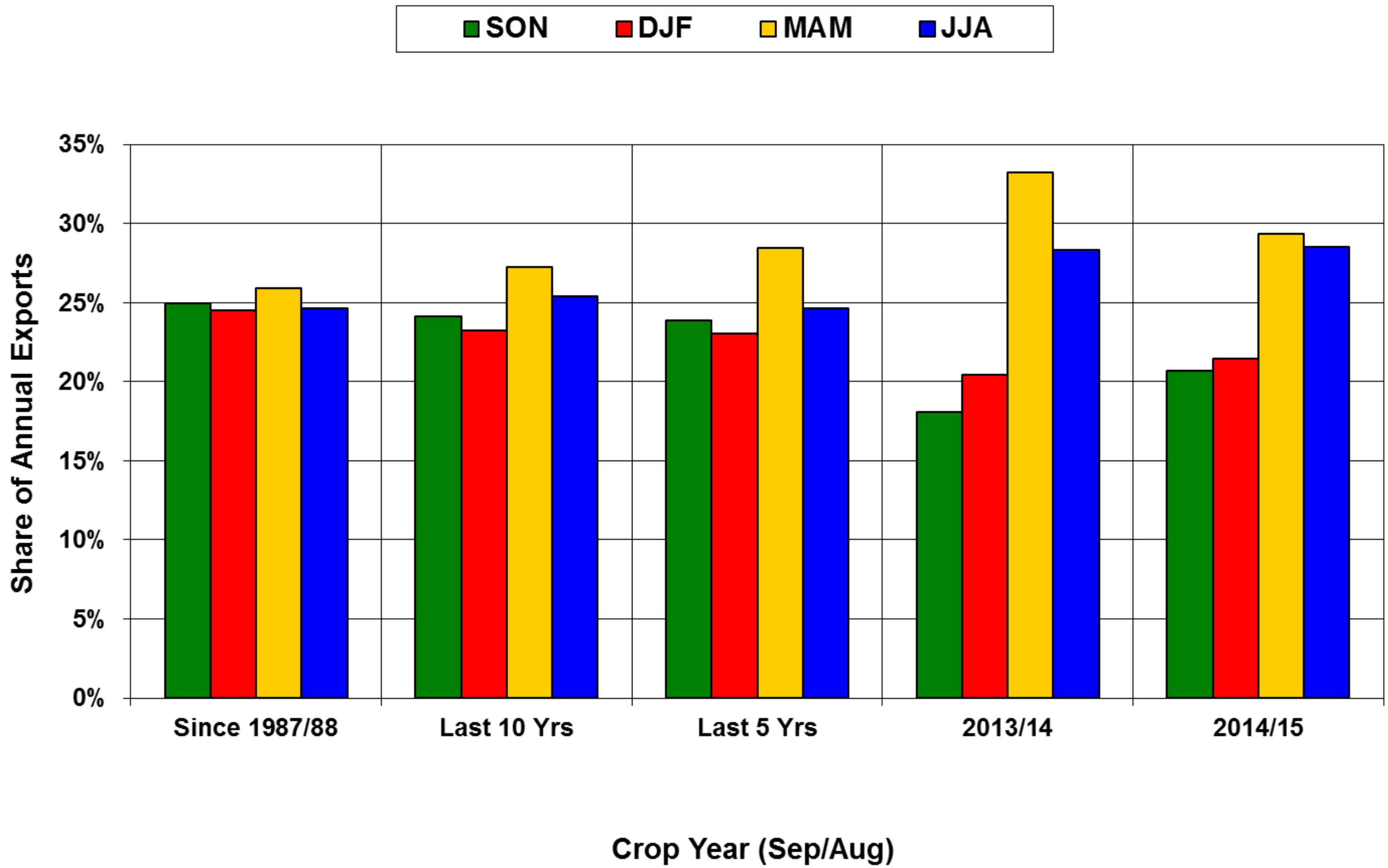


Figure 74: Quarterly Share of Export Inspections of Wheat

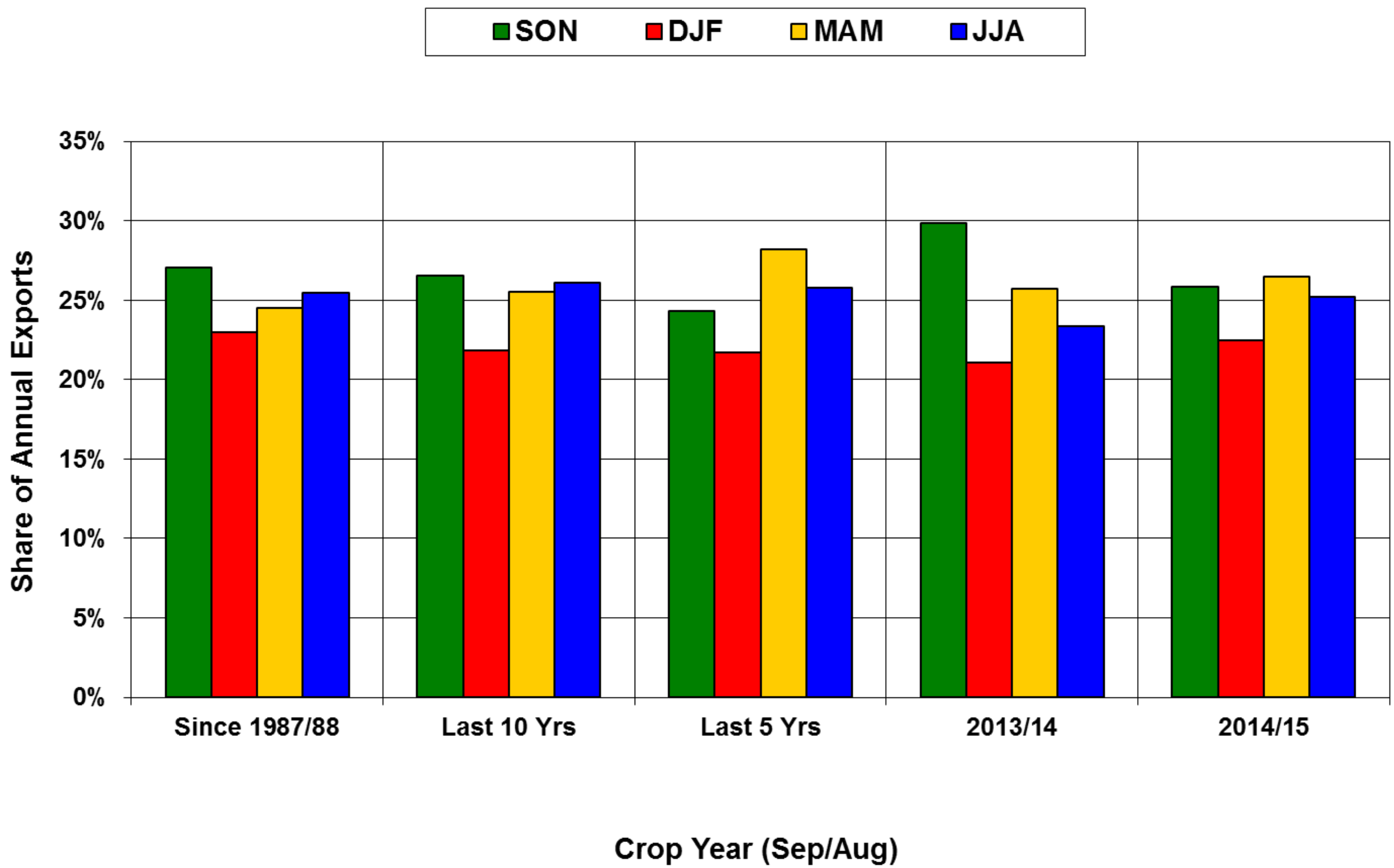
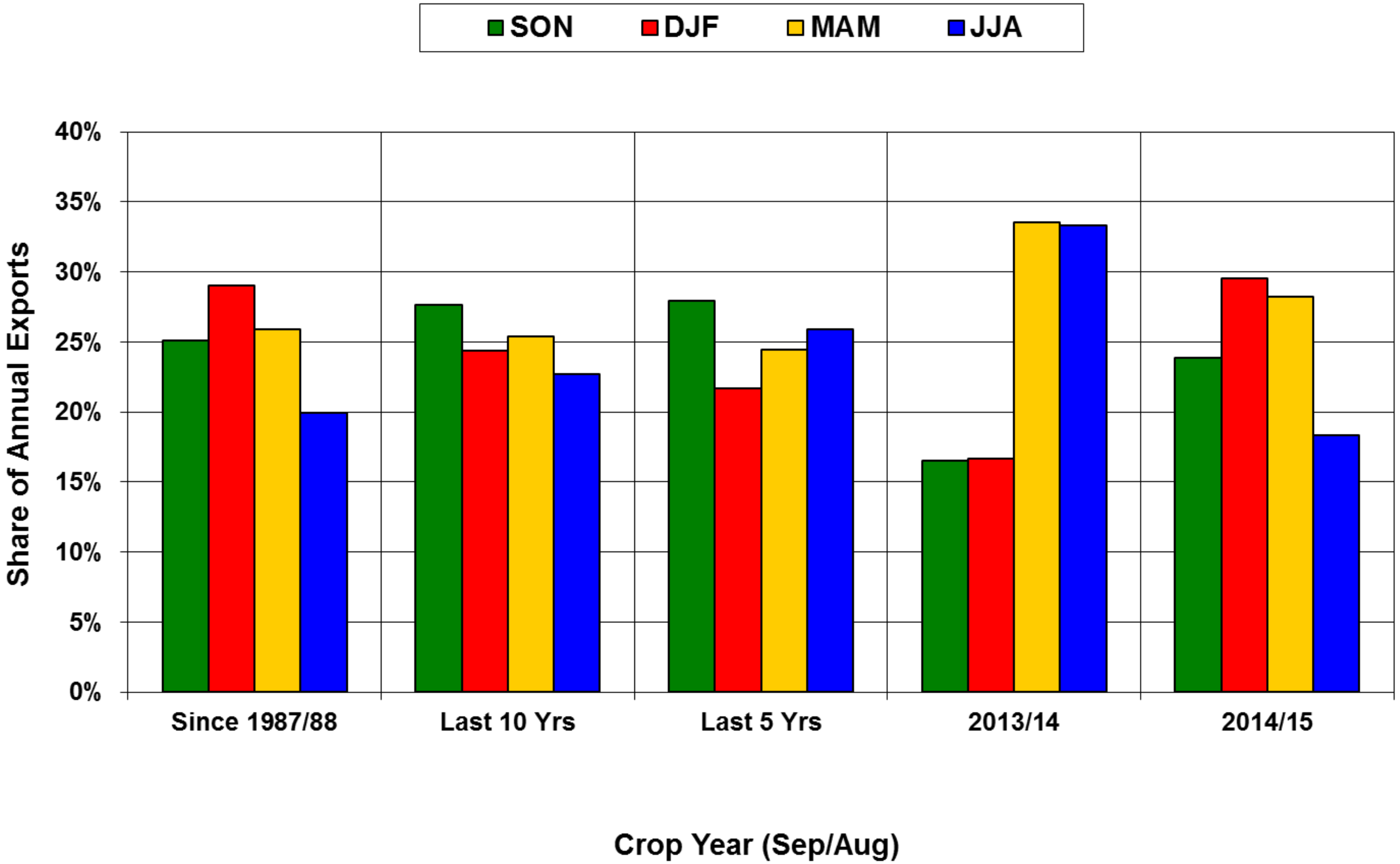


Figure 75: Quarterly Share of Export Inspections of Sorghum



A. Rail Carloading Situation for Grains and Soybeans

The most current data on rail is available through calendar year 2013. Informa converted the data to a crop marketing year (September/August) through 2012/13. This section includes highlights of key rail factors that have emerged.

- The drought of 2012/13 drastically impacted grain carloadings which dropped to 979 thousand carloadings. Since that time grain carloadings have increased to 1.2 million carloadings.

- The industry has been transitioning from smaller trains that hauled relatively shorter distances using smaller cars, to an industry with more cars per train on longer hauls using larger cubic capacity cars through shuttle train programs. This is particularly notable given the percentage of tonnage moved by trains larger than 100 cars, which increased from 32 percent in 2010/12 to 38 percent in 2012/13.

- The transition has developed as crop production has expanded north and westward into the western Corn Belt, where corn and soybeans are supplanting wheat area.

- Meanwhile, ethanol production has increased corn production, but fewer surpluses, in key states like Iowa. As ethanol production reaches its ceiling in the next few years, shuttle trains should continue to increase the average rail distances of corn as the surplus corn is transported to export and feeding positions.

- Grain carloadings peaked at 1.7 million in 2005/06, and fell below 1.5 million in 2008/09 and slightly increased in 2009/10 before dropping below 1.0 million in the drought of 2012/13 (see Figure 76).

- More than one-third of the trains exceed 100 cars, up from less than 15% in 2003; one-third had less than 25 cars per train, down from 45% in 1996 (see Figure 77).

- Carloadings expanded in the western Corn Belt from 400,080 in 2004/05 to 437,187 in 2004/06, but have steadily declined since; from eastern Corn Belt carloadings have increased from 280,423 in 2004/05 to above 400,000 in 2006/07(see Figure 78).

- Carloading destinations increased to export position for the PNW with up to 394,699 carloadings in 2009/10 before declining the following two years. Carloadings to the Texas and Oklahoma region have steadily increased since the mid-1990s and are now total more than 260,000 carloadings; and to the Southwest and Southeast regions hover near 100,000 carloads each (see Figure 79).

- The average distance grain and soybeans were moved increased from less than 800 miles in 2002/03 to more than 900 miles starting in 2007/08 and reached 935 in 2008/09 on increased moves to export position, but fell slightly below 900 in 2009/2010 and hit 895 miles in 2012/13 (see Figure 80).

- The size of railcars was consistently expanding with larger cubic capacity cars (those exceeding 5,000 cubic feet) up until 2010/11 and has dropped since then. In 2010/11, there were 978,826 carloadings above 5,000 cubic feet but that fell to 772,653 by 2012/13 (see Figure 82).

- The larger cars can haul more volume, increasing from 96.2 tons per car in 1995/96 to more than 100 tons in 2005/06, and in 2012/13 were nearly 105 tons (see Figure 83).

- With increased miles and heavier loaded cars, total ton-miles have expanded from 107.8 billion in 1997/98 to 171.6 billion in 2007/08 and in 2012/13 had fallen to 115.5 billion ton-miles (see Figure 84).

Figure 76: Total Grain and Soybean Rail Carloadings

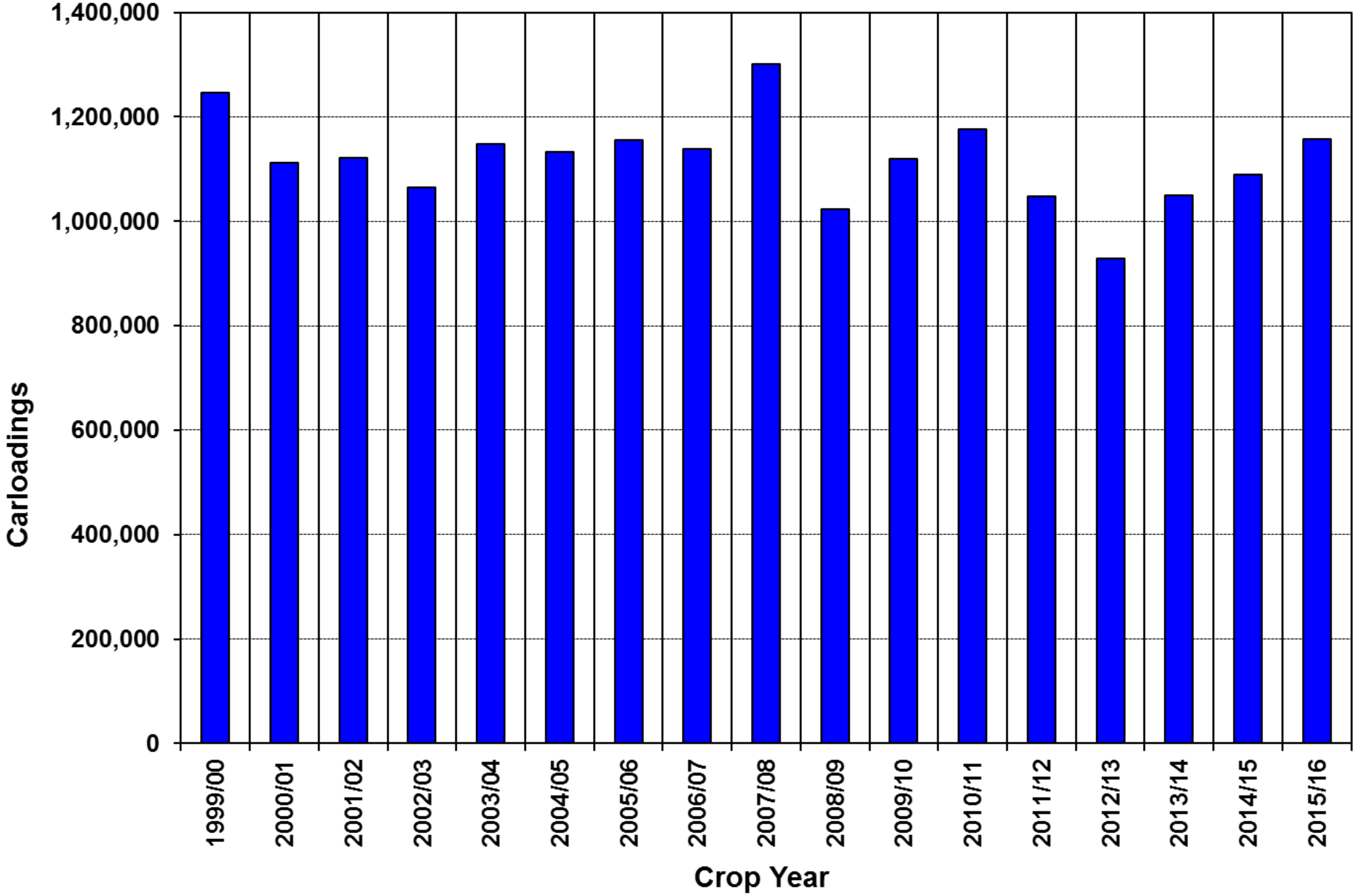


Figure 77: Grain and Soybean Tonnage Moved by Train Size

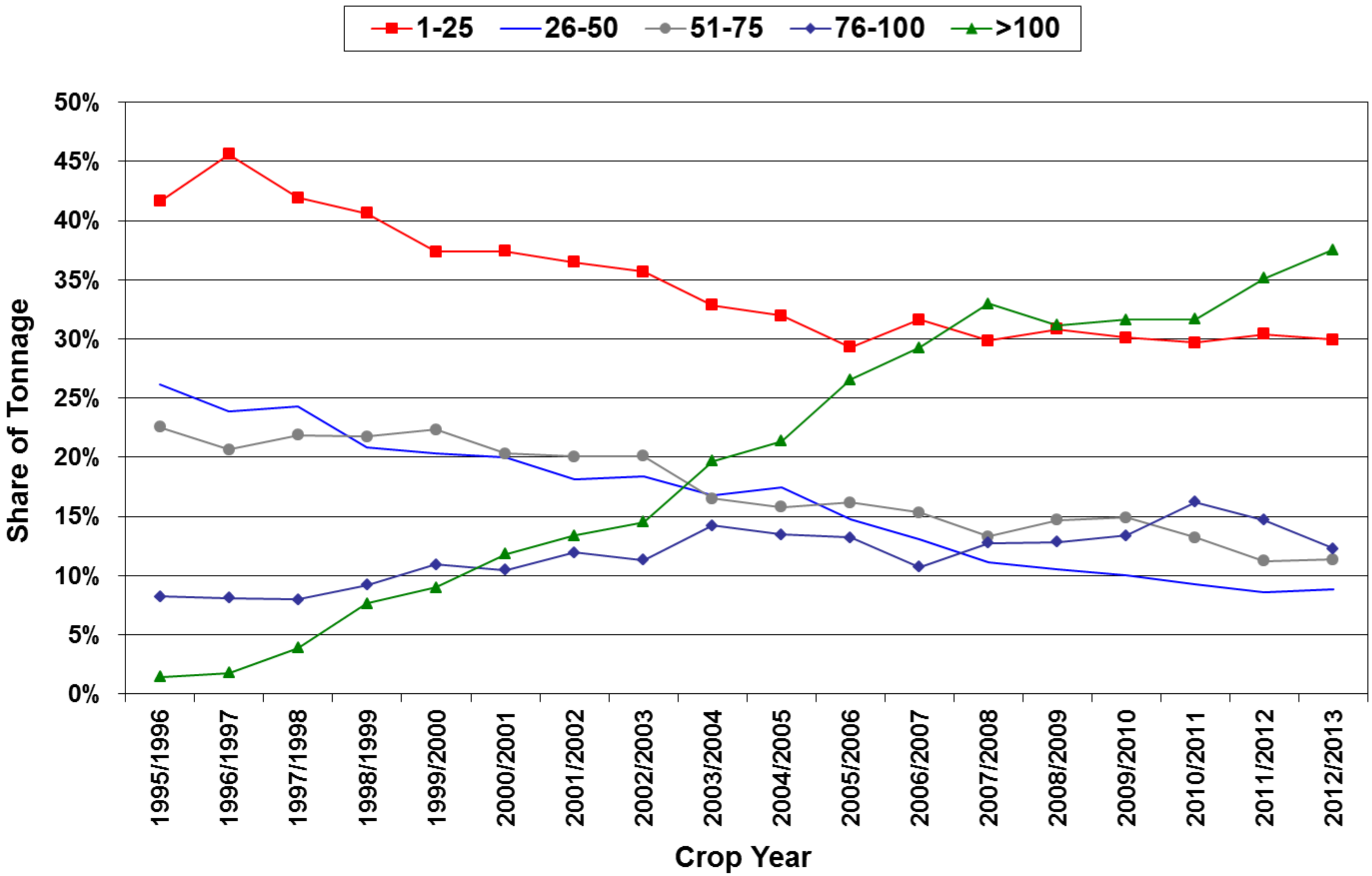


Figure 78: Grain and Soybean Rail Carloading Origins

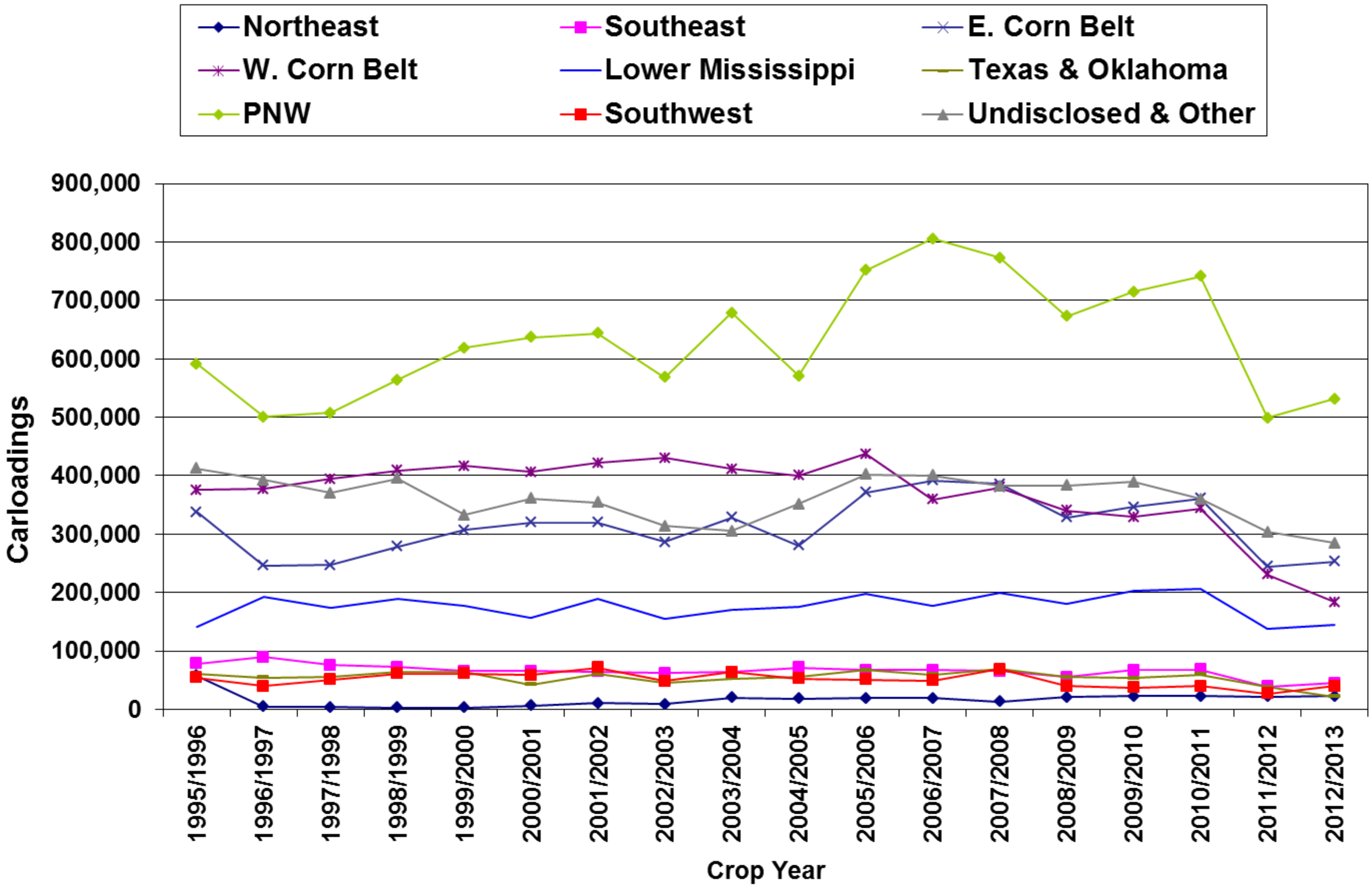


Figure 79: Grain and Soybean Rail Carloading Destinations

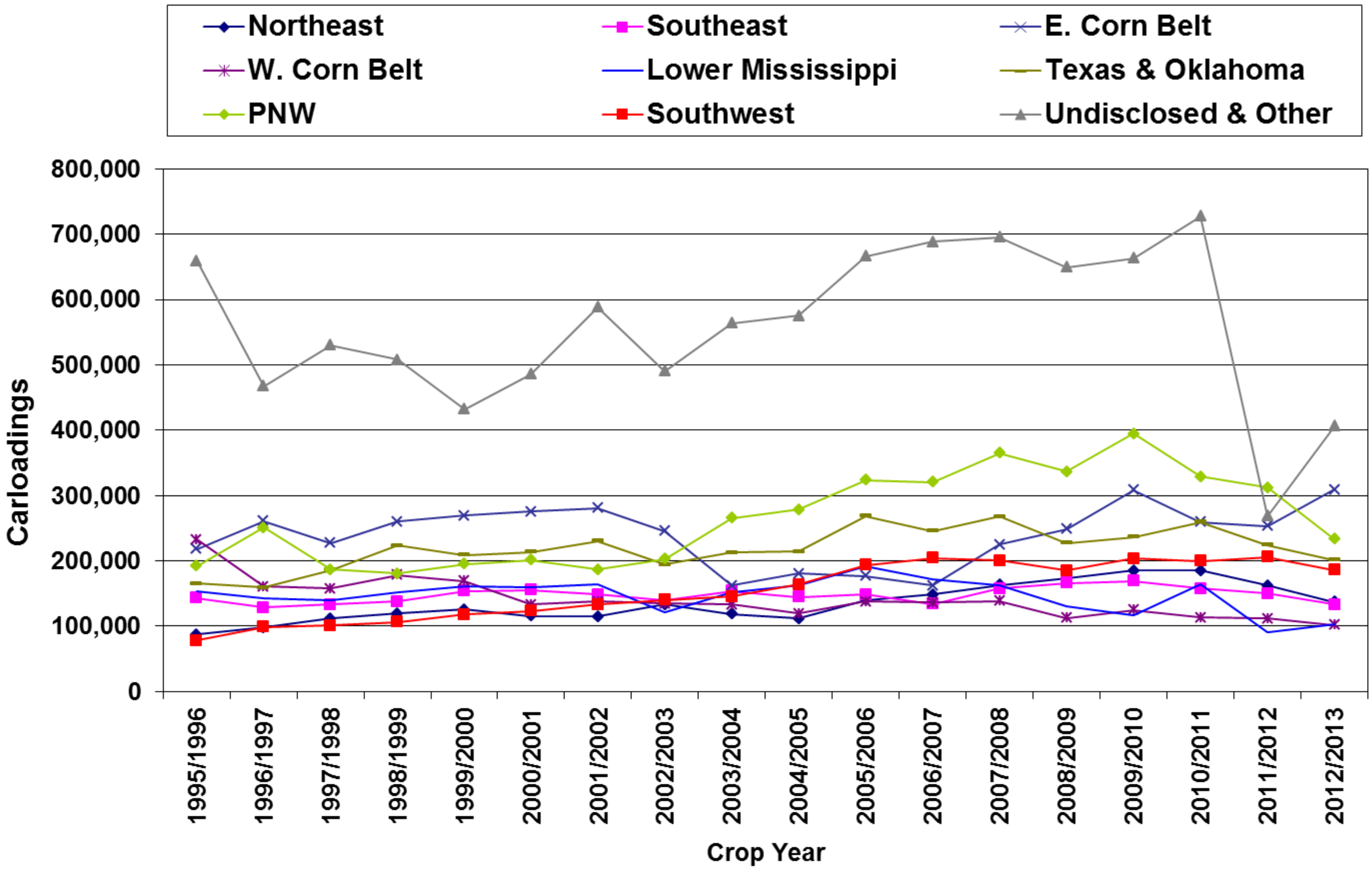


Figure 80: Grain and Soybeans Average Rail Miles Transported

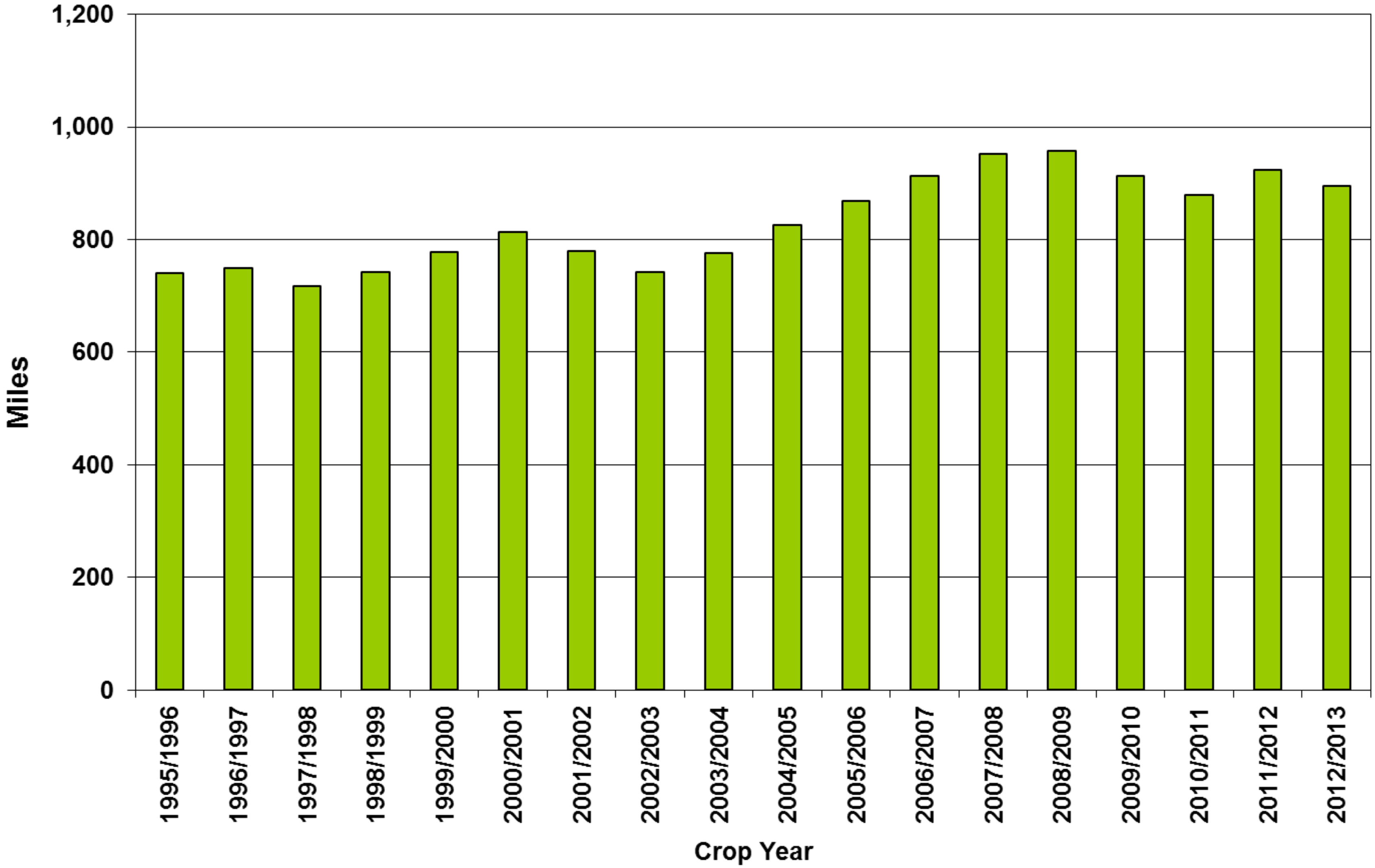


Figure 81: Grain and Soybeans Average Rail Miles Transported, by Crop

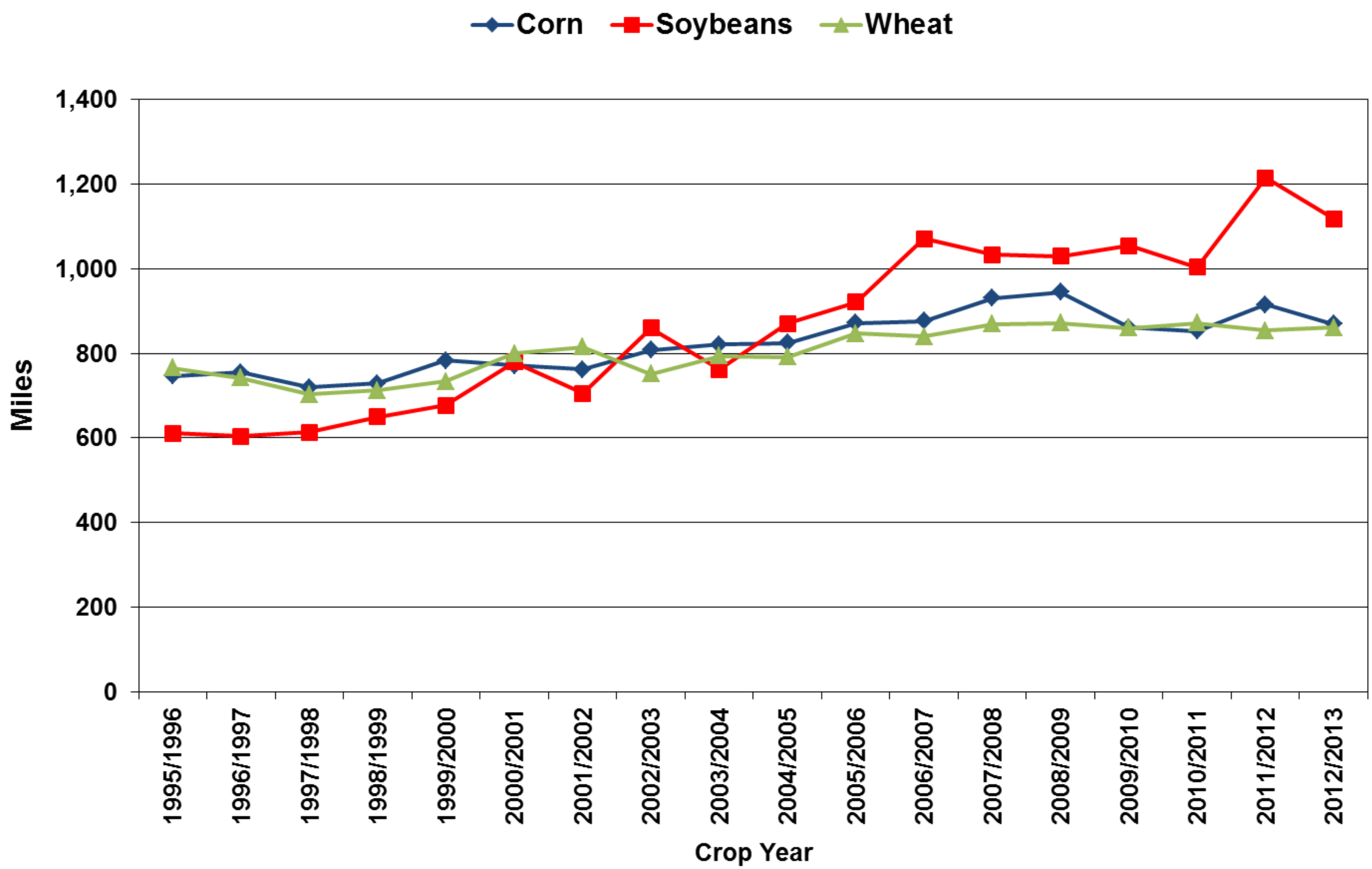


Figure 82: Grain and Soybean Rail Carloadings by Railcar Cubic Capacity

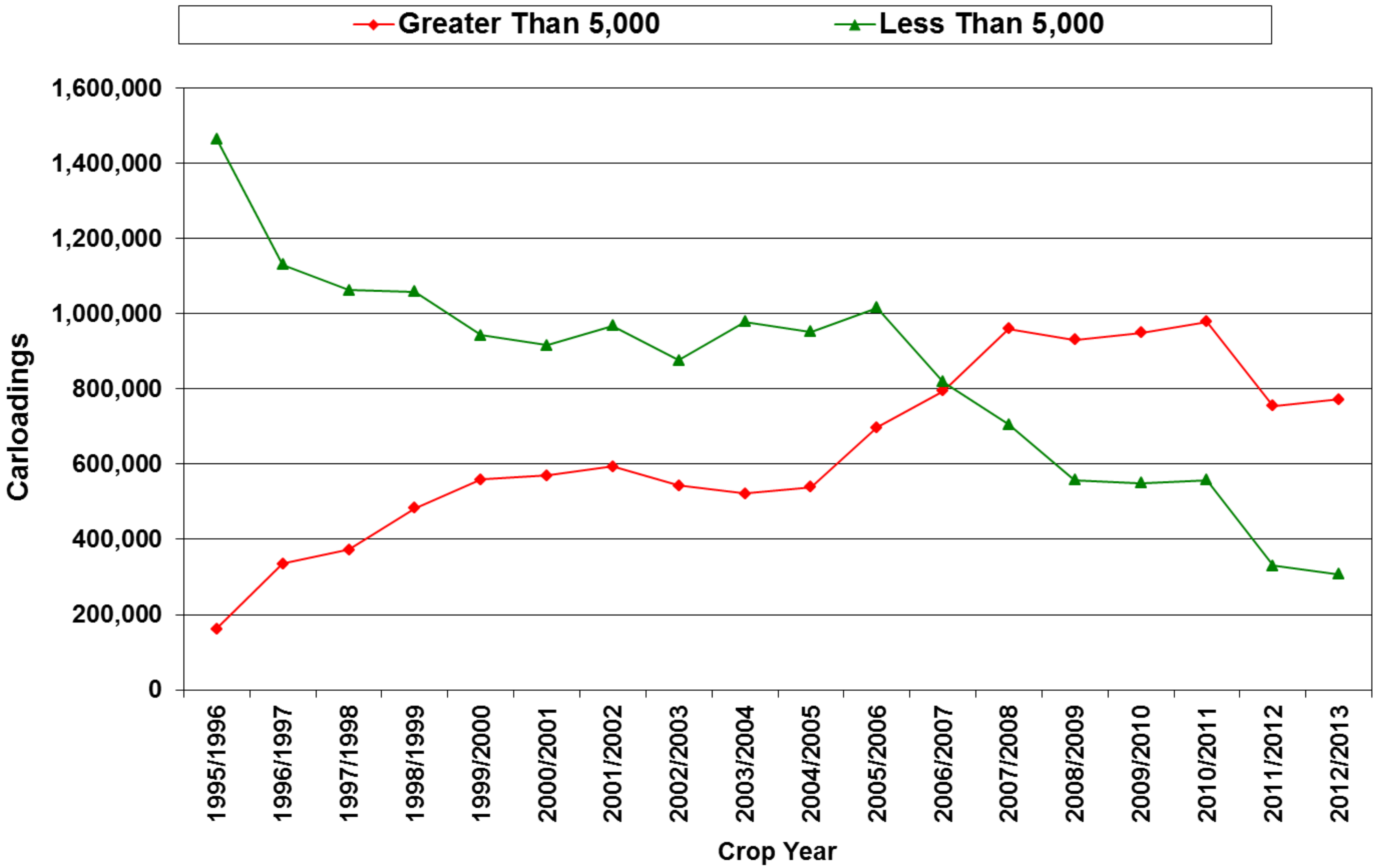


Figure 83: Average Grain and Soybean Tons per Railcar

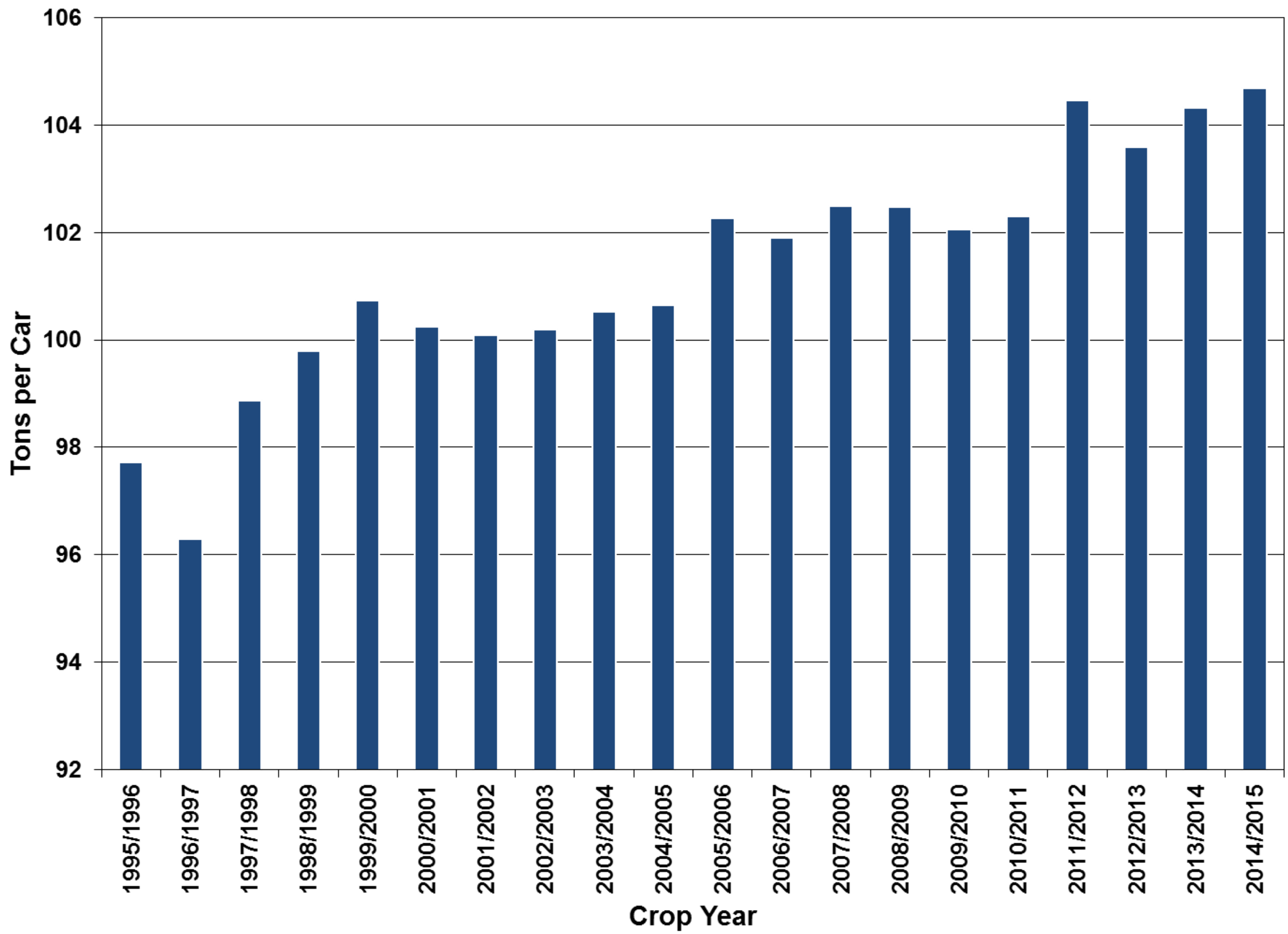
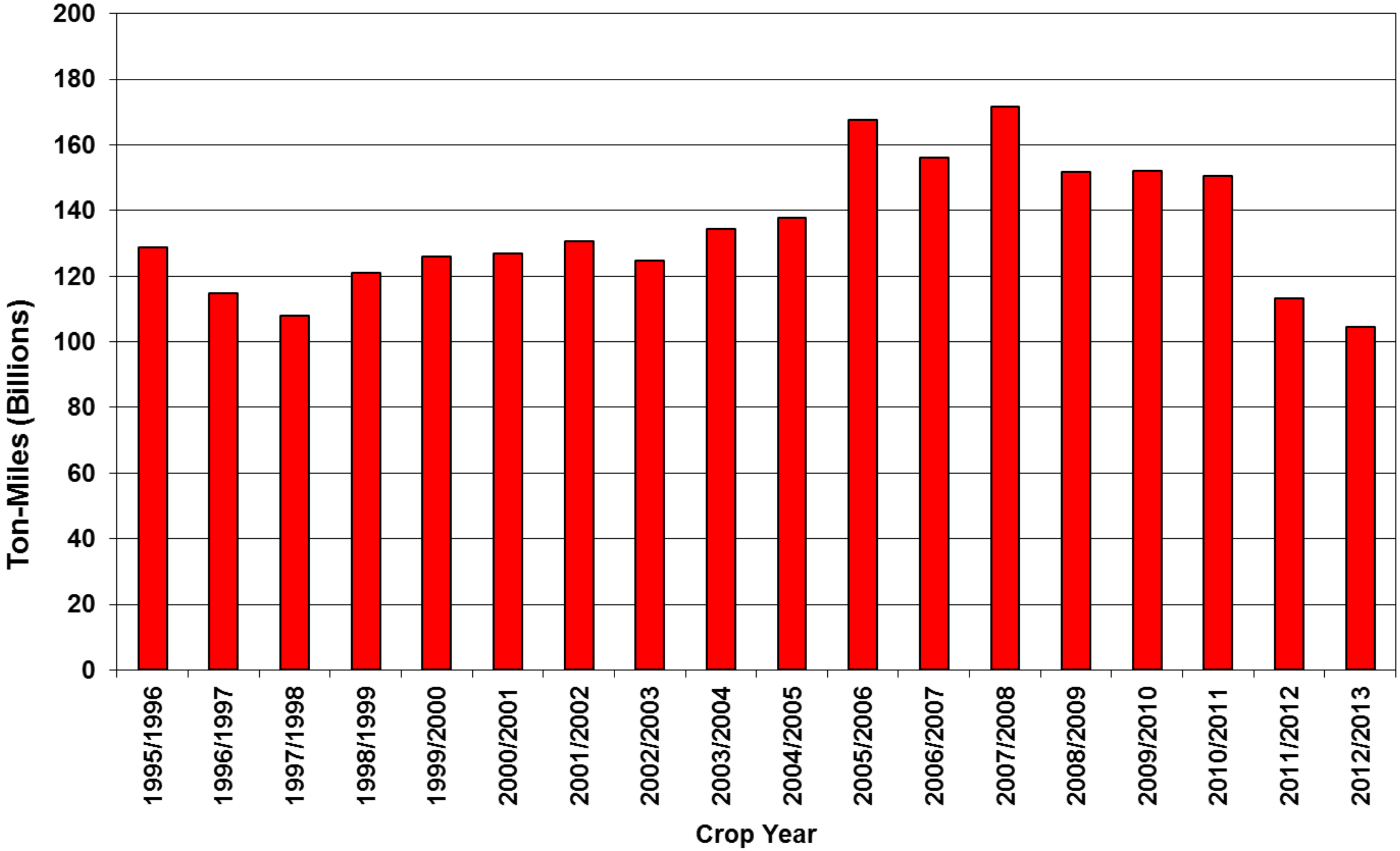


Figure 84: Grain and Soybeans Rail Ton-Miles



B. Barge Situation for Grains and Soybeans

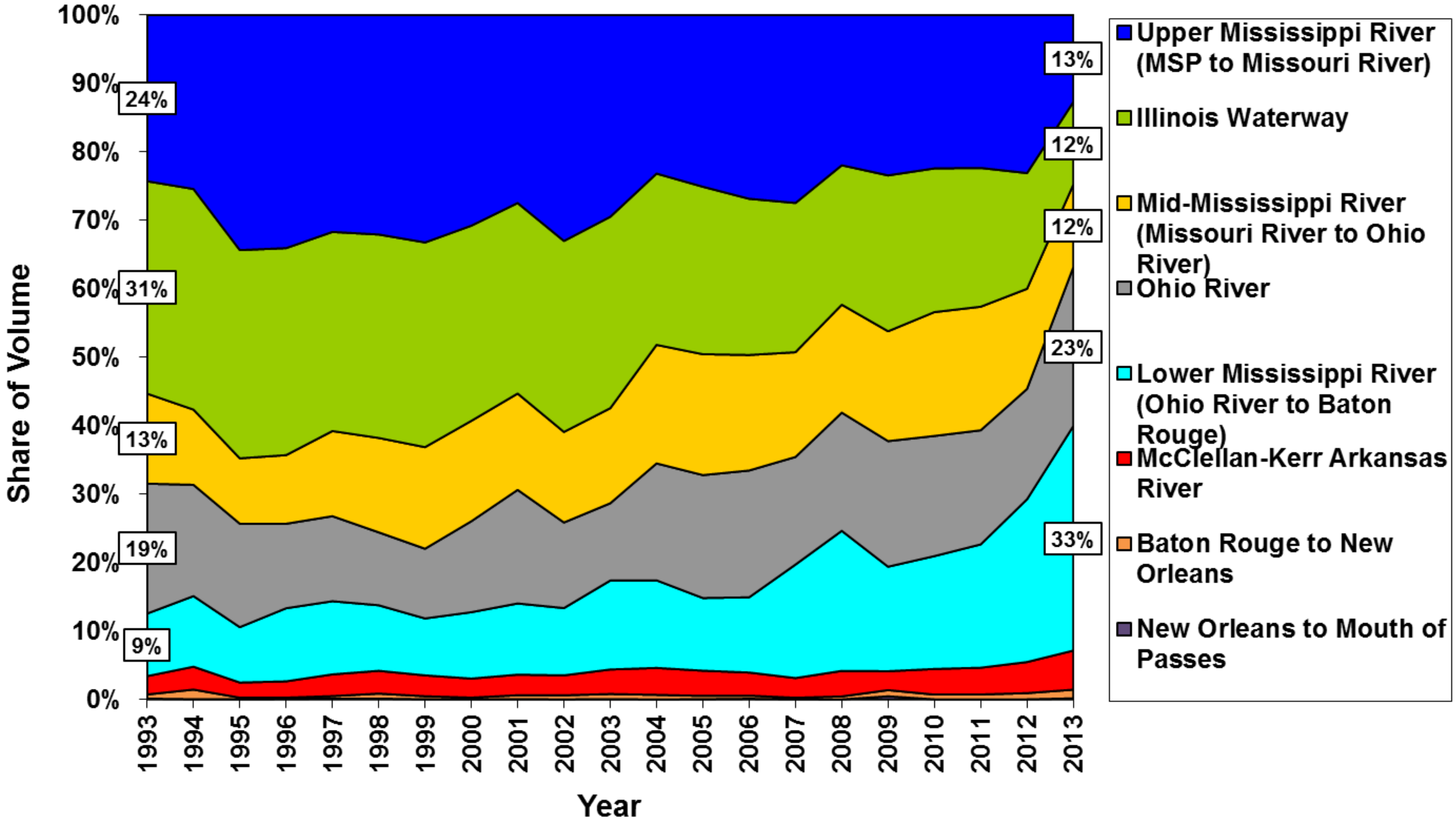
This section evaluates the key barge factors impacting movements of grains and soybeans. The information in this section is based on information from the Army Corps of Engineers Lock Performance Monitoring System, Waterborne Commerce of the United States Vessel Operator Characteristics, and Informa's annual Barge Fleet Profile report. A map of the Inland Waterway System is shown in Figure 85.

Figure 85: U.S. Inland River System

- Grain barge loadings demonstrate a shift in loadings by waterway. The trend of relatively less grain being loaded in locking areas of the upper Mississippi and Illinois Rivers has emerged since the early 2000s.
    - About 60% of annual grain barge loadings originated on the upper Mississippi and Illinois Rivers, and has trended lower to about 40% in 2013, as shown in Figure 86.
    - This trend is particularly evident for soybean loadings with increased loadings on the lower Ohio and lower Mississippi Rivers, as shown in Figure 87.

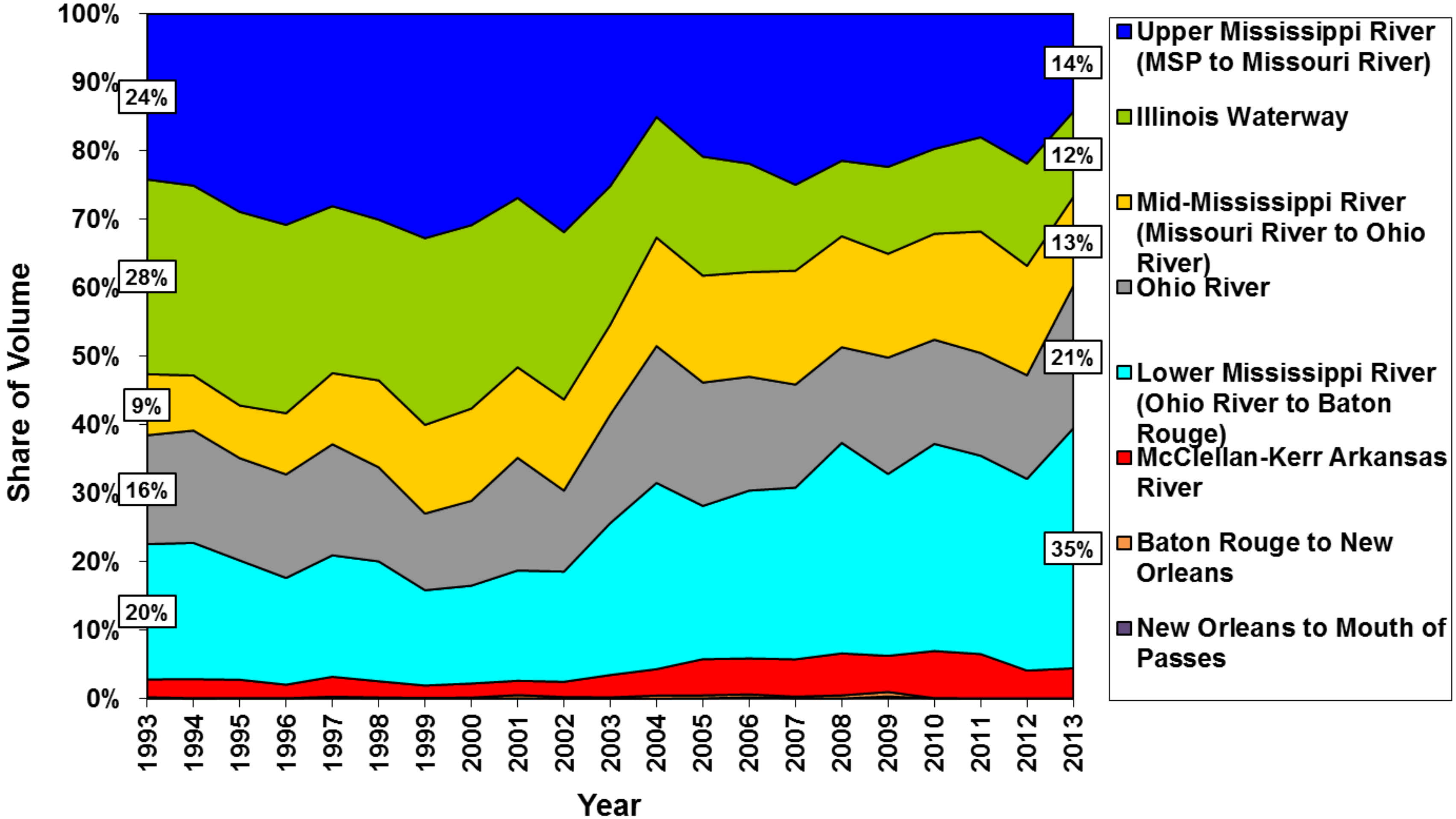
- This shift in loadings has occurred during the time of the ethanol build out across the Corn Belt and within proximity of the navigable river system, especially in Iowa where corn became deficit.
    - Once the corn ethanol mandate is achieved, corn surpluses are expected to return along the upper Mississippi River.
    - With issues of crumbling lock infrastructure, increased crop production near the lower Mississippi River, deeper draft barge equipment being used, and a widening barge freight spread, will the upper Mississippi River gain a competitive edge with the lower Mississippi River, during a time when the Panama Canal expansion effort will be completed and will likely expand the draw area for river navigation.

Figure 86: Share of Grain and Soybean Loadings by River Segment



Source: Army Corps of Engineers and Informa

Figure 87: Share of Soybean Barge Loadings by River Segment



Source: Army Corps of Engineers and Informa

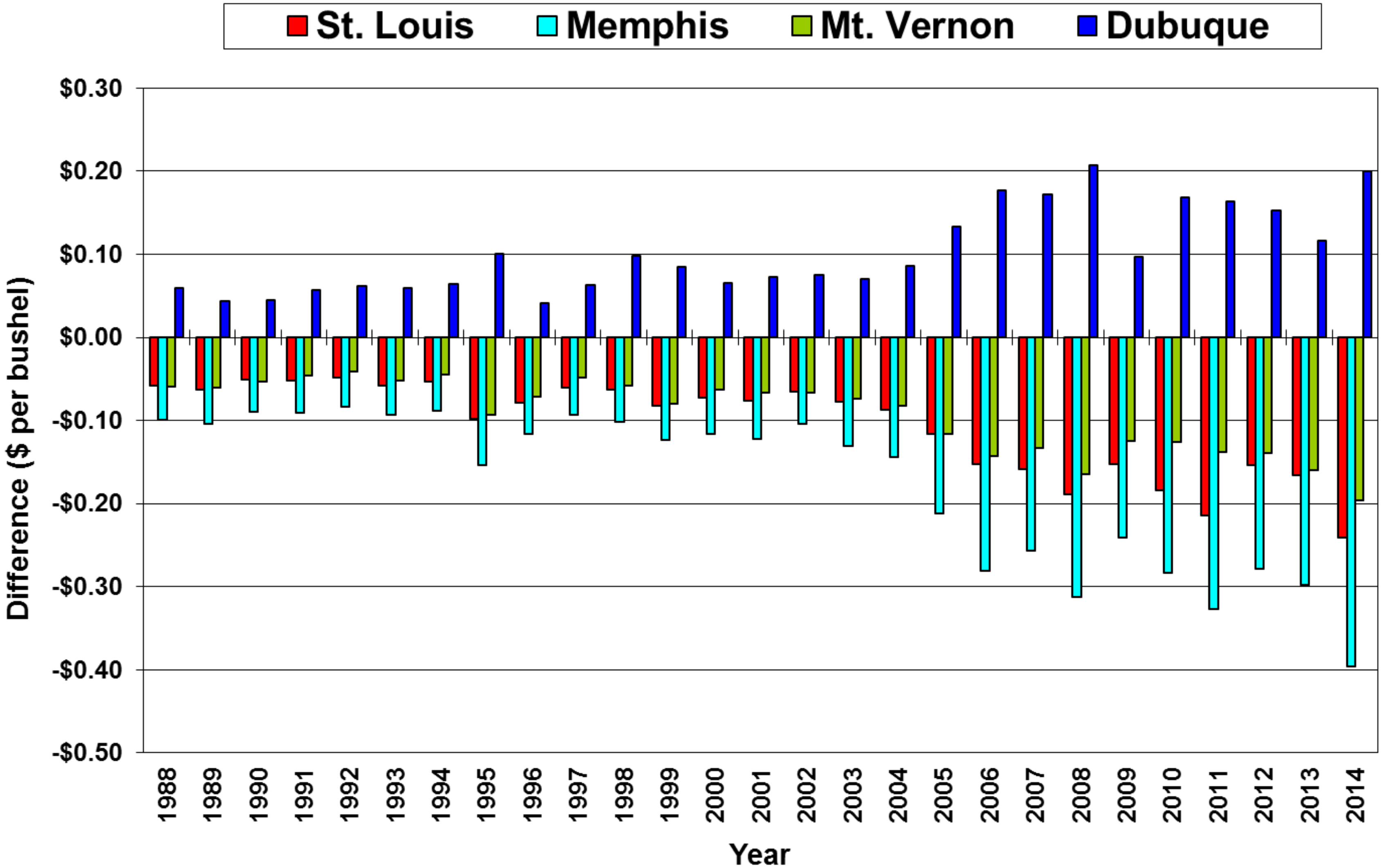
- Since 2001, the average tons loaded per barge for grains and soybeans by river segment:
  - Upper Mississippi River 1,554 tons;
  - Lower Mississippi River approximately 1,700 tons;
  - Illinois Waterway 1,552 tons;
  - Ohio River 1,561 tons; and

  - Arkansas River 1,406 tons (average since 2003).

- Since 2011, the average tons loaded per barge for grains and oilseeds by river segment:
  - Upper Mississippi River 1,538 tons;
  - Lower Mississippi River approximately 1,700 tons;
  - Illinois Waterway 1,544 tons;
  - Ohio River 1,699 tons; and
  - Arkansas River 1,397 tons.

- Around 95% of the covered hopper barge fleet is able to handle loads that draft 12 feet to 14 feet compared with 5% that is limited to 9 feet to 10 feet. As a result, in most cases a covered hopper barge will be able to take advantage of deeper drafts if the river allows. This is creating a freight differential between segments of the Mississippi River System that have locks and the lower Mississippi River.
  - The barge freight rate differentials between key river locations and Peoria, IL on the Illinois River have been widening. The spreads at locations downriver from Peoria have widened from a range of –10 cents to –15 cents per soybean bushel from the mid-1990s to the mid-2000s from Memphis, for example.
  - Since 2004, the barge freight spread between Memphis with Peoria has widened further to more than –30 cents per soybean bushel and has maintained a greater than 25% freight advantage since 2009, as shown in Figure 88.
    - Memphis, which represents the lower Mississippi River where freight can be loaded heaviest, is almost 40 cents per bushel cheaper.
    - The switching of 1,100 open barges to covered barges is expected to reverse this trend because these barges have a lower combing (front) that hinder the ability to load the barge to full capacity.

Figure 88: Barge Freight Rate Differential with Peoria, IL for Soybean Movements to New Orleans, LA by Select River Segments



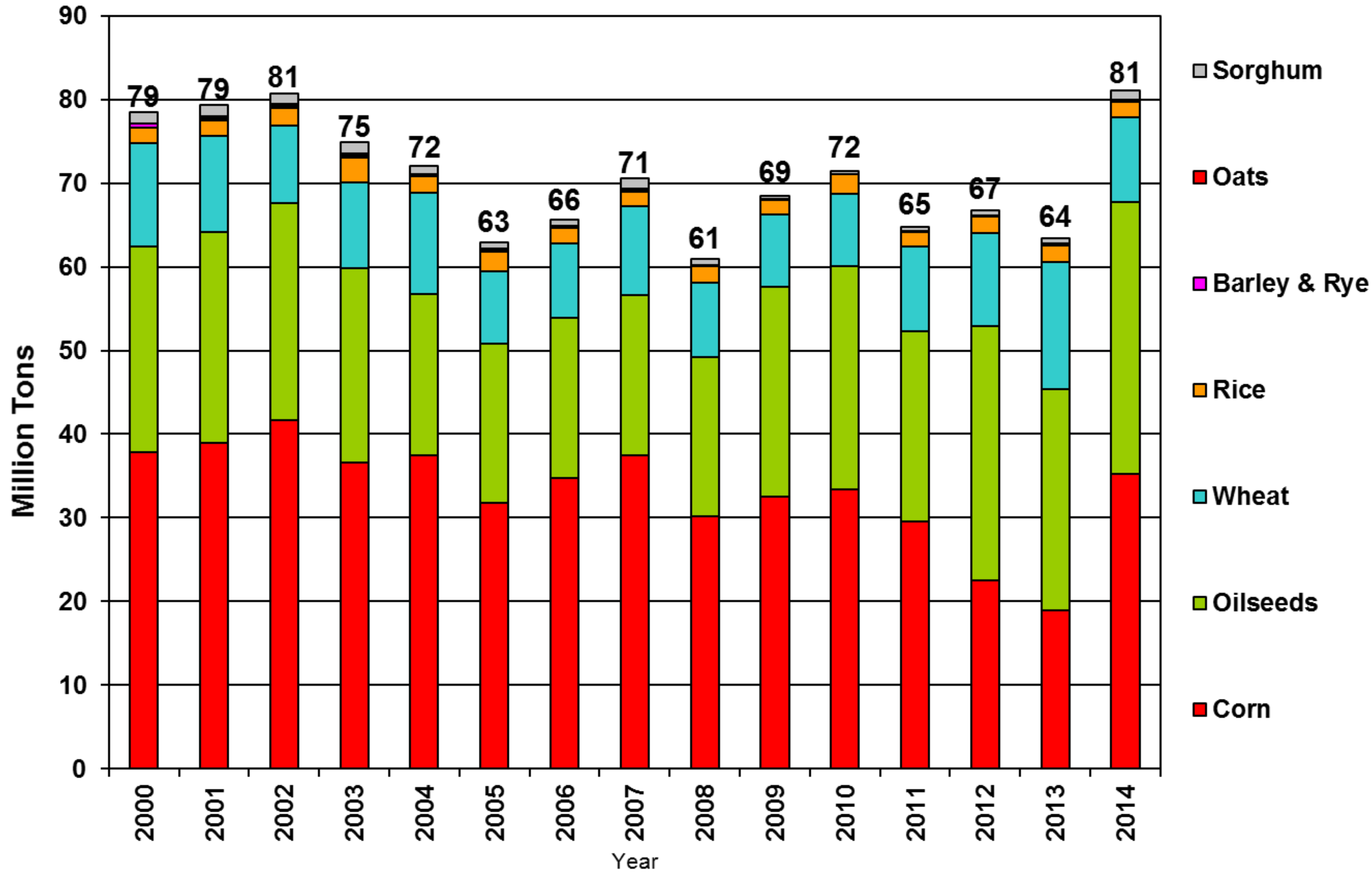
Source: USDA and Informa

Commodities Moved

Tons

- On the demand side, commodity volumes moved on the inland waterways during 2013 totaled 559 million tons, an increase of 7% from 2009. The economic recession led to a dramatic drop in commodity flows during 2009, but movements during 2010 showed a decent rebound.
  - Coal is clearly the largest commodity moved by barge. Coal barge volumes have decreased approximately 70 million tons since 2005. For comparison, total grains and oilseed barge movements in 2013 was 63 million tons.
  - The decline in coal, which is moved by open barge, is resulting in barge companies retrofitting open barges with covers to move grain and oilseeds.
- Volumes of farm products moved by covered barge are shown in Figure 89.

Figure 89: Farm Product Moved by Covered Barge (million tons)

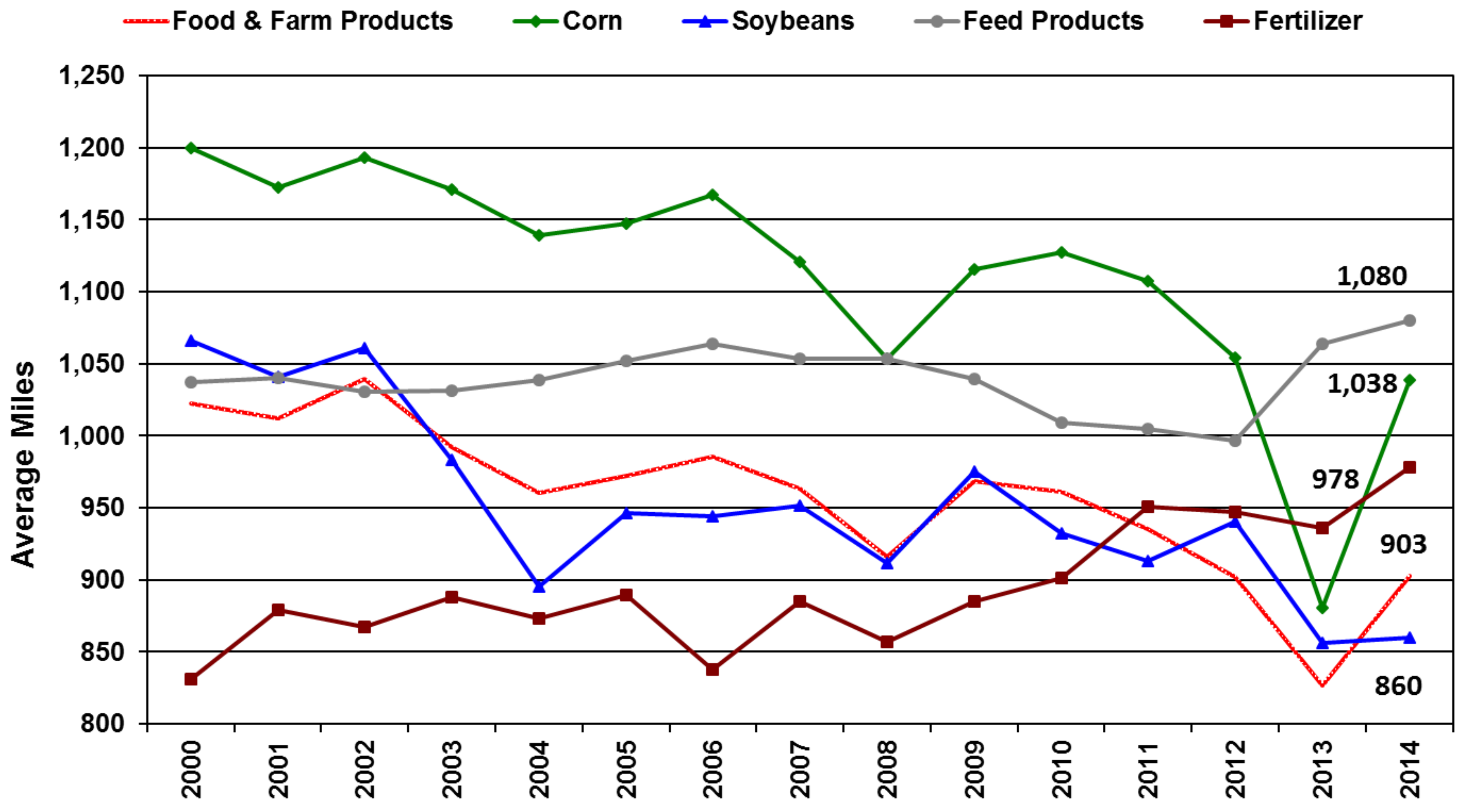


Average Distance

- The average distance commodities hauled continue to decrease as grain and oilseeds continue to be loaded lower on the Mississippi River.

- Since 2006, grain and oilseeds average distance has declined from 1,200 and 957 miles, respectively, to 773 and 877 in 2013 shown in Figure 90.
  - Corn and soybeans are in a clear downward slope. It is anticipated that as the grain and soybean supplies increase in the upper Mississippi River draw region, average distance traveled will increase.
  - The risk is that the locks become more unreliable and the ability to load barges heavier in the locking areas will lead barge companies to incentivize loadings on the lower Mississippi River.

Figure 90: Average Distance Food and Farm Product Moved by Barge (miles)

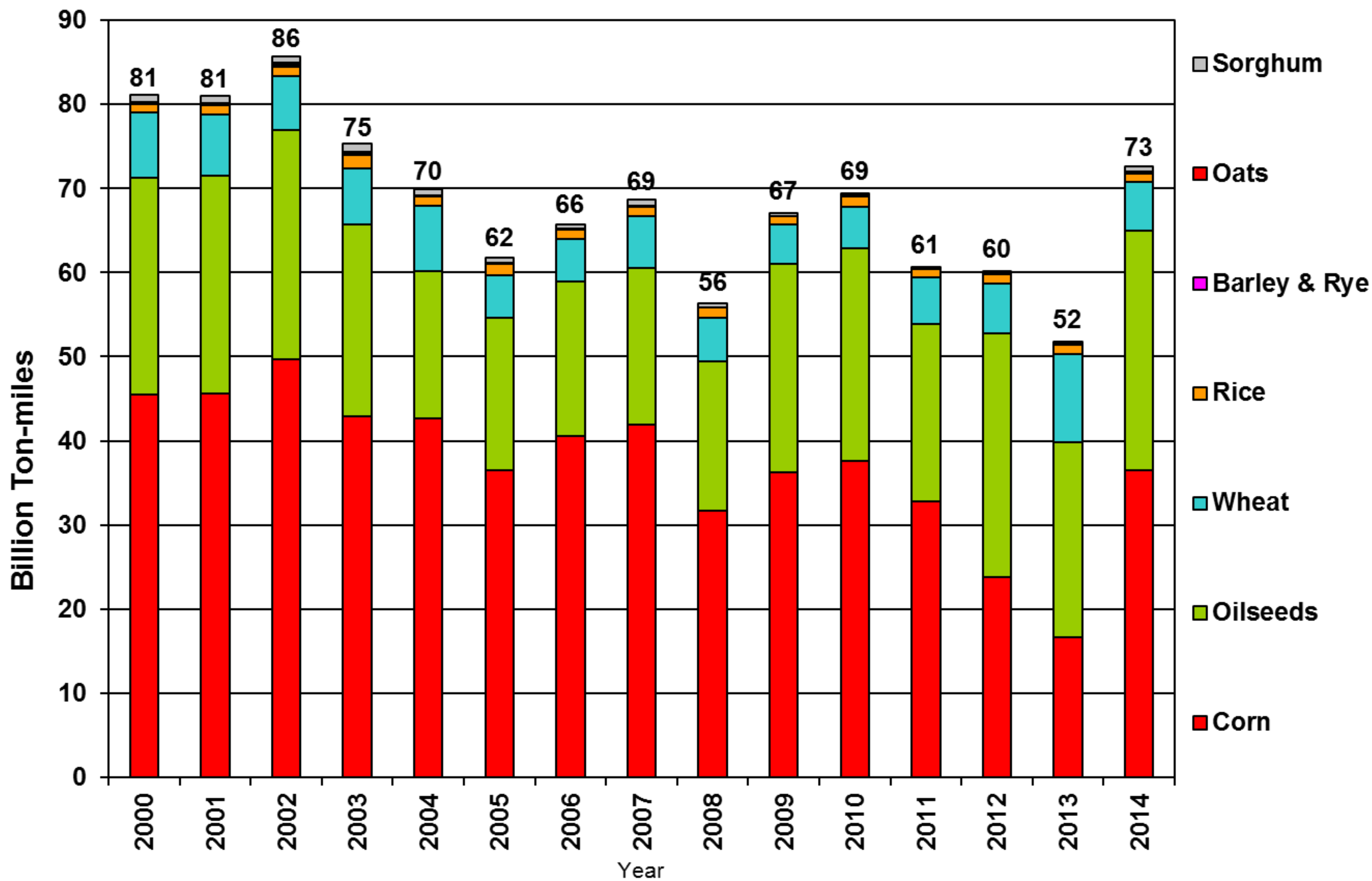


Informa Economics, *Barge Fleet Profile*

Ton-Miles

- Commodity ton-miles for all internal movements during 2013 totaled 252 billon ton-miles, down 6% from 2012.
- Grain and oilseeds totaled 52 billion ton-miles during 2013, a decrease of decrease of 13% on lower volumes and shorter distances moved.

Figure 91: Farm Product Moved by Barge (billion ton-miles)



VI. Infrastructure Brazil Transportation Enhancements

- Transportation infrastructure has a great impact on a country's economy, determining production decisions, trade flows, and who can or cannot operate within the economy.
    - In South America, infrastructure improvements provide the most potential for fostering economic growth and development.
        - However, more effort has been focused on land expansion rather than the transportation infrastructure that includes highways, and grain storage capabilities.
    - Brazil is expected to increase its soybean production by 49% from 2013 levels to 129 million metric tons in 2022/23, as shown in Figure 93.
    - Brazil will simultaneously increase whole soybean exports throughout the forecast period from 45 million metric tons in 2013/14 to 74 million in 2022/23.
    - In Brazil, soybean meal and soybean oil exports will remain relatively stable given Brazil exports a higher proportion of whole soybeans.
    - Brazil relies heavily upon roadways for transport of agricultural goods, both domestically and internationally. The challenge for Brazil will be finding ways through infrastructure enhancements to accommodate growth in both production and exports.

- The market conditions for soybean meal and soybean oil in Brazil are important factors to consider.
    - Excess soybean oil in the Brazilian market has accumulated from the volume of Brazilian soybean crush. Without increases in renewable fuel standards around the world, vegetable oil will become burdensome as crush continues to increase to meet world demand for meat.

- In addition to transportation infrastructure constraints, Brazil also faces constraints with respect to storage infrastructure.
    - In Brazil, production growth is hindered in Mato Grosso by the lack of storage facilities available to store expanding grain production.
    - Additional storage facilities are slowly being added throughout production regions, where Brazil's government offers low interest loans for the construction of additional storage facilities.
    - The creation of storage capacity in South America provides farmers options by allowing them to store products until after the harvest season, where prices are typically low while transportation costs remain high. However, data and information on storage capacity in South America is limited.

Figure 92: Brazil Transportation Infrastructure Map

- Informa expects Brazil will continue to increase soybean production to meet the growing Chinese usage exports as shown in Figure 93. The increasing exports are limiting supplies for the domestic market. Brazil's growing poultry market is increasing soybean meal usage and in turn, decreasing exportable supply

Figure 93: Brazil Soybean Production and Net Trade

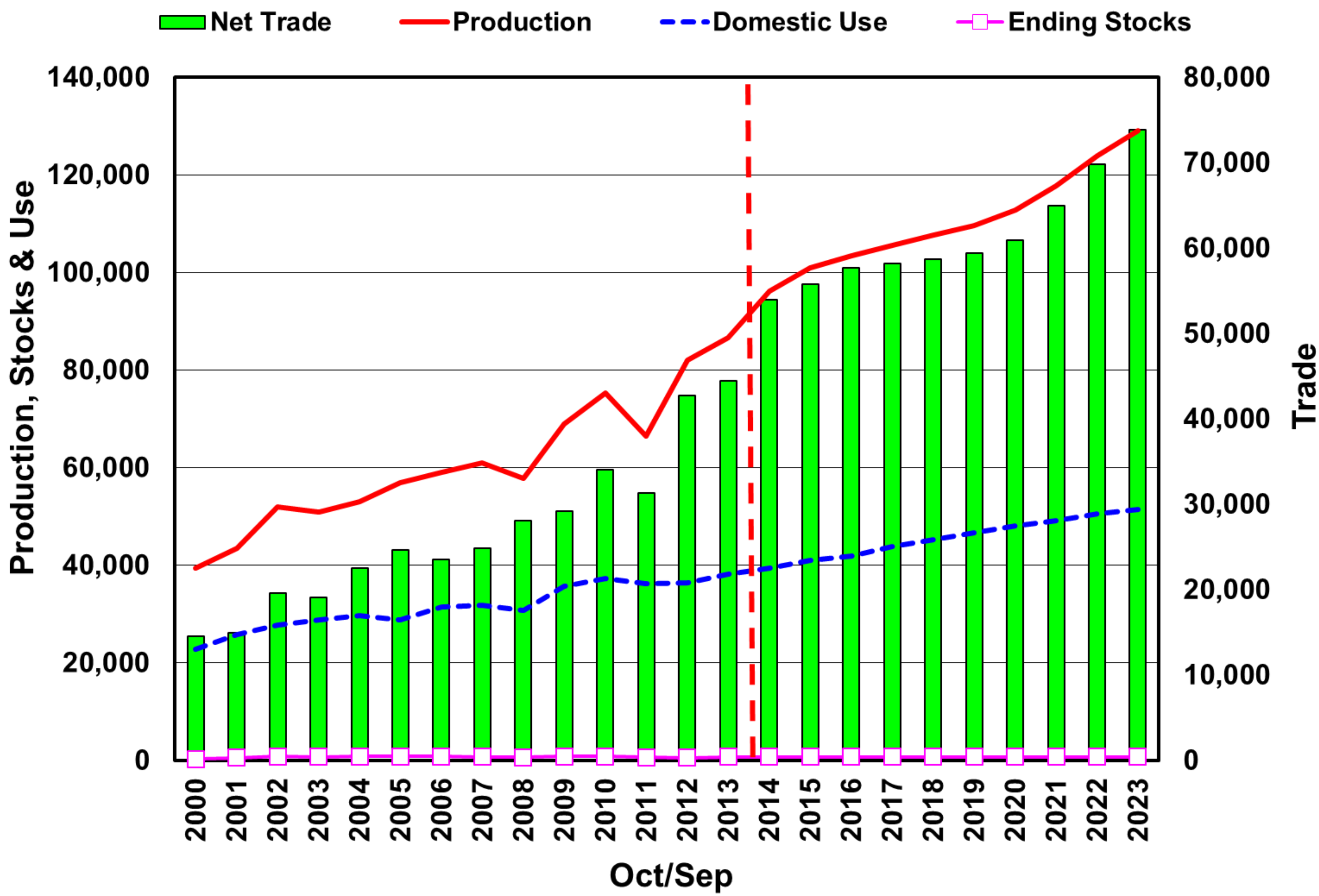


Figure 94: Brazil Soybean Export Market Destinations

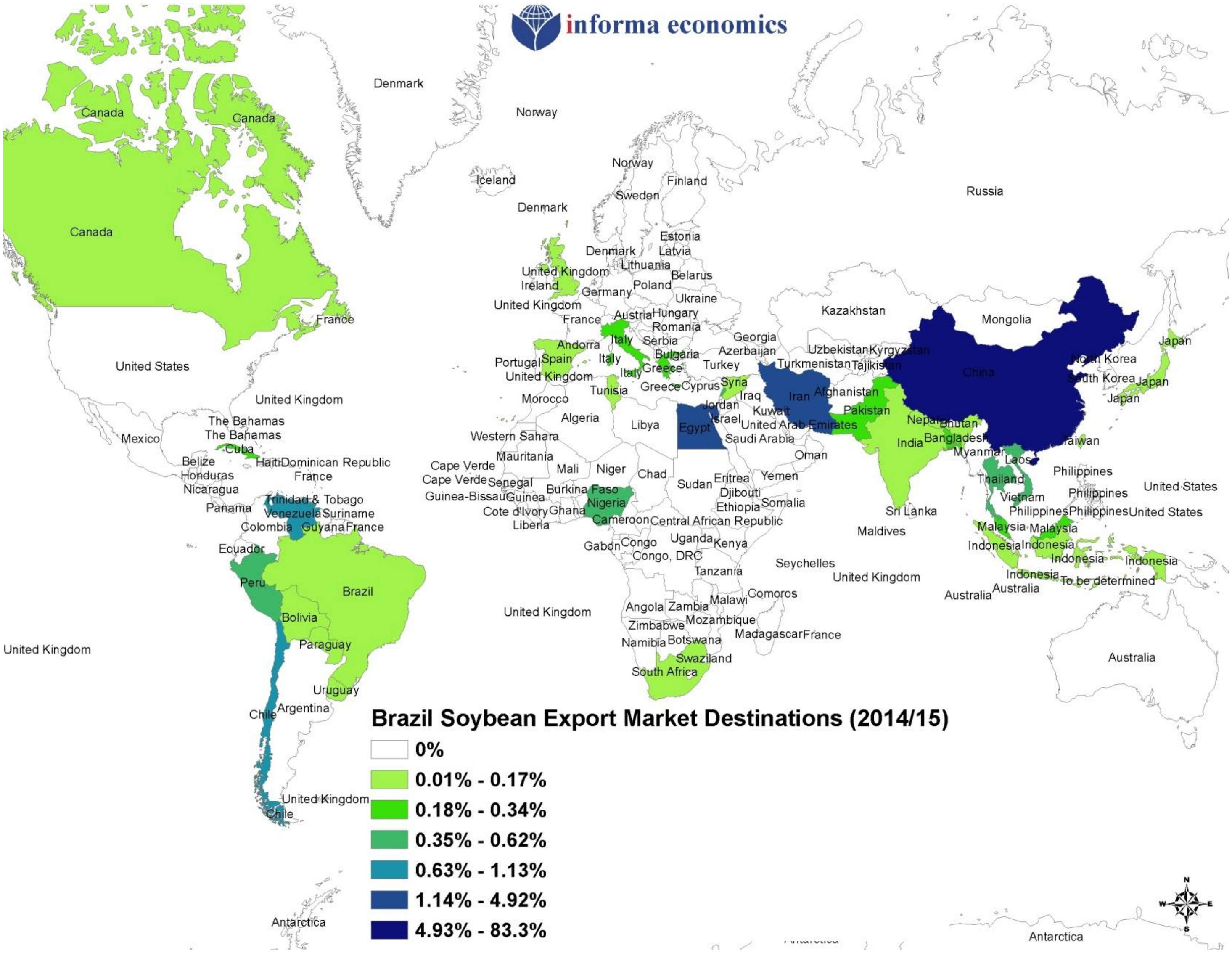


Figure 95: Brazil Soybean Meal Export Market Destinations

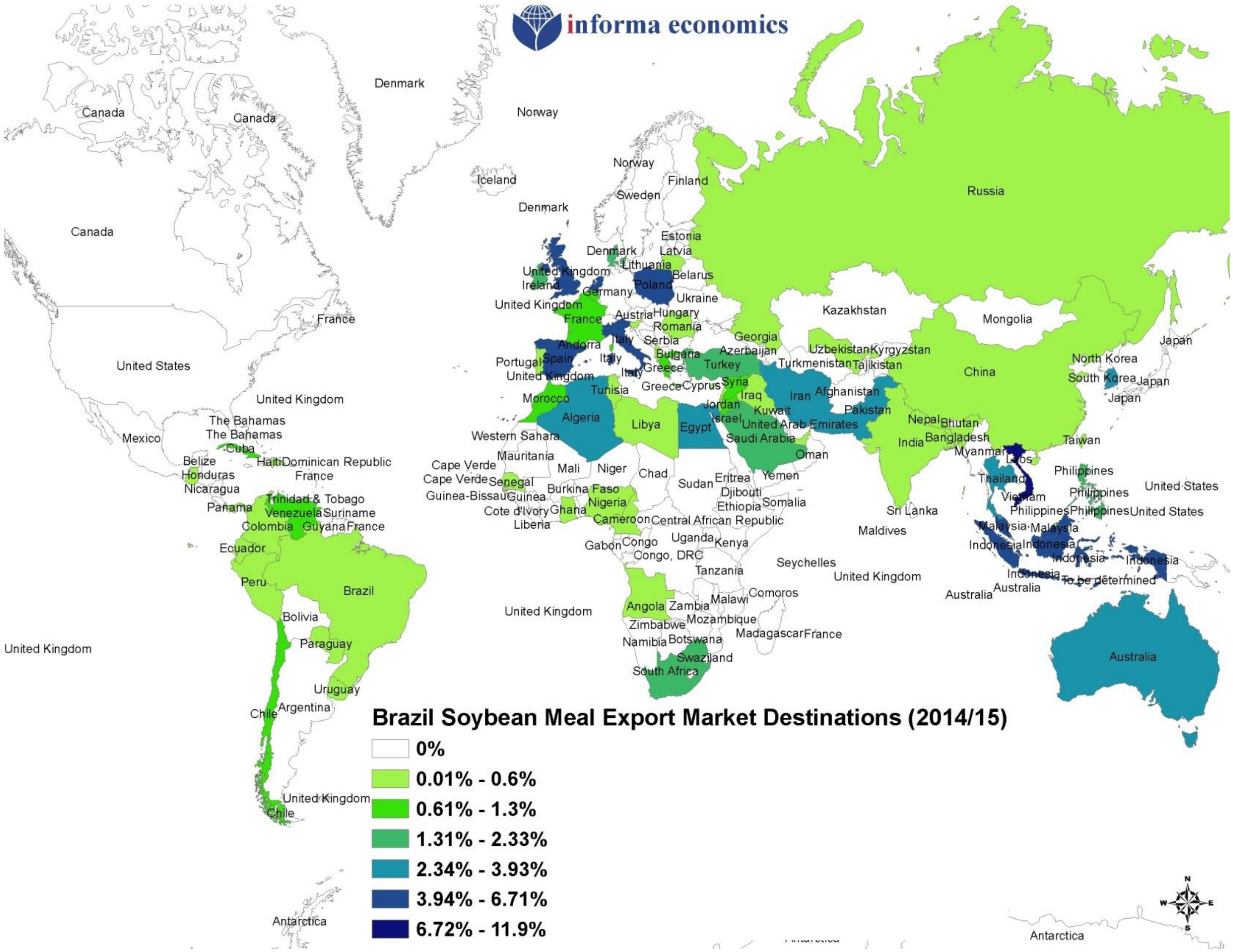
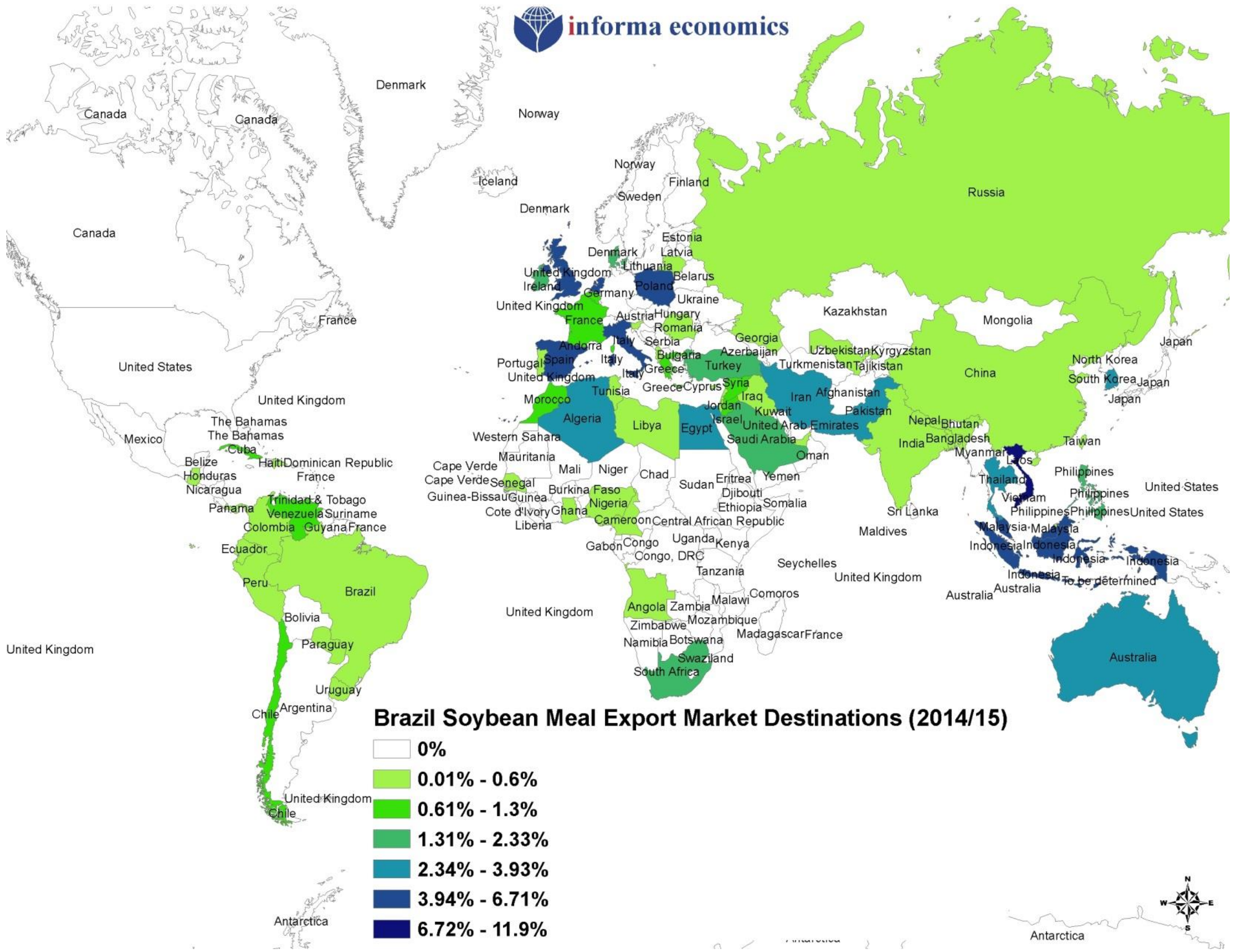


Figure 96: Brazil Soybean Oil Export Market Destinations



A. Brazil Infrastructure Investments in Transportation

- The Brazilian government plans to change the current cargo transportation matrix by developing an integrated intermodal system. The intention is that within 15 to 20 years, railway participation will increase from 25% to 35%; waterways from 13% to 29%; and truck shipments will be reduced by 28 points, from 58% to 30%.
    - To modify the transportation matrix, in January 2007, the Brazilian government created the Growth Acceleration Plan 1 (PAC 1) to promote sustainable social and economic development by generating employment, income, and reducing regional inequalities.
    - During the same year, the PAC was integrated into the National Plan of Logistic and Transportation (PNLT).
        - The PNLT is executed through the Ministry of Transportation and Defense allocating funds in 3 phases from 2008 to 2023.
        - By March 2010, the Government announced the second Growth Acceleration Plan (PAC 2), 2011-2014.

- The ninth evaluation results of Growth Acceleration Program 2 (PAC 2), 2011-2014, showed that Brazil did not finish the projects as planned.
    - However, the Midwest agricultural exporters in Brazil gained from selected strategic port improvements, extended railways miles and a new intermodal grain terminal.
    - Some of the port improvements include: dredging in the ports of: Santos (SP), Sáo Francisco do Sul (SC), and Rio Grande (RG); Port of port of Itaquí (MA) expansion and building pier 100; Sáo Francisco do Sul (SC) Pier 102 restoration; and Port of Vila do Conde (PA) main pier expansion.

- Three railroad projects are underway and scheduled to finish by the end of 2015.
    - Ferronorte railroad (Rondonópolis-Alto Araguaia), finished 153 railway miles, including an intermodal yard in Rondonópolis facilitating the flow of grains from Mato Grosso (MT) to the southern port of Santos.
    - By November 30, 2014, the North-South railroad (Palmas,Tocantinas (TO)-Estela D'Oeste, São Paulo (SP)) is expected to be finished. This railroad integrates 4 states: TO, Goiás (GO), Minas Gerais (MG),and SP with access to the northeastern port of Itaquí-Sâo Luis (MA).
    - By the end of 2015, the East-West railroad (Ilheusin-Caetité-Port of Ilhéus Bahia (BA)) will facilitate the movement of grain from the midwest, north and northeast to Ilhéus.

- By December 30, 2015, construction of highway BR-163 (began in PAC 1) will complete 619 miles, connecting Brazil's Midwest to the Amazon River. The BR-163 will significantly reduce transportation costs to the Amazon River ports.

- It will shift soybean exports to Europe and Asia from southern ports toward northern ports. However, it is less likely that the Brazil–China route would be significantly affected because it requires a major cost reduction of inland transportation to offset the increase in ocean rates, due to 7 or 8 additional days at sea if around South Africa's Cape of Good Hope to China, but with the expansion of the Panama Canal the route could be shortened or at a minimum unchanged, complete with potential lower ocean freight costs.

Table 26: Growth Acceleration Program, Ninth Evaluation Results (2011-2013)

Transportation Mode	2011-2013	
	km	miles
Highways		
Completed	3,080	1,910
Initiated	274	170
Work in progress	6,915	4,287
Total	10,269	6,367
Railways		
Completed	639	396
Work in progress	2,471	1,532
Total	3,110	1,928
Port - Modernization and increase capacity and inland waterways		
Ports	21 projects	
Inland Waterways		
Tietê waterway improvements	6.4	

Source: Brazilian Ministry of Transportation, PAC 2; http://www.transportes.gov.br/;Accessed 3-10-14

- The planned spending on transportation infrastructure is decreasing dramatically on an annual basis, as shown in Table 27.

Table 27: National Logistics and Transportation Program (PNLT), timeframe 2008 - after 2015, billions

Phases	Total (billions)		% share
	R$	US$	
I: 2008-2011	109.2	46.9	37.6
II: 2013-2015	84.3	36.2	29
III: 2015-2023	97.3	41.8	33.4
Total	290.8	124.8	100

*Average 2014 exchange rate: 1 US$ = R$ 2.3303

Brazilian Ministry of Transportation

- The breakdown of total amount spent by mode leans heavily toward railways, as shown in Figure 97. This is testimony to the strength of the mining industry in Brazil. The same investment has not been forthcoming in the agricultural areas. The mining industry can tie the rail investment to new mine production and jobs.
  - However, with mining activity slowing because of lower global activity, the agriculture sector is gaining more attention.

Figure 97: National Logistics and Transportation Program (PNLT), timeframe 2008 - after 2015, billions

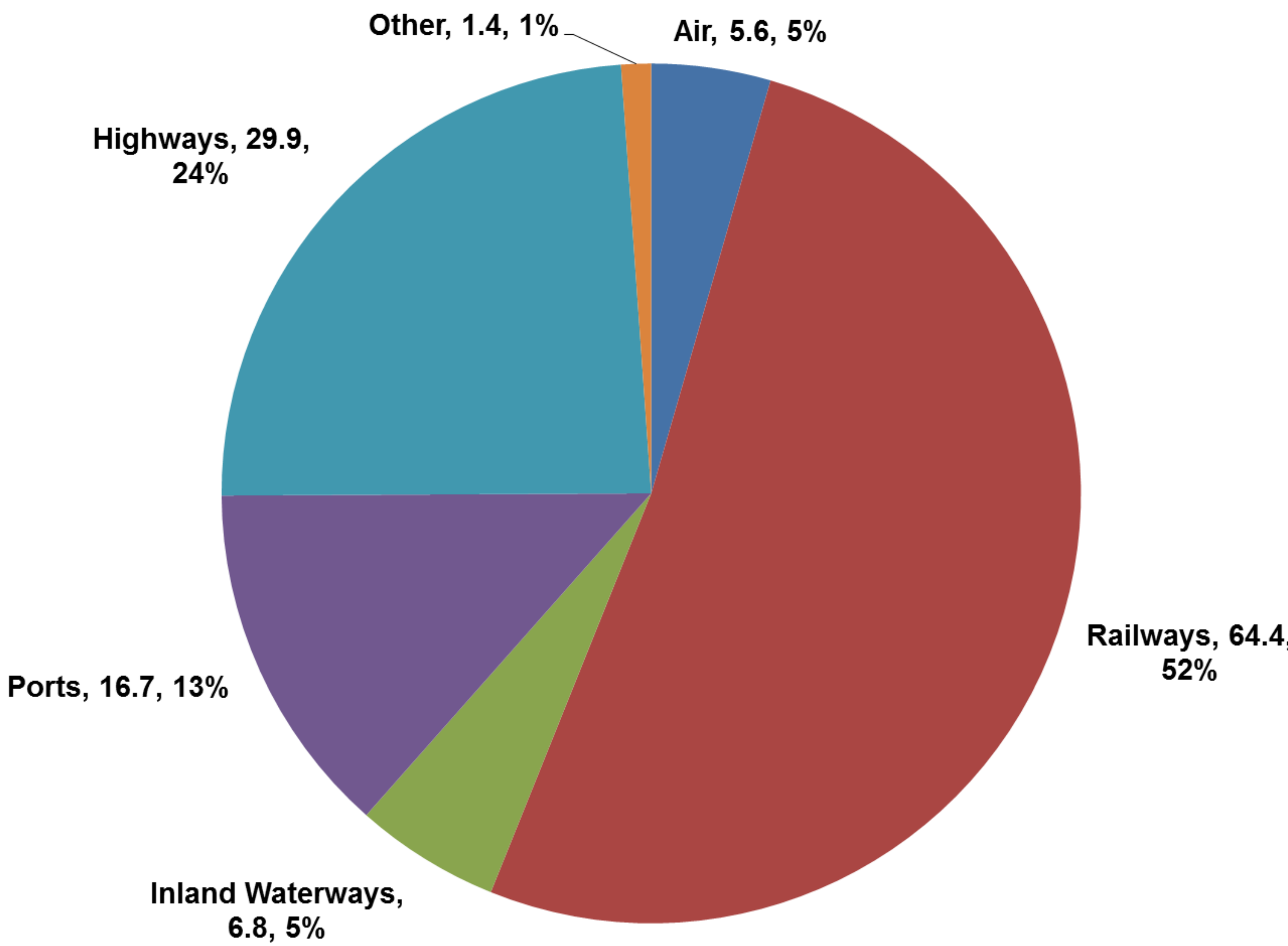
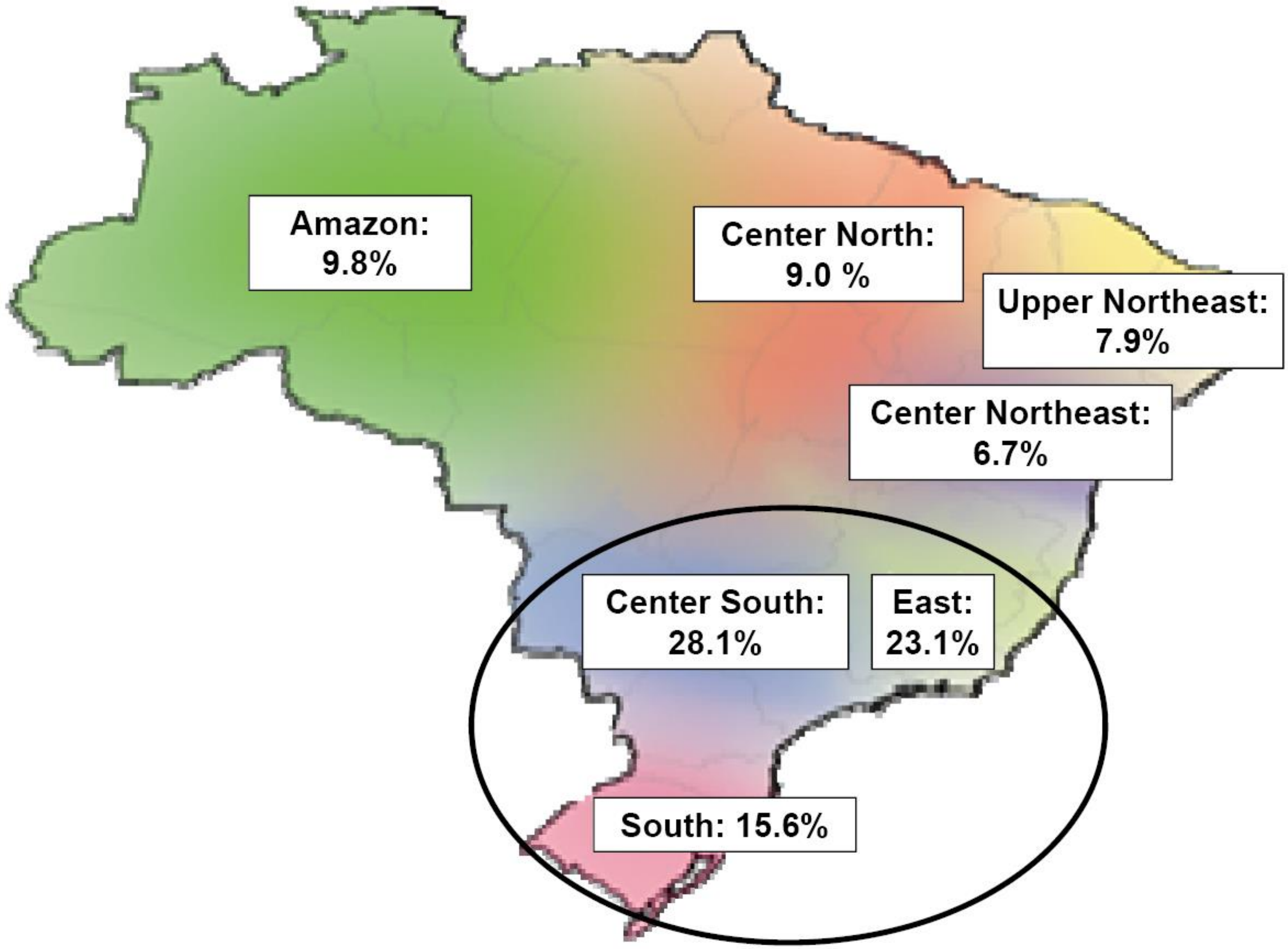


Table 28: PNLT Transportation Mode Investments in Brazil by Region (percent)

Mode	Amazon	Center-North	Center-South	East	Center Northeast	Upper Northeast	South	Total
Air	5.3	6.6	28.2	20.8	2.8	25.0	11.4	100
Railways	6.8	6.2	37.4	24.2	5.9	4.5	14.9	100
Inland Waterways	31.3	29.7	13.0	9.6	1.7	1.0	13.7	100
Ports	2.6	8.7	20.8	41.8	4.0	5.3	17.0	100
Highways	16.5	9.1	15.5	14.6	12.0	14.4	18.0	100
Other	0.0	49.3	24.3	7.2	0.5	16.5	2.5	100
% of Brazil	9.9	9.2	11.3	9.6	20.4	22.7	16.9	100

Source: Brazilian Ministry of Transportation

Figure 98: PNLT Brazilian Infrastructure Investment Allocation by Area



1. Waterways

- In Brazil, there are 40 water and sea ports and 42 private terminals.
  - The Port of Santos navigation channel is 426.4 ft wide and 42.64 ft deep.
  - The Port of Paranaguá's entrance channel is 656 ft wide and 39.36 ft deep. It has 3 access channels.
    - Galheta, the major access channel, extends 17.7 miles and has a width ranging from 492 to 656 ft, and a depth of 39.36 ft.
  - The Port of Vitória's entry channel is 820 ft wide and 62.32 ft deep. Its access channel extends 4.34 miles, and is 393.6 ft wide and 36.08 ft deep.
  - The Port of Santarém access channel is 5,905 ft wide and 49.2 ft deep.
  - The Port of Manaus access channel is 1,640 ft wide and 114.8 ft deep.
    - Both ports, Santarém and Manaus, have the capacity to handle Panamax vessels that require a draft of up to 39.5 ft.

- Brazil has 39,060 miles of river-lake surface water and 27,280 miles of navigable rivers, but only 8,060 miles are commercially navigated.

Table 29: Select Waterways Infrastructural Improvements Status, Growth Acceleration Program (PAC 2)

Transportation Mode	2011-2013		Percent	Expected date of completion/notes
	km	miles	finished	
Ports - Modernization and increase capacity				
Dredging in 7 ports of: Santos (SP), Sáo Franciso do Sul (SC), Natal (RN), Fortaleza (CE), Itajai (SC), Rio de Janeiro (RJ), and Suape (PE)			100	
Rio Grande do Sul (RS): Pier expansions			100	
Itaquí (MA): build pier 100, south pier enlargement and port expansion			100	The Port of Itaqui is a natural port with an average access channel of 98 feet (30 meters) and a minimum depth of 88.6 feet (27 meters), and a length of 5,904 feet (1,800 meters). The dock depth is 29.5-62.3 feet (9-19 meters). The terminal of Ponta Madeiras access channel ranges between 75.4 to 114.8 feet (23 to 35 meters).
Vitoria (ES): recovery, enlargement and extension of commerical wharf Victoria Harbor			100	
Sáo Francisco do Sul (SC): Pier 102 restoration			100	
Port of Vila do Conde (PA): expansion of main pier			100	

Source: Brazilian Ministry of Transporation, PAC 2; http://www.transportes.gov.br/; Accessed 3-10-14

Figure 99: Brazilian Ports

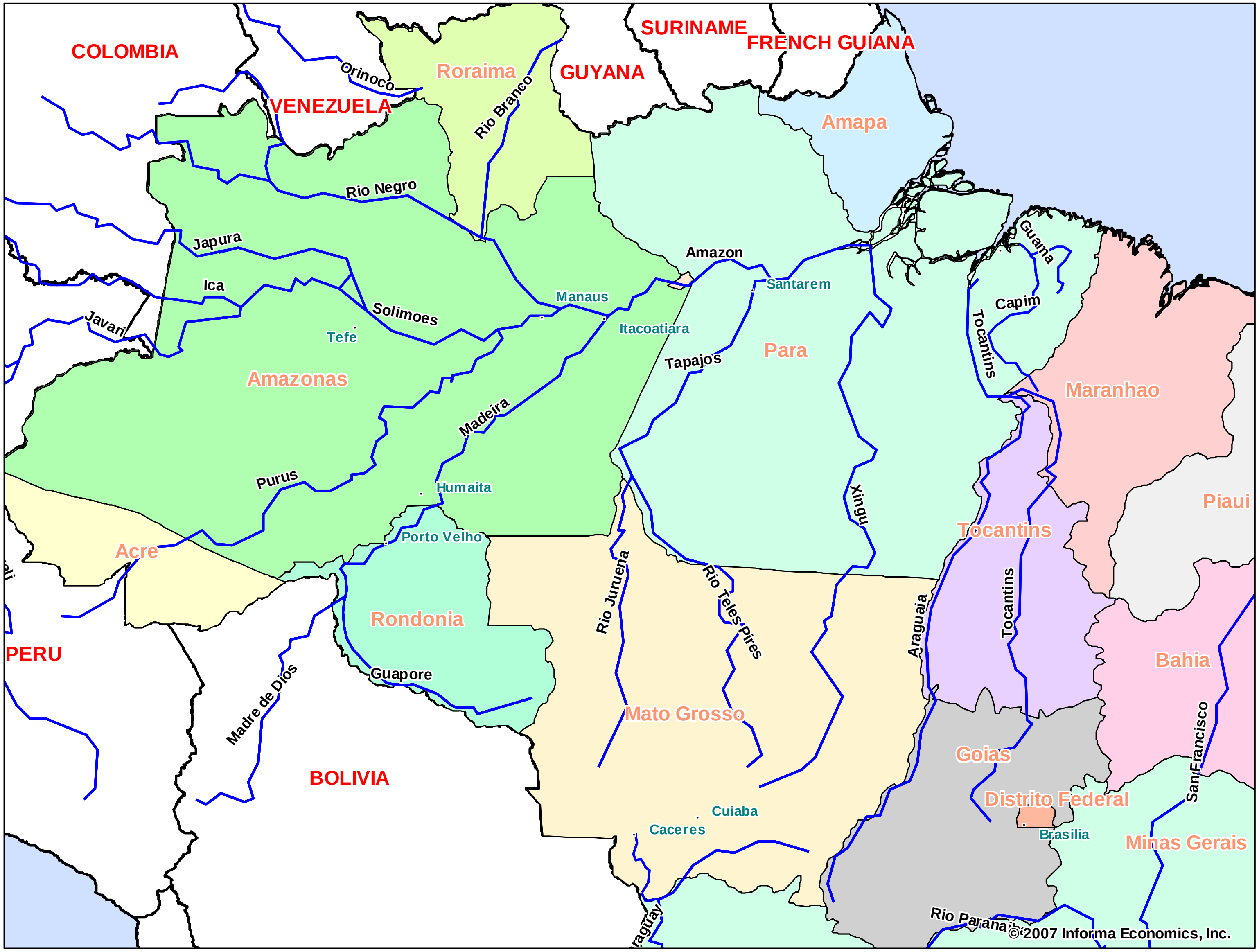
Note: Brazilian ports where cargo data are collected. These ports are responsible for more than 98% of the Brazilian cargo movement.

a) Amazon River

- The Amazon River is the largest watershed area in the world, and the Amazon Basin covers nearly 30% of South America. Brazil's Amazon River Basin has approximately 19,024 kilometers (km) of rivers with 18,300 km considered navigable and 724 km with the potential to be made navigable through dredging efforts.
    - The basin includes 28 rivers (Madeira, Amazon, Solimoes, Teles Pires, Tapajos, Tocantins, Acara, Acre, Branco, Capim, Guama, Envira, Guapore, Ica, Japura, Jari, Javari, Jurua, Mamore, Moju, Negro, Purus, Tarauaca, Tefe, Trombetas, Uatuma, Urucu and Xingo) covering 6 states (Amazonas, Para, Acre, Rondonia, Roraima and Amapa).
        - The major navigable rivers of the Amazon River Basin and significant cities and ports, are shown in Figure 100.

- The Amazon River benefits Brazilian agriculture from both production and transportation standpoints. The Amazon region has been a source of soybean production since the 1990s, a result of improved soybean varieties that can be produced within the tropical climate.
    - Production in the region benefits from the advantage of shipping production via the Amazon River. Ocean going vessels are able to navigate nearly two-thirds of the Amazon's length, without regard to vessel tonnage, although draft issues can be a concern at the mouth of the Amazon River.
    - Many vessels regularly travel up to Manaus.
    - Despite the Amazon's shipping advantage, it is one of Brazil's most underutilized corridors.

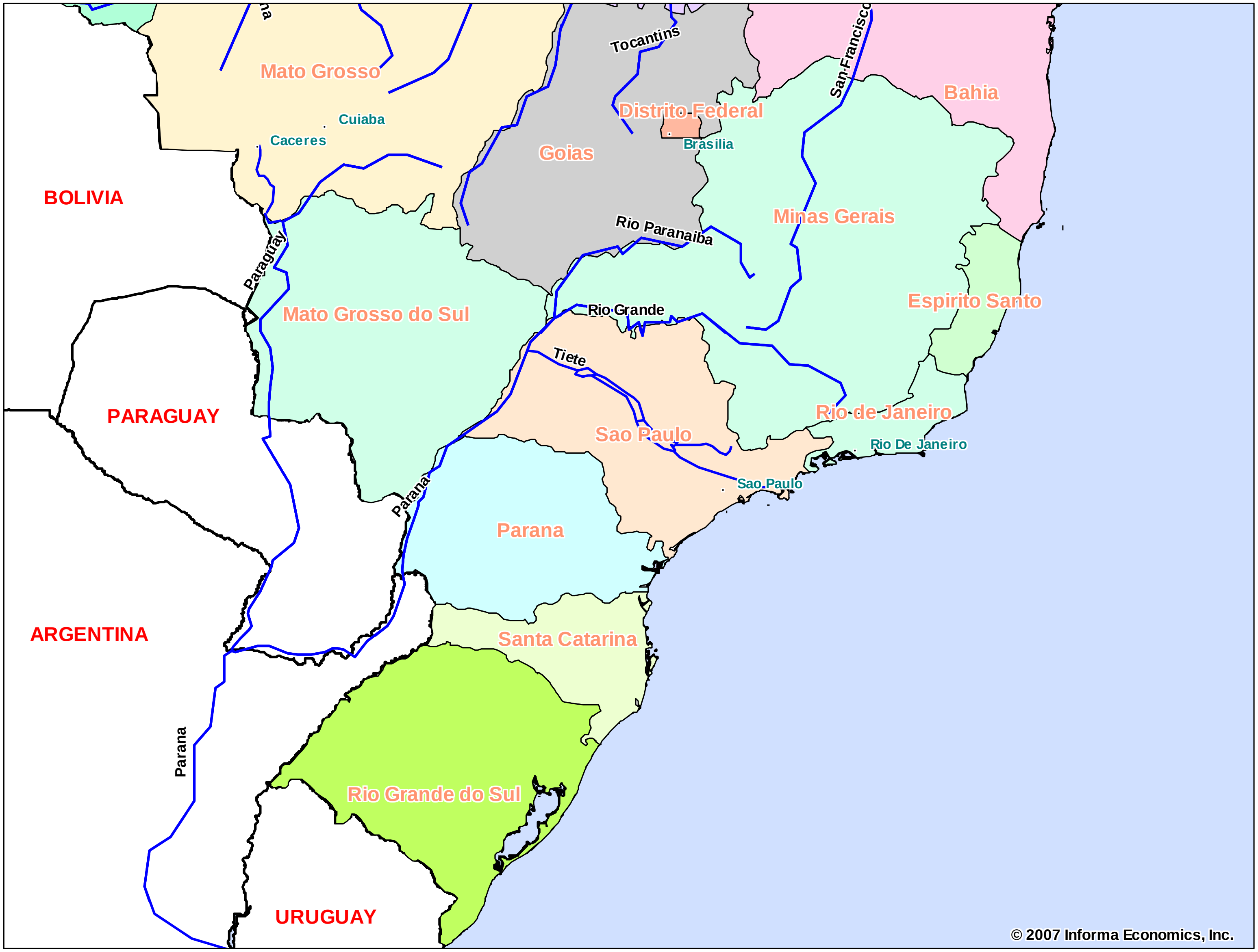
Figure 100: Major Navigable Rivers of the Amazon River Basin



b) Tiete-Parana River Basin

- The Tiete-Parana River Basin includes 2,400 km of navigable riverways that flow through five states: Goiás, Minas Gerais, Mato Grosso do Sul, São Paulo and Paraná.
    - The Tiete-Parana River Basin includes the Paranaíba, Grande, São José dos Dourados, Tietê, Paranapanema, Pardo, Ivinheima, Ivaí, Piquiri e Iguaçu and Paraná Rivers. Various commodities are moved on the Tiete-Parana River Basin such as sugar cane, soybeans, soybean meal, construction sand, corn and fertilizer.
        - The most important rivers are the Parana and Tiete and are shown in Figure 101.

Figure 101: Major Navigable Rivers of the Tiete-Parana River Basin



c) Rio Madeira River

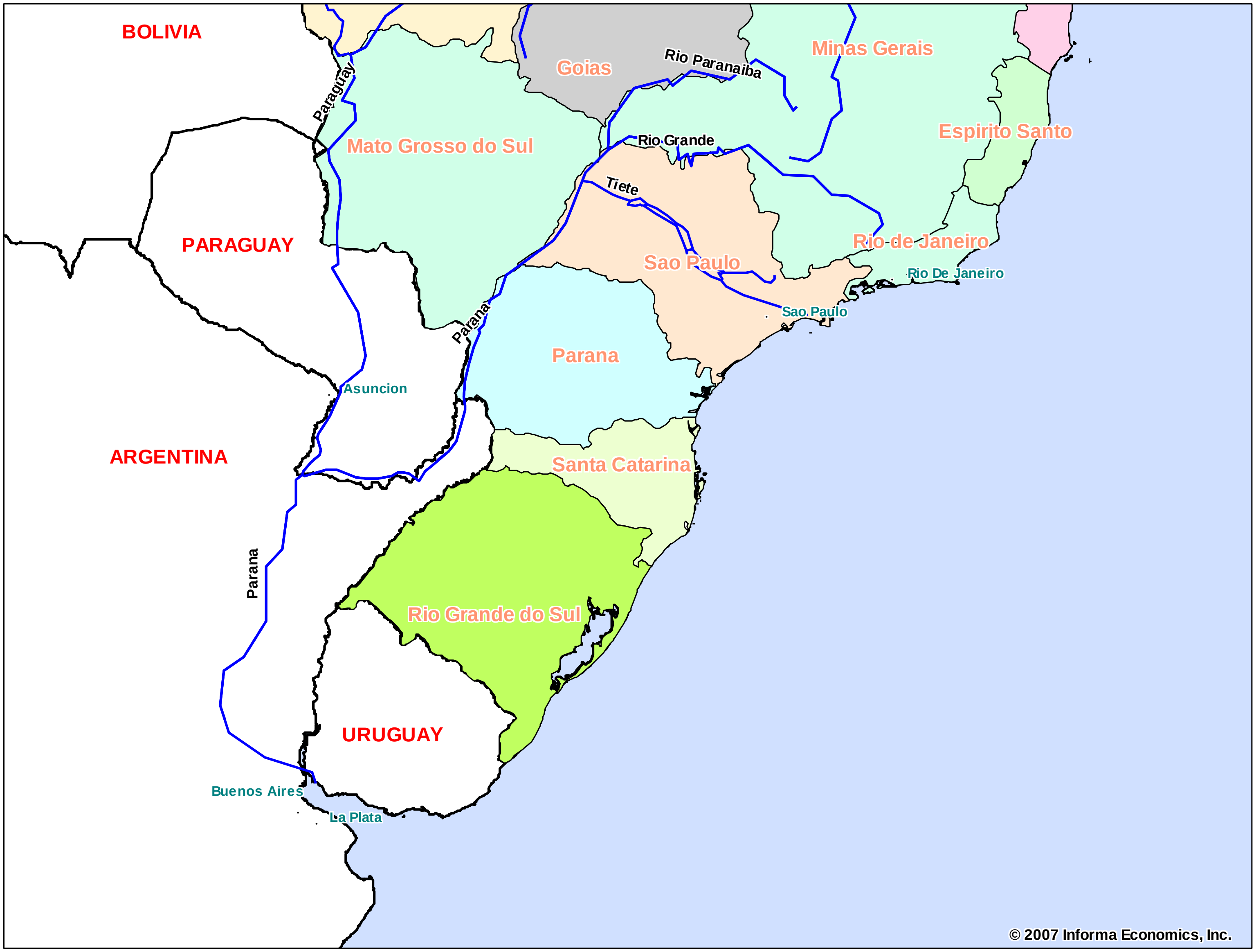
- The Rio Madeira located in Brazil is the largest tributary of the Amazon, and offers the most opportunity for future grain movements in the country.
  - This waterway has the potential to move a total of 2 to 3 million tons annually.
    - The cost of transporting soybeans along the Rio Madeira is higher than transportation along the Mississippi River System.

d) Paraguay-Parana River Basin

- The Paraguay-Parana River System is among the longest, and most important inland waterways in South America. It runs from Port Caceres in Mato Graso, Brazil to Port La Plata in Argentina and Nuevo Palmira, Uruguay covering a distance of 3,442 km, as shown in Figure 102.
  - Ocean going vessels navigate up the Paraguay-Parana River to Rosario loading to a maximum 38,000 metric tons with commodities.
    - This requires the use of smaller vessels such as Handymax or light loading a Panamax vessel.
    - Once the Panamax vessel is loaded it is shifted or is moved to another deep water port along the Atlantic Coast of Brazil or to a mid-stream operation to be topped off to maximize its payload of about 60,000 metric tons.
      - Handymax and Panamax vessels are commonly used for the movement of grains, fertilizers, steel, and some coal and iron ore.
      - The most efficient vessels for iron ore and coal shipments is a Capesize vessel that loads upwards of 200,000 metric tons of low value bulk commodities.
      - A Panamax vessel is the largest vessel that can transit through the Panama Canal lock system.
      - Capesize vessels sail around the Cape of Good Hope or Cape Horn or through the Suez Canal but they are too big for the Panama Canal.

- This inland waterway serves five countries including Brazil, Bolivia, Paraguay, Argentina, and Uruguay. Unlike the Amazon or Madeira Rivers, this system is an international river system with a unifying body, the Comision Intergubernamental de la Hidrovia Paraguay-Parana (CIH), that oversees its operations and functions.
  - The system is maintained (dredging, buoy and light mainteance) by a private contractor arrangement from Rosario Argentina to the mouth of the river at the Atlantic Ocean. The rest of the system northward to Port Caceres is overseen by the governing body wtih representatives from each country.

Figure 102: Major Navigable Rivers of the Paraguay-Parana River Basin



e) Hidrovia Paraguay - Parana

- The Hidrovia waterway is a natural river system that flows through five countries in South America: Argentina, Bolivia, Brazil, Paraguay and Uruguay.
  - This river system is equivalent to the Mississippi River's importance in the U.S., and aims to be a nearly 4,000 km shipping canal. The Paraguay and Parana Rivers in Brazil form the beginning point of the Hidrovia.
    - In order for this river system to be completed, dredging and extensions will be needed, a process that could take several years.
    - Additionally, several organizations have shown their disapproval for the project arguing that there are environmental factors, such as increased flooding and loss of ecosystems at risk.

2. Roadways

- The Brazilian highway system extends 1,066,776 miles (1,720,607 kilometers), with only 14% paved. Most of the paved highways are federal and state highways.
  - Brazil's road network is better maintained in the populated areas of the south and southeast than within the remainder of the country.
  - In the agricultural regions of Brazil, the roads are used heavily and experience bottlenecks during the soybean harvest season. It is exceptionally difficult to ascertain how many of Brazil's 1.8 million trucks are used to haul grain, but it is notable that the average age of the national heavy truck fleet overall was estimated to be 18 years old in 2010.
    - This aged class of transportation assets is a further impediment to efficient transportation operations.

- The country faces increasing problems with truck transportation as the average age of the vehicle fleet increases, and transportation costs continue to be among the highest in the world.
  - Cargo transport costs are compounded by a number of factors which include:
    - Poor quality and lack of roads;
    - Maintenance costs due to poor roads;
    - Extra time required in port moves (i.e., moving product from one transportation mode to another);
    - High diesel prices;
    - Insurance costs; and
    - Product lost in transit.

Table 30: Select Highways Infrastructural Improvements Status, Growth Acceleration Program (PAC 2)

Transportation Mode	2011-2013		Percent	Expected date of completion/notes
	km	miles	finished	
Highways				
BR-163: Guarantã do Norte, Mato Grosso (MT)-Santarém, Pará (PA), including access to Miríttuba-BR-230 (PA)	999	619		Dec 30, 2015. It connects North MT-PA to the Amazon port of Santarém
Completed	277	172	27.7	
Work in Progress status by segment:	722	448	72.3	
Segment III: Divisa (MT)-Guarantã do Norte (MT) and Travesia Ubana de Guarantã	52	32	100	
Segment II: Rurópolis-Divisa (MT) with access to Miríttuba-BR-230 (PA)-33 km (20 miles) Divisa MT, total 822 km (510 miles)	822	510	22.4	December 20, 2015
Segment I: Santarém-Rurópolis(PA)	125	78	32.8	October 31, 2015
Total:	999	619		

Source: Brazilian Ministry of Transporation, PAC 2; http://www.transportes.gov.br/; Accessed 3-10-14

3. Railroads

- Brazil's rail network is limited and inefficient, with only 29.5 thousand kilometers of multiple gauge track.
  - These tracks lie mostly in the south and eastern portions of the country, and were developed around mineral extraction. Brazilian railroads are privately held, and total 12 freight lines.
  - Brazilian rail cost controls has left the railroad system underdeveloped and underinvested.

- The idea of government-owned or government-controlled railroad industry is popular, but realities of what the level of fixed expense are required to maintain a railroad was either not understood and/or funded. Eventually, capital has to be invested in rail infrastructure to maintain operations.
  - As a result, the rail system has been a low priority for the federal government since the turn of the twentieth century. As such, of the few operating rail lines, most are based on and depend on mining products because the large mining companies used their influence to ensure their rail needs were accommodated. Other factors that negatively impact the rail industry include:
    - A lack of standardized track gauge;
    - Very slow average train speeds;
    - Underutilization of several rail lines; and
    - Poor passage conditions in urban areas.

Figure 103: Brazil Railroad Networks

Source: National Association of Rail Transporters (ANTF)

Table 31: Select Brazilian Railway Infrastructure Improvement Status, Growth Acceleration Program (PAC 2)

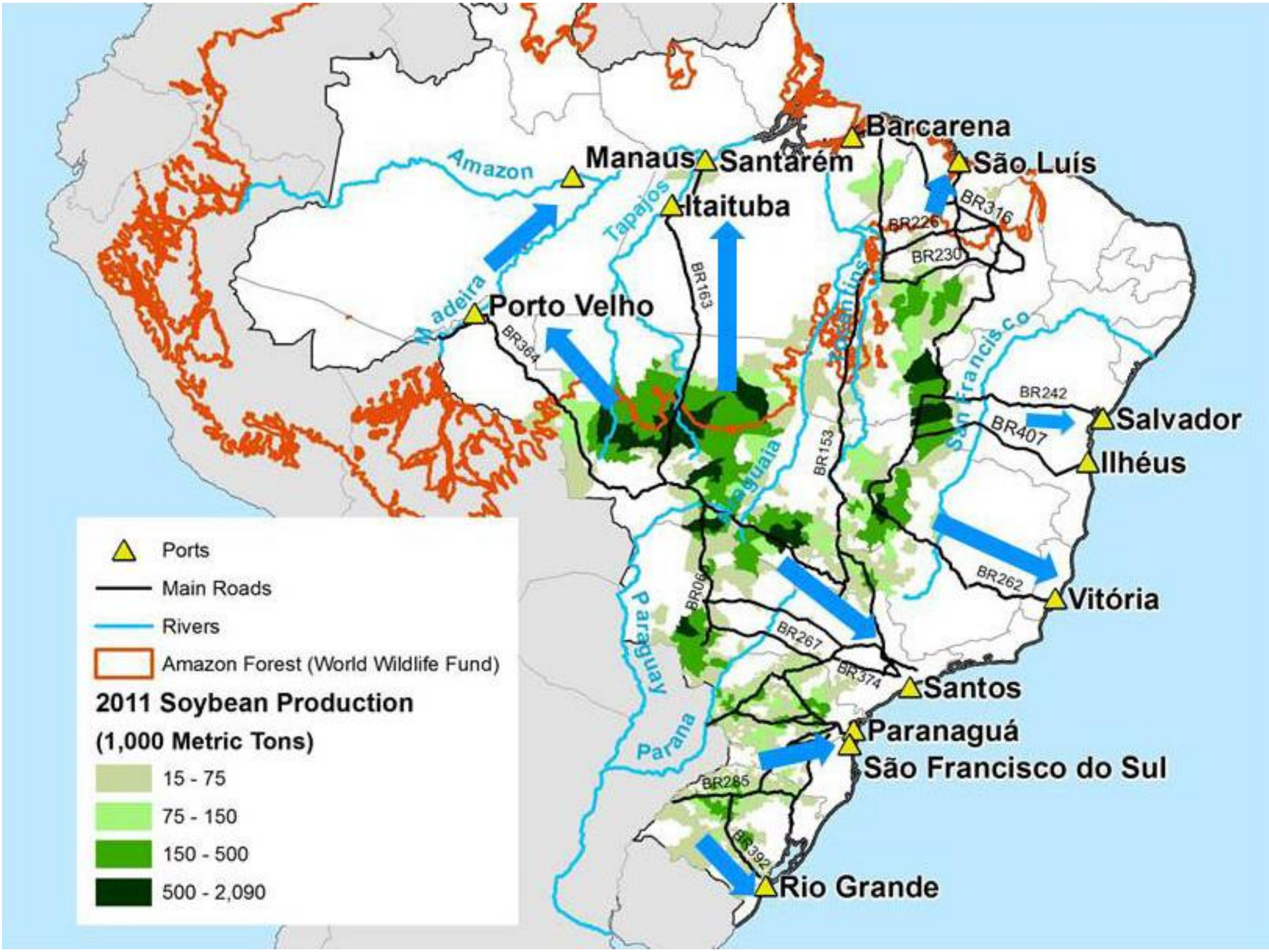
Transportation Mode	2011-2013		Percent	Expected date of completion/notes
	km	miles	finished	
Railways				
Ferronorte extension: Rondonópolis-Alto Araguaia (MT), including Intermodal Yard Rondonópolis (MT) , 52 miles (84 km). In additiona, to the previous 101.1 miles (163 km) built in the PAC 1 totaling 153 miles.	247	153	100	Note: this new terminal facilitates the flow of grains exports from MT to the southern port of Santos (SP).
North-South: Palmas, Tocantinas (TO)-Estela D'Oeste, São Paulo (SP)	1,536	952		Nov. 30, 2014. It integrates 4 states: TO, Goiás (GO), Minas Gerais (MG), and SP with access to the northeastern port of Itaquí-Sâo Luis (MA).
Completed	283	175	18.4	
Work in Progress	1,254	777	81.6	
North-South segment status updates:				
Segment I: Palmas (TO)-Anápolis (GO): total 855 km	855	530		March 31, 2014: Finished 410 km (254 miles).
-Palmas (TO)--Uruguaço (GO)	575	357	94.8	March 31, 2014
-Uruguaço (GO)-Anápolis (GO)	280	174	91.2	March 31, 2014
Segment iI: Ouro Verde/GO-Estela D'Oeste/SP	681	422	53.0	Nov 30, 2014
East-West: Ilheusin-Caetité-Port of Ilhéus Bahia (BA)	1,022	634		Dec 30, 2015. It connects Barreiras (BA) with the northeastern port of Ilhéus (BA)
Completed	200	124	37.3	
Work in Progress	822	509	80.4	
East-West segment status updates:				
Segment I: Caetité (BA)-Port of Ilhéus (BA)	537	333	37.3	Dec 30, 2014
Segment II: Ilheusin (BA)-Caetité Bahia (BA)	485	301		Dec 30, 2015: Project status: bidding process

Source: Brazilian Ministry of Transporation, PAC 2; http://www.transportes.gov.br/; Accessed 3-10-14

4. Economic Impact of Brazilian Infrastructure Investments

- Over the years, high transportation costs resulting from inadequate infrastructure have decreased farmer returns. This decline is a combined result of higher transportation costs, vehicle depreciation, and increased production costs. The primary causes of increased transportation costs have been:
    - Lack of competition among modes of transportation;
    - Inadequate access for agricultural producers to rail and waterway transportation; and
    - The heavy reliance on transportation by truck. Improvements toward infrastructure have been slow, and planned improvements have been unable to keep pace with production growth.

Figure 104: Brazilian Soybean Routes



- For example, because truck is used predominantly to move soybeans to market position, its costs can be more than double the cost of ocean freight rates, such as moving soybeans from North Mato Grasso to the Port of Santos, as shown in Table 32.

Table 32: Costs of Transporting Brazilian Soybeans to Shanghai, China (US$ per metric ton), by Port

	2008	2009	2010	2011	2012	2013	2014	Percent Change 13-14	2008	2009	2010	2011	2012	2013	2014	Percent Change 13-14
	North MT[1] - Santos[2] --US$/mt--								**Northwest RS[1] - Rio Grande[2] --US$/mt--**							
Truck	115.74	97.00	116.78	123.31	111.78	116.40	103.90	-10.7	22.29	24.50	28.18	38.94	25.83	23.26	24.56	5.60
Ocean	70.38	58.78	55.84	50.50	49.70	40.99	36.85	-10.0	72.08	59.42	58.21	51.10	49.69	41.52	36.65	-11.70
Total transportation	186.12	155.78	172.62	173.81	161.48	157.36	140.75	-10.6	94.37	83.92	86.39	90.03	75.51	64.79	61.20	-5.50
Farm price[3]	358.99	324.34	318.15	392.10	483.31	415.28	388.33	-6.5	394.66	359.51	344.90	415.87	483.22	459.33	442.52	-3.70
Landed cost	545.11	480.12	490.77	565.91	644.80	572.64	529.08	-7.6	489.03	443.43	431.29	505.90	558.73	524.11	503.72	-3.90
Transport % of landed cost	34.1	32.6	38.6	30.3	28.4	28.4	27.8	-2.2	19.4	19.0	20.1	17.8	13.7	12.3	12.2	-1.4
	North Center PR[1] - Paranguá[2] --US$/mt--								**South GO[1] - Santos[2] --US$/mt--**							
Truck	33.6	27.37	34.51	39.54	34.76	32.26	30.98	-4	55.33	50.83	64.71	63.92	55.02	58.9	62.57	6.2
Ocean	71.66	59	58.92	57.32	55.2	43.88	39.21	-10.6	70.38	58.78	55.84	50.5	49.7	40.96	36.85	-10
Total transportation	105.26	86.37	93.43	96.86	89.96	76.15	70.19	-7.8	125.71	109.62	120.56	114.42	104.72	99.86	99.42	-0.4
Farm price[3]	399.31	372.46	350.44	431.66	513.81	470.66	433.91	-7.8	373.13	338.31	324.27	412.89	479.8	428.06	401.49	-6.2
Landed cost	504.56	458.83	443.87	528.52	603.76	546.8	504.1	-7.8	498.84	447.93	444.82	527.31	584.52	527.93	500.91	-5.1
Transport % of landed cost	21.0	18.9	21.2	18.4	15.1	13.9	13.9	0	25.4	24.6	27.4	21.7	18.1	18.9	19.8	4.9

[1]Producing regions: RS = Rio Grade do Sul, MT = Mato Grosso, GO = Goiás, RP = Paraná

[2]Export ports

[3]Source: Campanhia Nacional de Abastecimento (CONAB) www.conab.gov.br

Source: ESALQ/USP (University of São Paulo, Brazil) and USDA/AMS

Table 33: Costs of Transporting U.S. Soybeans to Shanghai, China (US$ per metric ton), by Selected Regions

	2008	2009	2010	2011	2012	2013	2014	% Change 2013-2014	2008	2009	2010	2011	2012	2013	2014	% Change 2013-2014
	To Shanghai, China															
	Minneapolis, Minnesota --US$/mt--								Davenport, Iowa --US$/mt--							
Truck	11.50	10.01	9.45	11.38	11.29	11.56	13.04	12.8	11.50	10.01	9.45	11.38	11.29	11.56	13.04	12.80
Rail[1]	26.00	-	10.86	34.74	31.61	36.48	42.08	15.4	-	-	10.86	10.86	24.16	27.93	30.77	10.20
Barge[2]	34.75	25.56	41.41	31.93	28.53	25.79	37.45	45.2	30.41	19.77	35.61	25.99	22.89	21.38	32.80	53.40
Ocean[3]	91.18	51.21	54.56	53.08	46.98	46.76	45.72	-2.2	91.18	51.21	51.84	53.08	46.98	46.76	45.72	-2.20
Total transportation	143.93	86.78	108.13	105.05	94.71	93.23	106.72	14.5	133.09	80.99	99.61	97.06	87.20	86.69	99.25	14.50
Farm price[4]	411.71	363.80	355.37	446.13	507.43	511.04	455.47	-10.9	416.89	370.01	364.16	458.68	510.13	517.78	458.07	-11.50
Landed cost	555.64	450.57	463.51	551.18	602.14	604.28	562.19	-7.0	549.98	450.99	463.77	555.74	597.33	604.46	557.32	-7.80
Transport % of landed cost	25.4	19.2	23.3	19.1	15.8	15.5	19.1	23.6	23.7	17.9	21.5	17.5	14.7	14.4	18.0	25.0

[1]Rail rates include fuel surcharges, but do not include the cost of purchasing emtpy rail cars in the secondary rail markets, which could exceed the rail tariff rate plus fuel surcharge shown in the table.

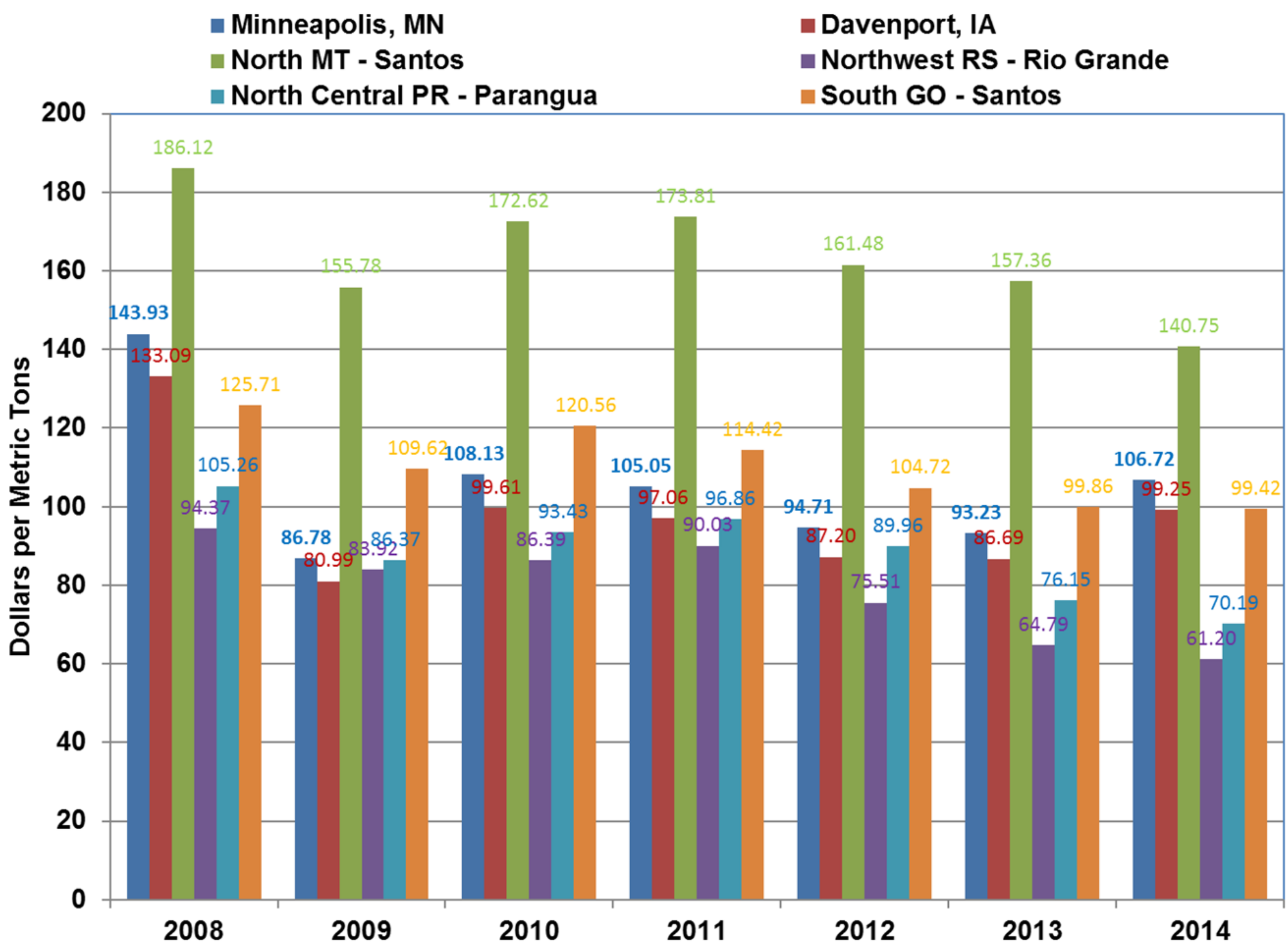
[2]The Mississippi River closes from Minneapolis to just north of St. Louis during mid-December to late March; The distance by barge between Minneapolis and Davenport to the Port of New Orleans is 1,713 and 1,343 miles, respectively.

[3]Source: The Baltic Exchange and O'Neil Commodity Consulting; excludes handling charges.

[4]Source: USDA/NASS/Quick Stats database

- The declining price of fuel and ocean freight is lowering the transportation cost. Due to Brazil having to move the soybeans a longer distance by truck than the U.S. to export position, the lower fuel prices benefits the Brazilians more than the Americans.
  - Matos Grasso is still the high cost location, but the gap is closing as shown in Figure 105.

Figure 105: U.S. and Brazilian Transportation Cost to Shanghai, China



Source: USDA AMS

B. Northern Brazil Developments

During August 2015 a team from the United Soybean Board, U.S. Soybean Export Council and American Soybean Association assessed the grain and soybean transportation infrastructure of northern Brazil. The assessment looked at the Ports of Barcarena, Belem, Itaqui and Santarem, visiting port authorities, export elevators (currently open and those under construction), hearing from transportation providers and investors. The northern ports have awarded concessions to private companies to build export elevators and improve the infrastructure.

- Multinationals have entered the Brazilian grain and soybean handling system, investing heavily on grain and soybean collection infrastructure including barge equipment, barge loading elevators, rail network and export elevators.

- Current export throughput capacity of export elevators across northern Brazil totals about 15 million metric tons
    - This includes export capacity at Vila do Conde or Barcarena, Belem, Itaqui and Santarem.
    - Much of this grain destined to these export elevators arrives by truck, some by barge and rail.

- Current construction efforts at these same port areas and including Itacoatiara, will push annual export throughput capability exceeding 61 million metric tons by the end of 2017.
    - New construction and enhanced capacity improvement is underway in Barcarena and Santarem.

- The new export elevator system is being supported by expansion and higher utilization of the navigable river system and barge network with barge loading operations expanding from about 3 million metric tons currently to nearly 41 million metric tons by the end of 2017.

- Grain and soybeans are first trucked north on the BR-163 to Miritituba where they are loaded onto barges for final shipment to export elevators at Santarem and Vila do Conde or Barcarena.

- Several rail projects are planned to connect key grain and soybean production areas to export elevators. Rail service is operational to the Port of Itaqui, where the goal is to receive 85% of the grain and soybeans by rail, decreasing the need for truck.
    - The rail will use 80 cars per train, 90 to 100 metric tons per car
    - The various rail projects will connect to export elevators and to barge loading operations at Miritituba

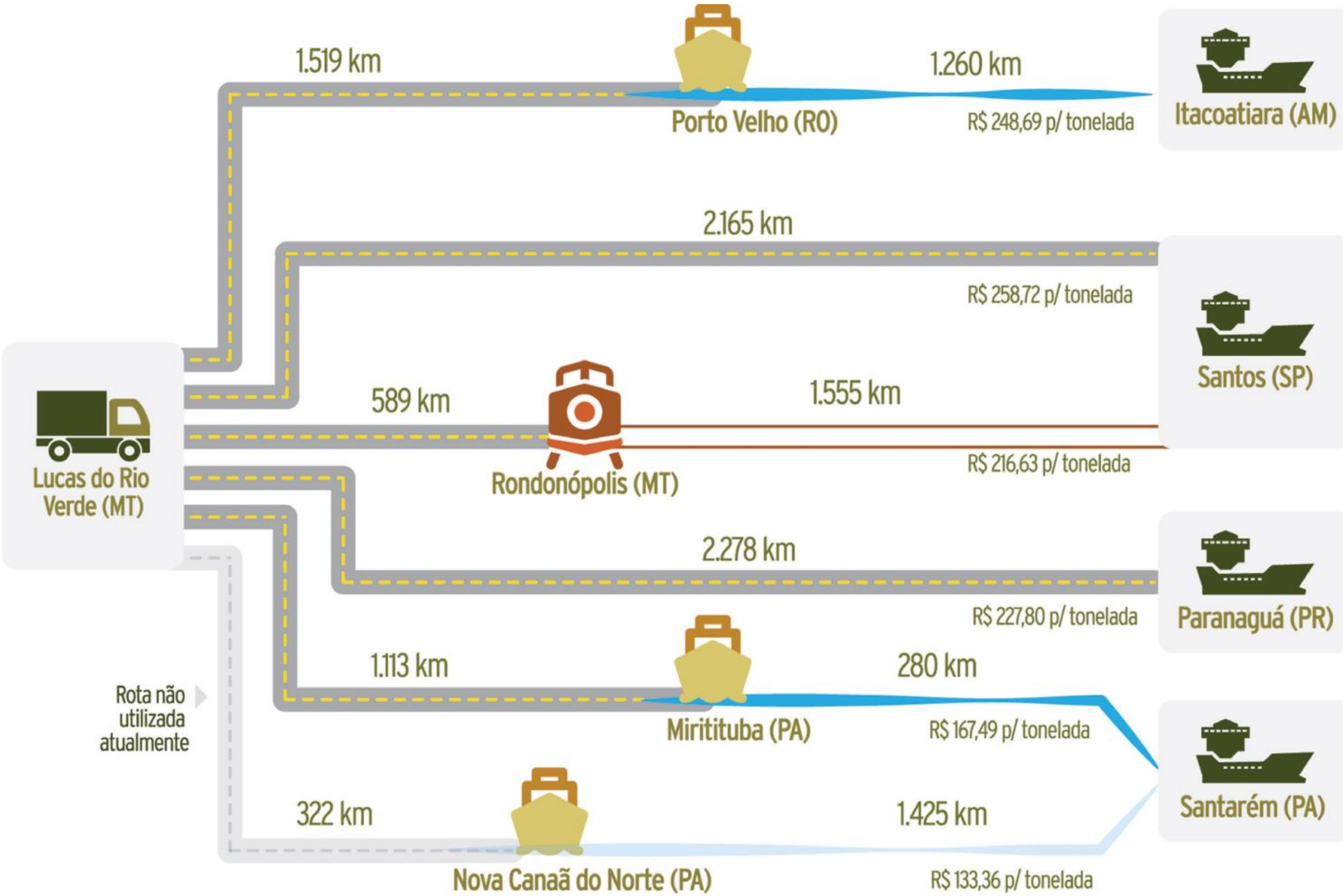
- Brazil's economy and financial condition is an impediment for full investment in its infrastructure. Private companies and entities are investing where they can but at some point will rely upon federal investment for key inland transport infrastructure support. Some of the support is through privatization of highways and ports.

- The timeline getting projects started and completed in Brazil is a long, arduous effort. But the country is reeling from losses in the mining and mineral sector and looks to agriculture as its bright spot.

- For U.S. farmers the agriculture export expansion through the northern ports will increase competition between Brazil and the U.S. Having additional export elevators to load more vessel simultaneously during the peak export period will lower costs by keeping more ships moving with more cargo.
    - Compared to the southern Ports of Paranagua and Santos, these northern ports expect to be about five days closer to the U.S. and ten days closer to Asia through the Panama Canal.

- The export elevator projects will lead to more inland connections by barge and rail, lowering inland transport costs, making Brazil more competitive with the U.S.
    - An example of route and modal comparisons in Brazil are shown in Figure 106.

Figure 106: Brazilian Grain and Soybean Logistics Chain Options, Modes, Distances and Cost



Fonte: Elaboração CNT
Nota: A rota entre Lucas do Rio Verde e Santarém via Nova Canaã do Norte não é atualmente utilizada pela ausência de eclusas que possibilitem a navegação.

- According to industry participants, the inland routes through the northern ports have reduced transport costs 25% to 30% as compared to sending grain and soybeans from Mato Grosso to the southern ports.

- The lower inland transport costs and available savings moving grain and soybeans through more export elevator spouts simultaneously is expected to expand production areas along the BR-163 from central Mato Grosso to the north by about 188% from 5.9 million hectares to 17.0 million.
  - Soybean production is expected to increase 187% from 17.9 million metric tons to 51.3 million.
  - Corn production is expected to increase 160% from 17.2 million metric tons to 44.7 million.

- Crop expansion is moving further north and west, but expansion efforts into yet another agriculture frontier further north and east includes the states of Maranhao, Piaui, Tocantins and Bahia (referred to as the MaPiToBa agriculture frontier).

C. Routing Comparisons – Distance, Time and Costs

1. Analysis of Routings from Sample U.S. Origin Locations to Shanghai and Rotterdam

The case study to demonstrate differences between origins for freight transportation competitive advantages were characterized through identification of several sample locations indicative of major production areas, without immediate proximity to the major long haul corridors.

- Truck mileage was developed and estimated using proprietary Informa Economics industry elevator location data analysis, to determine average distances for draw areas for different levels of rail operational capacity, considering country elevator, short line, and Class I shuttles, as well as unit train load facilities.
  - It was recognized that the location where the major Mato Grosso highway corridor for soybeans and other products, BR 163, leaves the state, there are approximately 10,000 trucks per day moving down the road.
    - It was designed to handle only half as much volume of traffic.
    - It is estimated that one third of the trucks have seven or more axles and each axle supports ten tons of grain.
    - The highway was designed to handle no more than six tons per axle.
      - The result is that these heavy trucks have already burdened the highway and left it in an unsatisfactory condition across numerous locations.

  - This continues to exacerbate the ruining of the infrastructure, resulting in a considerable slowing of the transits over the routes.[2]

- Rail mileage was developed using rail distance calculators provided by railroads and utilizing contacts within the railroad companies for verified route miles on their system.
  - Due to the lack of competing railroads within the state, farmers will not see much of a financial benefit from shipping by rail.

- Wage rate data was for the truck drivers in the U.S. was obtained from U.S. Department of Labor, Bureau of Labor Statistics, and state occupational wage data for 2010.
  - Wages for truck drivers in Brazil were obtained from wageindicator.com. Origin locations selected serve as examples of soybean storage and load locations in each U.S. and Brazilian state.

- Distances were converted to miles from kilometers for distances in Brazil.

- The time between pick-up, drive time, and delivery does not fully account for time the product is waiting, staged for the following transport or on-carriage.

- The delivery is not always direct to transfer for the next mode. A truck may take product to a facility for discharge, and while there is storage time for the soybeans, the next mode may not have assets in position for immediate loading.

- The arrival of transport equipment for the next mode may require some discharge of another inbound commodity, preparation of equipment, or other operational formalities that delay outflows.
  - Truck to rail, truck to barge, or rail to vessel may await the arrival of the next operating departure. Significant effort goes into planning the coordination between modes.
  - However, the cascade of delays can arise and put strains on terminals as cargo arrives ready to be loaded, but where the train, barge or ship to depart with the cargo has faced delay in its most recent freight.

- In constructing the simplified model for comparison purposes, this examination has considered how one metric ton of soybeans are moved, given a set of points in rural Iowa, rural Illinois, and remote points in the Brazilian states of Mato Grasso and Goiás.

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[2] http://www.soybeansandcorn.com/Brazilian-Infrastructure

- Transport at peak harvest time can mean arrival of the cargo at a terminal that just missed the on-carriage mode's departure.
- Frequency and consistency of transportation results in, either effective planning and management of the freight for its intended end use, or when the movements are not timely and routine, the logistics stream, the supply chain reflects the poor connectivity.
- The model was constructed to define the competitiveness of transits to vastly different market destinations, Rotterdam, Netherlands and Shanghai, China.

- From inland locations like Iowa and Illinois the flow to the Center Gulf or to the West Coast were dependent on the destinations. A path of least resistance approach was utilized to direct the cargo in the most logical logistical routing.

- Looking at the time, distance and estimated costs of the transits in the following tables, the model evaluates the competitive markets in those three particular respects.

Table 34: Transit Distance Comparisons of U.S. and Brazilian Soybean Routings

Distance (in Statute Miles)	United States				Brazil			
Farm	**Iowa**		**Illinois**		**Mato Grasso**		**Goias**	
Truck	22.5	22.5	15	15	950	350	549	305
Wait								
Country Elevator								
Truck	40	40	40	40				
Wait								
Long Haul						**Rondonópolis**		**Rondonópolis**
Barge Loader		1,444		1,235				
Rail Shuttle	1,655		1,820			787		787
Wait								
Export Elevator								
Wait								
Load Vessel								
Sail	**PNW**	**Gulf**	**PNW**	**Gulf**	**Santarem**	**Santos**	**Santos**	**Santos**
Rotterdam		4,854		4,854	5,192	6,310	6,310	6,310
Shanghai	5,708	10,013	5,708	10,013	12,922	12,493	12,493	12,493
TOTAL DISTANCE								
TOTAL to ROTTERDAM		6,361		6,144	6,142	6,660	6,859	6,615
TOTAL to SHANGHAI	7,426	11,520	7,583	11,303	13,872	13,630	13,042	13,585

- The distances from the U.S. are highly competitive. The northern Brazilian Port of Santarem is very comparable to the U.S. easterly transit distances from the Center Gulf. Far and away the Center Gulf location is closer to China.
    - The very long haul initial move in Brazil is by truck. Sixty to seventy percent of the soybean freight movement in Brazil is attributed to truck movement.
        - Given the different standards, considering the international movements were originally compiled using standard nautical miles, the default measure for sea distances for moves from port to port.
        - The PNW moves were calculated through Puget Sound, Center Gulf locations focused upon the Port of New Orleans, and from the respective Brazilian East Coast and Amazonian Ports of Santos and Santarem.

- Local truck moves in the U.S. are being considered as from the farm to the first country elevator, as well as from the local elevator to the shuttle train or river elevator.

Table 35: Transit Time Comparisons of U.S. and Brazilian Soybean Routings

Time (in Hours)	United States				Brazil			
Farm	**Iowa**		**Illinois**		**Mato Grasso**		**Goias**	
Truck	0.6	0.6	0.4	0.4	21.1	7.8	12.2	6.8
Wait for Loading at Harvest	1.5	1.5	1.5	1.5	24.0	24.0	24.0	24.0
Country Elevator								
Truck	1.1	1.1	1.1	1.1				
Wait for Loading	1.5	1.5	1.5	1.5				
Long Haul Terminal						**Rondopolis**		**Rondopolis**
Barge Loader		262.5		224.5				
Rail Shuttle	82.8		91.0			52.47		52.47
Wait for Loading	20.0	48.0	20.0	48.0		72.0		72.0
Export Elevator								
Wait	84.0	84.0	84.0	84.0	120.0	420.0	420.0	420.0
Load Vessel	72.0	72.0	72.0	72.0	72.0	72.0	72.0	72.0
Sail	**PNW**	**Gulf**	**PNW**	**Gulf**	**Santarem**	**Santos**	**Santos**	**Santos**
Rotterdam		345.6		345.6	321.6	391.2	391.2	391.2
Shanghai	423.6	715.2	423.6	715.2	859.2	957.6	957.6	957.6
TOTAL TIME (Hours)								
TOTAL to ROTTERDAM		816.9		778.7	558.7	915.0	919.4	914.0
TOTAL to SHANGHAI	687.1	1,186.5	604.2	1,148.3	1,096.3	1,481.4	1,485.8	1,480.4
TOTAL TIME (Days)								
TOTAL to ROTTERDAM		34.0		32.4	23.3	38.1	38.3	38.1
TOTAL to SHANGHAI	28.6	49.4	25.2	47.8	45.7	61.7	61.9	61.7

- The differences in speed and modal split make for the greatest differences in the time in transit. The U.S. barge movement, as can be recognized in cost comparison, exceptionally cost effective and significantly slower.

- Comparisons for trucking from farm to elevator assume more restrictive load factors in the U.S. than in Brazil, where it is reported that tonnage of loads is routinely 25 metric tons, and the vehicles are often 40 metric tons or more. However, truck in the U.S. applied a 22 metric ton average load since the national gross vehicle weight ratings for commercial vehicles are 80,000 pounds or just under 36.3 metric tons.
  - The speed of the vehicles in the respective markets were evaluated at 35 miles per hour from the U.S. farm, and 45 from the Brazilian farm, given the average differences in distances, and other operating local road and transportation conditions.

- The rail cars can carry nominally, 110 tons, with as many as 110 cars being assembled and moved together as a unit train. The cost effectiveness of loading unit trains in as few as 15 hours can help movement of that much cargo over inland distances to achieve even greater savings as published railroad tariffs provide material cost incentives for achievement of such efficiencies.

- Barges commonly have capacities in the U.S. inland river system of around 1,500 to 1,700 tons per barge. The scale of the vessels most commonly plying the trades under this review, known as Panamax vessels, is nominally loading 60,000 tons per voyage. The vessels operate at an average speed of 14 knots, or nautical miles per hour.

- For vessels that can carry 60,000 tons of grain, the normal loading time at a Brazilian port is around 36 hours. The average loading rate at the port is 100,000 metric tons per day, but on can drop to as little as 22,000 tons due to wetness arising from inclement weather.

Table 36: Transport Cost Comparisons of U.S. and Brazilian Soybean Routings

Cost (in US$/MT)	United States				Brazil			
Farm	**Iowa**		**Illinois**		**Mato Grasso**		**Goias**	
Truck	7.45	7.45	4.73	4.73	66.99	66.99	70.53	70.53
Wait for Loading	1.13	1.13	1.32	1.32	4.2	4.2	4.2	4.2
Country Elevator								
Truck	7.45	7.45	4.73	4.73				
Wait for Loading	1.13	1.13	1.13	1.13				
Long Haul						**Rondopolis**		**Rondopolis**
Barge Loader		14.09		14.50				
Rail Shuttle	18.27		35.70			17.60		17.60
Wait for Loading								
Export Elevator								
Wait for Loading								
Load Vessel	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00
Sail	**PNW**	**Gulf**	**PNW**	**Gulf**	**Santarem**	**Santos**	**Santos**	**Santos**
Rotterdam		26.72		26.72	24.4	24.4	24.4	24.4
Shanghai	21.79	30.74	21.79	30.74	29.9	29.9	29.9	29.9
TOTAL COST								
TOTAL to ROTTERDAM		**64.98**		**60.12**	**95.6**	**95.6**	**99.1**	**99.1**
TOTAL to SHANGHAI	**64.23**	**69.00**	**76.39**	**64.14**	**101.0**	**118.6**	**104.6**	**122.2**

- Total landed costs have not taken account of factors outside of the transportation stream, such as differential interest rates, operational assets, and the associated capital costs, assuming that these are covered through transportation pricing mechanisms.
    - In personal correspondence with USDA Brazilian Post staff, it was noted that from Mato Grosso to the Port of Santos direct by truck (3 days) that time and volume accounts for one-fifth of soybean deliveries at port. The alternate routing, from Mato Grosso to the Port of Santos via multi-modal – truck to rail – (5-7 days) includes 1-2 days of bin storage with rail carrier, Americana Latina Logistica (ALL), during transfer from truck to rail. Rail actually accounts for 80% of soybean deliveries at port. So the rail option is slower, but more volume moves in the corridor. Routing to the Port of Paranaguá takes three days by truck from Mato Grosso. Recent slowdowns and waiting lines at Paranaguá have been due to a lease expiring at one of the receiving terminals (the port has 9 different terminals/entities that receive grain). As for routing to the Port of Santarem, a majority of the soybeans routed through there are delivered by barge via Porto Velho (7-8 days from farm to Port of Santarem depending on distance of farm to Porto Velho). There are also some significant volumes of soybean production occurring right around Santarem that are drawn to the port directly.

- Under a scenario where the investments are made in Brazilian infrastructure, and improved efficiencies are achieved through supply chain improvements, there are a number of improvements in competitiveness that can be expected. As seen in Table 36, for a metric ton, the reduction in truck miles by improving rail service reduced by more than half the cost from select locations in Mato Grosso or Goias going to either Rotterdam in service to the European market or Shanghai to serve Asian markets.
  - Rather than trucking product all the way from origin to port, using multimodal bulk transportation service for example, utilizing the rail terminal at Rondopolis, can take costs out of the system, as more turns can be achieved for the trucks, greater volumes can be moved utilizing the capital and infrastructure that have been designed to serve as the means to achieve exactly those ends.

- Improving logistics service by utilizing rail versus truck to the port, economies of scale are able to be achieved. While there are currently still waiting times and inefficiencies that can be improved upon in the Brazilian logistics stream for soybeans, as well as for other grain movements, the forecast, for when the logistics infrastructure is improved, will be expected to achieve further cost and time savings relative to the existing operations. Furthermore, these improvements can be anticipated to bring added cost reductions to support Brazilian cost competitiveness on world markets. To the extent that the bulk modal services can be operated with consistency, reliably without disruptions, or delays at either end of the transport mode interconnections to the next mode, the cost improvements will continue to improve Brazilian production competitiveness. Observing the investments and improvements supporting future exchanges of soybean movements from truck to rail, or truck to barge, and then from the barges or railroads to the deep water export vessels, will help define the Brazilian competitive position in the market.

- In the Model, the cost of wait time at the export elevator was defined as the difference between market costs for shipments moving on a Cost, Insurance and Freight (CIF) basis relative to the level of a shipment that moves under terms that are Free on Board (FOB).
  - This difference, while a reasonable approximation, across the marketplace can have greater or lesser differences from season to season, for different sizes of vessels, or with regard to other factors related to vessel loading cost, including port labor rates, the harbor itself and local competitive factors, and crop quality differentials.

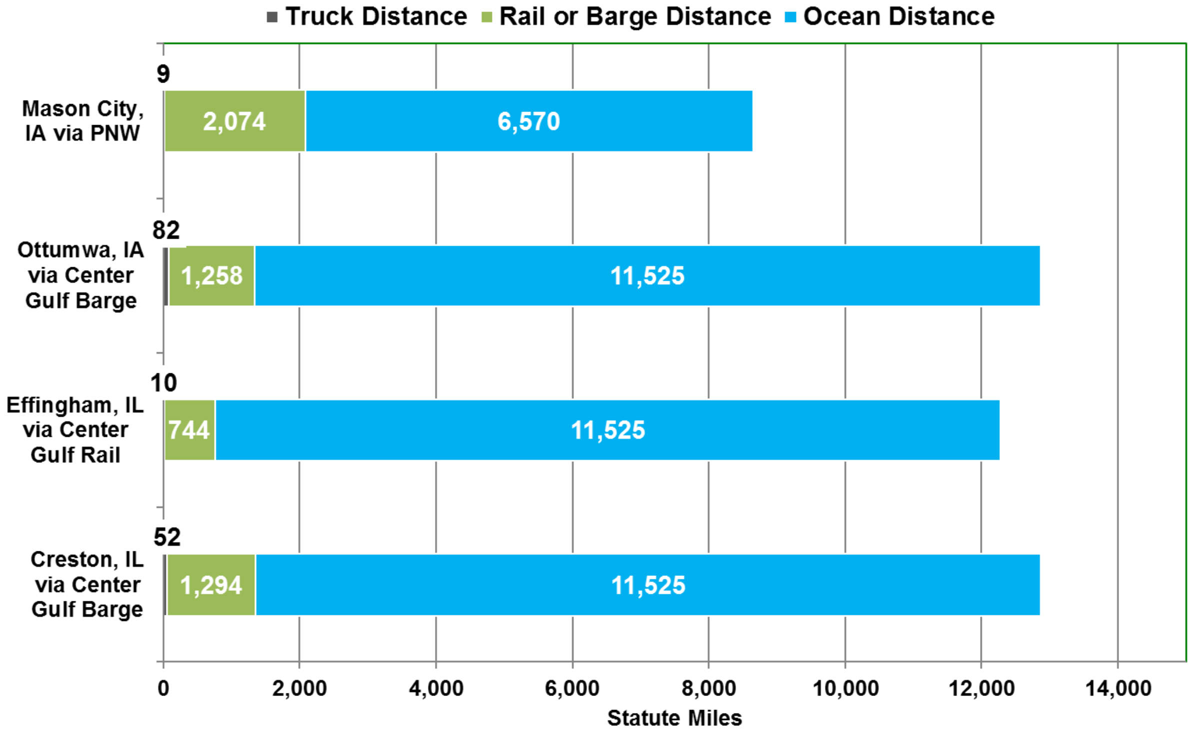
- The point of the comparisons is that truck, barge, rail and deep water vessel transport create complexities when examining similarities and differences among the respective modes. Furthermore, the differences in physical geography, regulatory regimes, labor, capital assets tangential to soybean and product distribution operations, not to mention the climatic distinctions, as well as the degree of maturity of agricultural production result in vastly different local market conditions.

- Congestion at the load centers and especially at the ports is a notable concern in Brazil. When the weather is good, at the peak of harvest, reservations are required for the drivers, at most of the main ports. Managers at the farm origin of the freight have commonly sent trucks on their way to the ports, without first having made a reservation.
    - When the trucks arrive and the pre-registration for deliveries were still not made, the domino effect, or reaction in the port area bring about consequent delays for others due to the administrative obstacles.
        - These have led to trucks backed-up as much as 30 kilometers or more. While such a long line can be cleared in about a day or two, for the management of the vessels, and the delivery of soybean product, the logistics stream is adversely impacted by the inefficiencies in the system.
            - The structure of the delivery registration, and reservation systems are getting better.

2. Analysis of Routings from Sample US Origin locations to Shanghai and Rotterdam

The case study to demonstrate differences between origins for freight transportation competitive advantages were characterized through identification of several sample locations indicative of major production areas with reasonable connectivity to the major long haul corridors to get the soybeans to export market positions at ports. Selected locations included select points in the states of Illinois and Iowa, as well as in Mato Grosso and Goiás, states in Brazil. The competitiveness of the origin locations relies on the smooth, consistent ability to move the product to from farm to market, even at peak volume, or harvest times.

Figure 107: U.S. Representative Distances of Soybean Origins and Routings to Shanghai, China



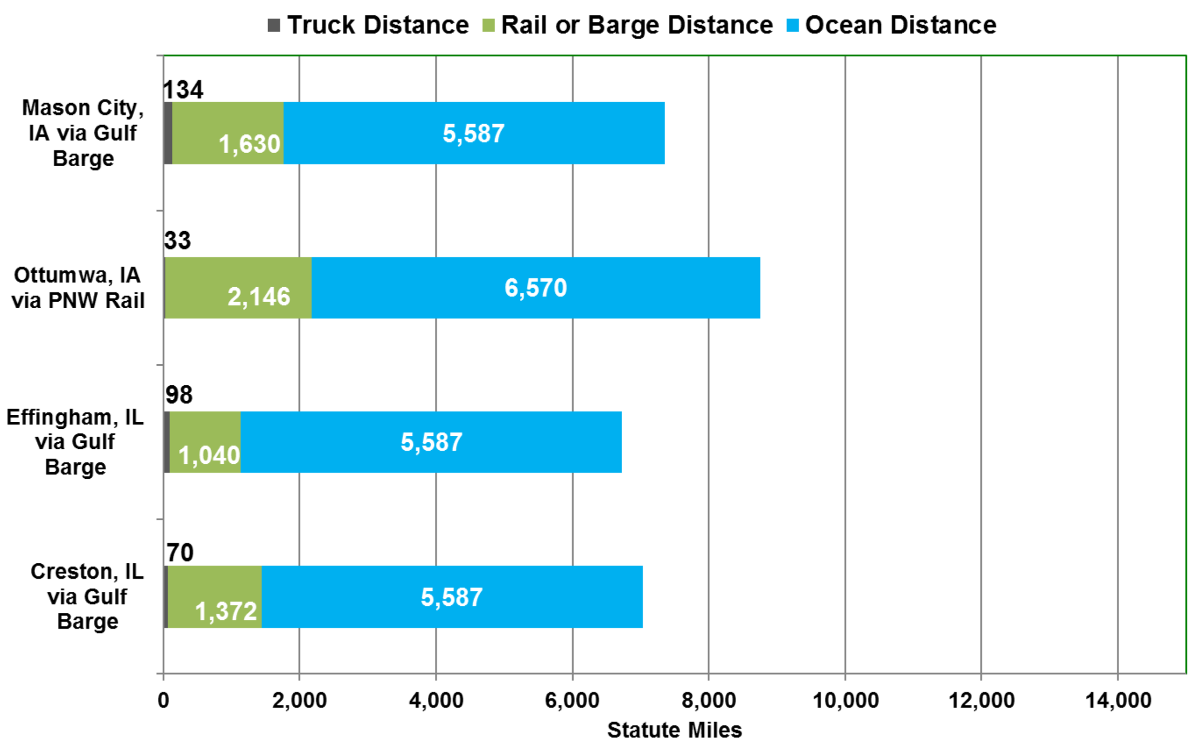
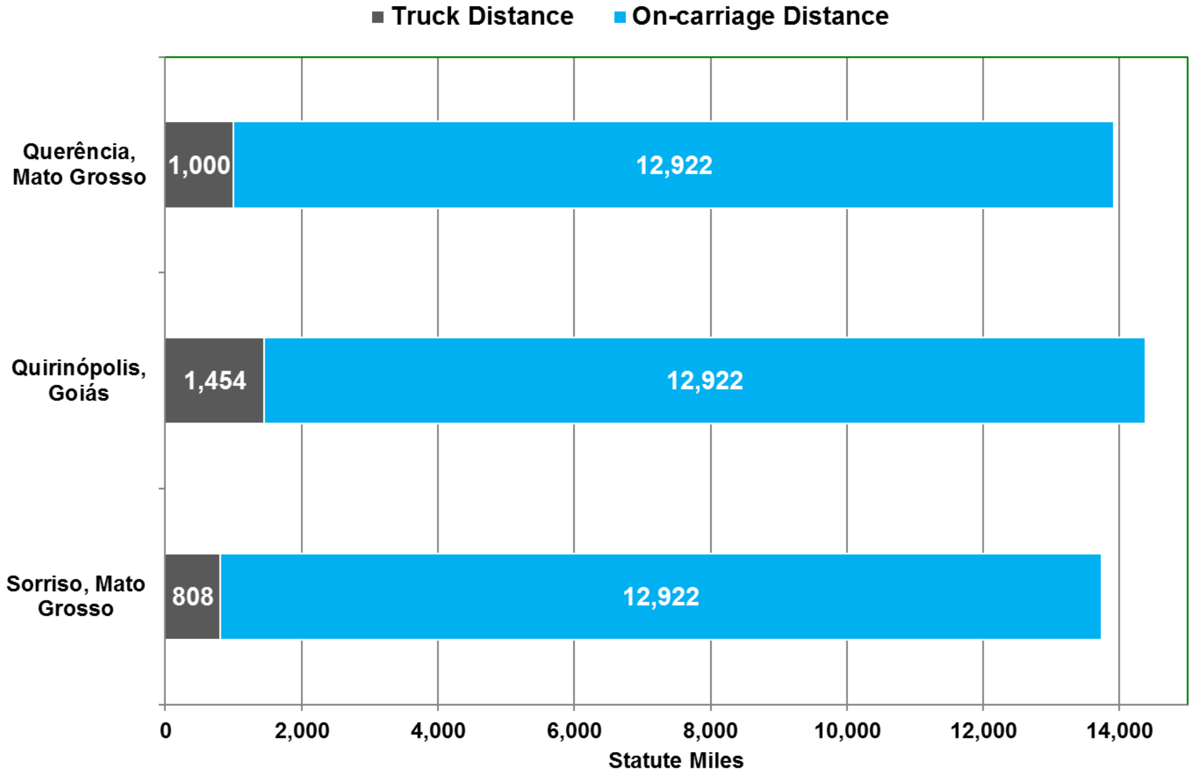


Figure 108: Brazil Representative Distances of Soybean Origins and Routings to Shanghai, China



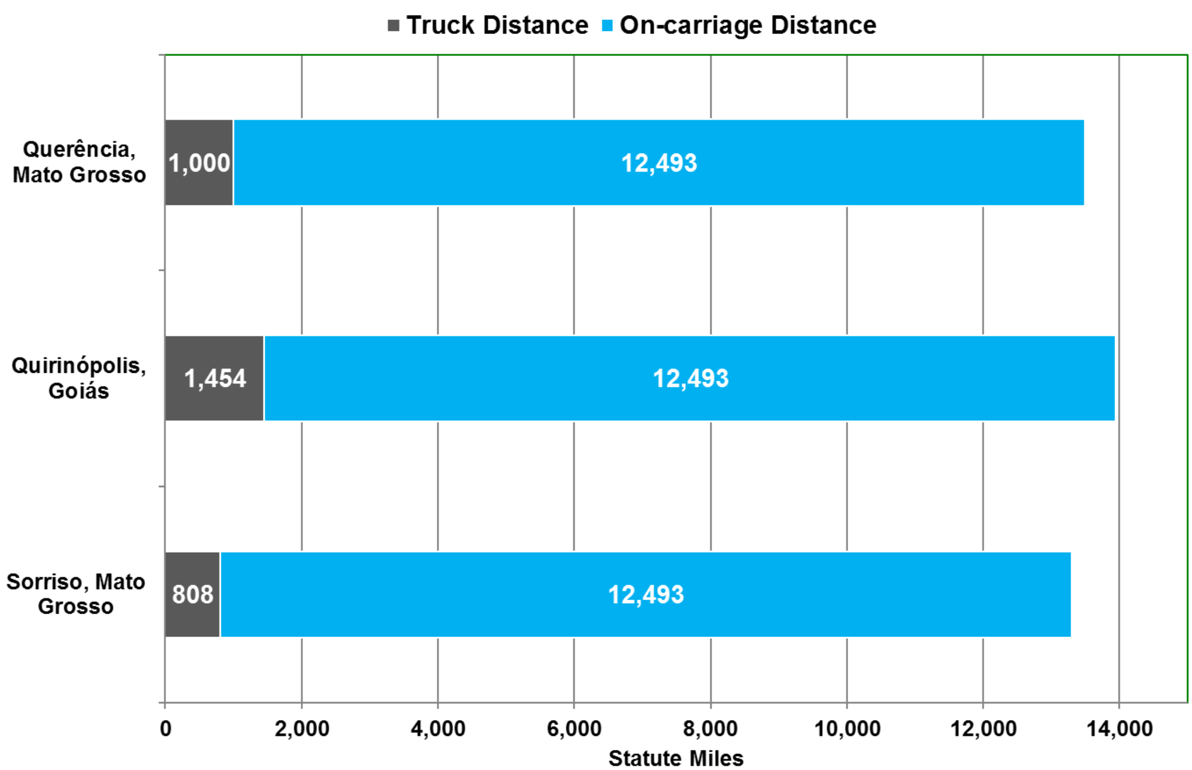


Figure 109: Distance Components of Representative Soybean Origins to Rotterdam, Netherlands

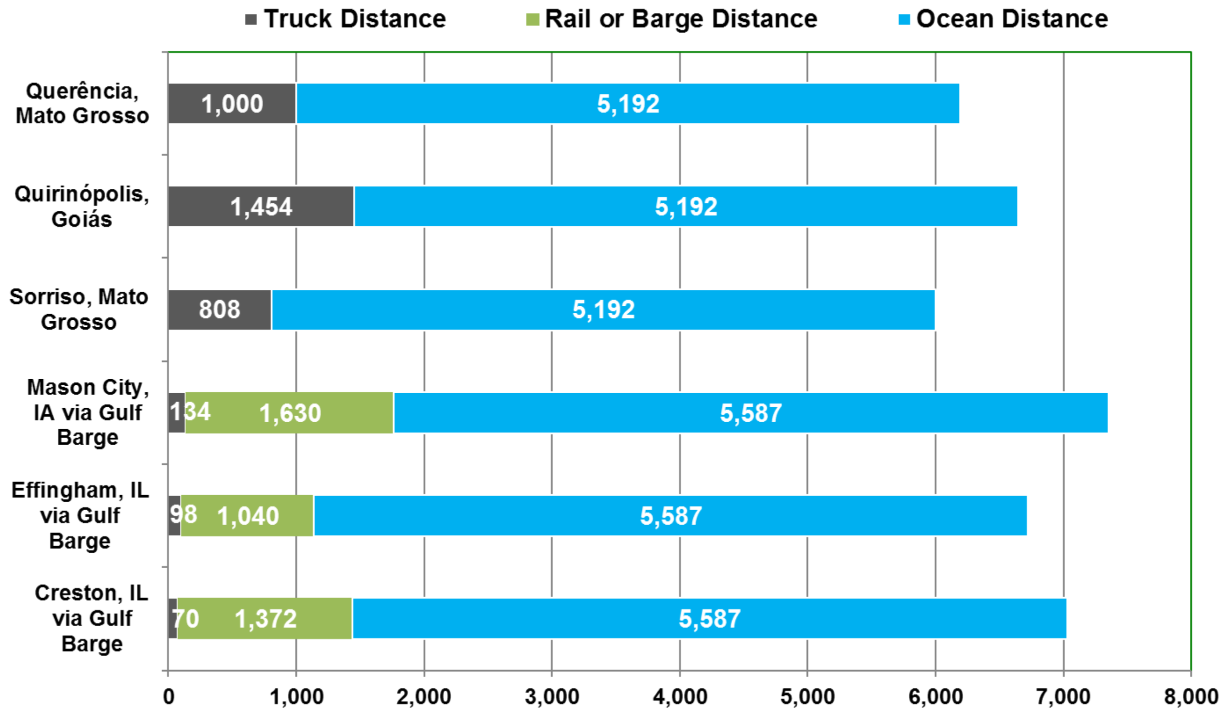


Figure 110: Time Components of Representative Soybean Origins to Rotterdam, Netherlands

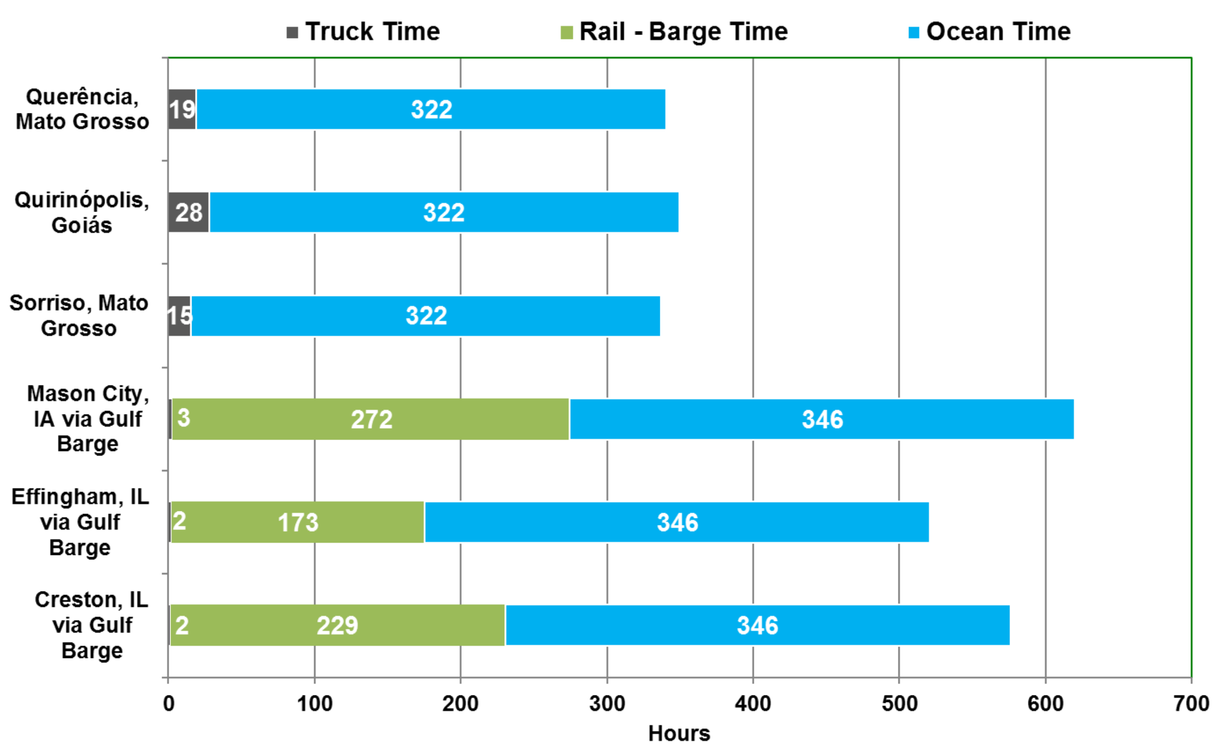
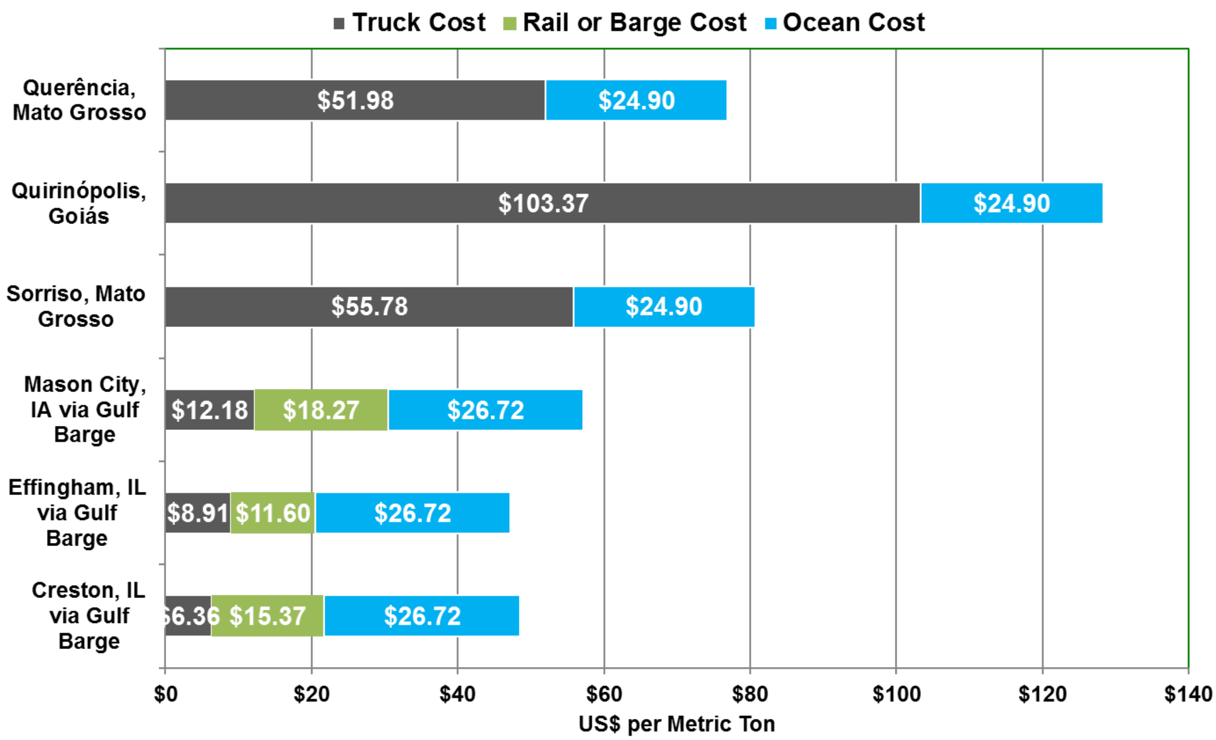


Figure 111: Cost Components of Representative Soybean Origins to Rotterdam, Netherlands



- As cited above in the figures, there are clearly differences, moving to Rotterdam, where the distances from Brazil's hinterland production areas to the East Coast is relatively comparable to the routing from the U.S. Midwest via the Center Gulf Coast.
  - The time in transit is longer from the U.S. due especially to the barge transfers and transits, with the additional handling, and the potential elevations between modes impacting the transit.

D. South America Infrastructure Impacts

While funding and project initiations have been set aside for infrastructure development in South America, the reality of the situation is that these projects are often not completed within the scheduled timeframe. For example, the completion date for finishing BR-163 has been delayed a number of times with infrastructure funds spent elsewhere. If infrastructure developments were to be completed efficiently and in a timely manner, this would benefit producers by reducing transportation costs. Decreases would also allow farmers to increase acreage and transport additional production to ports. However, for South America to prosper, increases in roadway and railway infrastructure must be paired with expansion and infrastructure improvements at the ports. Without both expansion components, producers will experience bottlenecks at the port, where producers may lose profit associated with the time sensitive nature of agricultural products.

The strength of Brazil's road haulage industry is its sheer dominance relative to other transport modes. Well over half of all Brazilian freight is carried by road. That means that particular segment of the transport industry has developed to quite sophisticated levels. In turn, it can count on an experienced workforce and efficient local production of large trucks. However, the extremely poor state of Brazil's roads and the lack of integration across modes cause delays, congestion, and high transportation costs. According to a Brazilian private sector lobby group, the National Transport Confederation, three-quarters of Brazil's highways are in bad condition. The trucking business does have a meaningful opportunity in the face of slow global economic recovery, as freight demand is expected to grow in the region at a rate roughly double the growth in the economy as a whole. Brazil is set to experience a strong export boom.

Meanwhile, improvements in rail freight infrastructure represent a threat to the road haulage industry. Generally neglected in the past, now that the privatized rail system is beginning to invest and expand capacity, it could win market share, particularly in the agricultural sector as well as for other bulk goods. In moving commodities such as iron ore and soybeans over long distances, rail can deliver lower costs per ton-kilometer or ton-mile.[3]

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[3] Brazil Freight Transport Report, Business Monitor International Ltd., Q2/2010, P. 8

In South America, both Brazil and Argentina provide examples of steps in the right direction towards improving transportation efficiencies. Brazil has taken steps towards improving both highway and port infrastructures. In addition, Argentina has taken a step in the right direction by privatizing its rail network to allow for additional sources of funding. However, at the current rate of expansion both countries still lag behind in achieving greater efficiency to be competitive with developed countries.

VII. Summary and Conclusion

- Crop Outlook
  - Production increasing on higher yields, stable cropping area; soybean area expanding, corn shrinking, but overall total production rising.
  - Corn ethanol will reached its Renewable Fuel Standard mandate cap of 15 billion gallons in 2015.
    - During the ethanol build out phase surplus corn supplies diminished across the Corn Belt, especially along the geographic reaches of the upper Mississippi and Illinois Rivers.
    - Surplus corn supplies are increasing, which increases the exportable supply of corn in a barge draw area, then increases Center Gulf exports versus PNW.
  - China will continue to import larger volumes of soybeans. China's annual soybean net imports have increased by 24 million MT from 2006 through 2010. From 2010 through 2023, soybean annual net imports are expected to increase an additional 74 million MT to 126 million MT in 2023.
    - China's consumption of soybeans is shifting world acreage away from grains to oilseeds.
  - Cropping of soybeans and corn has been and will continue to expand into the north and to the west, and the Delta, at the expense of wheat, cotton, and other feed crops, such as sorghum and oats.

- Livestock Outlook
  - U.S meat production is expected to increase on the strength of foreign demand.
    - For example, Chinese beef consumption is expected to grow by 1.5 million metric tons over the next decade, with Chinese imports fostering growth.
    - The increase in beef consumption is a result of China's strengthening economy, increasing incomes, and continued urbanization.
  - Livestock outlook is projected to be mixed with growth driven by export demand and not domestic consumption.
  - Free Trade Agreement rules are being finalized for implementation between the U.S and South Korea, Panama and Colombia, to the benefit of U.S. meat exports.
  - Poultry production will increase through 2016/17, and then slight shrink for 2017/18 and expand to 57.5 billion pounds or 26.0 million metric tons in 2022/23.
  - Hogs are projected to increase about 7.3 million head from the 2014/15 low point to 72.3 million in 2022/23 and remain steady from there.
    - Hog production will expand more rapidly within the Corn Belt, while essentially shrinking in other areas.
    - Even though head count will flatten out, hog productivity gains will expand total pork production.
  - Cattle head counts are forecast to increase up to 2019/20 before declining through 2022/23, with no significant shift in geographic distribution.

        - South Korea experienced a severe outbreak of foot-and-mouth disease, which has reduced the size of its herd, which increases the prospect of increased imports from the U.S., especially with the newly established Free Trade Agreement.
    - Dairy cattle head count will remain relatively stable, but annual productivity gains of 1.6% will increase total milk production.
        - The size of the U.S. dairy herd is dependent on exports of milk and associated products, especially to Asia and more specifically to China.

- Transportation of Soybeans and Products
    - Long haul transport of soybeans and soybean products, grains and grain products move from areas of surplus into deficit areas of the United States for domestic feeding and processing purposes, and to export position.
    - After years of losing market share to the PNW, the Center Gulf is maintaining its market share.
    - Unit or shuttle train elevators exceed 500 efficient, rapid operational locations across the Corn Belt. These facilities allow fast loading of unit or shuttle trains of 90 to 110 cars per train in less than 12 hours.
    - The relative movement of soybeans and grains by barge had shifted away from the upper Mississippi and Illinois River origins toward the lower Mississippi and lower Ohio Rivers. With the ethanol mandate maxing out, surplus corn supplies are increasing, which increases the exportable supply of corn in the upper Mississippi and Illinois River origins. That being stated, the unreliability of the locks and the ability to load heavier on the lower Mississippi River is encouraging loading below St. Louis, MO.
    - The fleet of covered barges has transitioned from older equipment with less carrying capacity and shallower draft to equipment that is 15% to 20% larger that has deeper hulls, which requires deeper draft capabilities when fully loaded. The ability to load heavier and avoid lock issues enables barge companies to charge 40 cents per bushel less on the lower Mississippi River.
    - Export capacity has increased 30% in the PNW, 10% across the U.S. The PNW capacity accommodates the westerly expansion of crops and increased soybean and grain trade with Asia.
    - Rail carloadings of soybeans will increase 20% to almost 240 thousand and barge loadings will increase 32% to over 21 thousand. The 26 states currently represent 97% of the soybean carloadings in the U.S., while in 2022/23 it is expected they will represent 98%.
    - Barge movements, the 26 states represent 100% of the soybeans moving on the navigable waterways of the Mississippi River System.

- Key Transportation and Infrastructure Issues

  - The locks and dams on the inland navigation system have exceeded the design life of the structures and have not been fully and efficiently maintained, and many are not adequate to accommodate modern tow configurations.
  - Dredging navigation channels to project depths, that is, the specified navigable waterway targeted by the U.S. Army Corps of Engineers at key ports is not being efficiently funded for reliable service to maintain adequate navigational draft. This limits the volume of soybeans and grains that can be loaded on a vessel, leading to higher freight costs.
  - Panama Canal expansion effort to add a new set of locks to accommodate increased traffic and larger vessels to transit the isthmus between the Atlantic and Pacific Oceans is almost complete. The expansion will allow vessels to be loaded to a 50 foot draft from the current draft of 39.5 feet, as well as longer and wider vessels to utilize the passage.

- South America Infrastructure Influence
  - Soybean production in Brazil's production to exceed 129 million metric tons by 2023.
    - Exports of soybeans will expand commensurately with Brazil's exports to exceed 74 million metric tons.
  - Transportation is key in future to remain competitive
    - Heavily oriented toward truck movement over long-haul distances, however efforts are underway to shift increasingly to rail and waterway modes to mitigate costs.
    - Since 2005, Brazil's modal shares have been realigning with the more efficient modes of rail and barge gaining notable shares.
  - Inland transportation expensive
    - The transportation cost to export position is expensive in South America, especially in Brazil where truck costs run upwards of U.S. $104 per metric ton (or U.S. $2.83 per bushel) during harvest on some routes. The movement of soybeans in Brazil is over long distances, while in the United States the truck move is much shorter, to the next logistics option. In the United States, truck costs moving soybeans to the next market position are considerably lower, between $10 and $15 per metric ton.
      - The lower fuel costs are increasing the competiveness of Brazil.
  - Proposed soybean corridors
    - Several infrastructure projects have been proposed to accommodate the reliable and efficient movement of soybeans in Brazil. Many have yet to be realized or lack resources to be fully completed.
    - Based on information in Brazil, improvements to the infrastructure, including the addition of multi-modal options (e.g., truck-rail or truck-barge to export position), have been estimated by Informa Economics to reduce freight costs $40 per metric ton or between 20% and 30% depending on the origin. Based on information compiled and taking into account wait times between transportation events and eventual

vessel loading for export movement, the more optimistic USDA estimated cost savings could exceed 50% or U.S. $55 per metric ton to more than U.S. $60 per metric ton.

- Such potential improvements will bring Brazil nearly on par with the United States in terms of inland transport costs, which effectively bolsters its farm industry.

- For South America, and especially Brazil, projects have been discussed for many years with little fulfillment. Some portions of some proposed projects have been started, but due to poor construction and or the lack of on-going maintenance resources, the infrastructure quickly crumbles.

VIII. Appendices

A. Flowcharts of the Soybean, Grain and Livestock

The value chains for soybeans, corn, wheat, broiler, dairy, beef, and pork are presented in this section. These value chains depict the key features of planting and harvesting crops or raising slaughtering livestock and the flows involved to move them through their respective value chain to consumer.

Figure 112: Soybean Value Chain

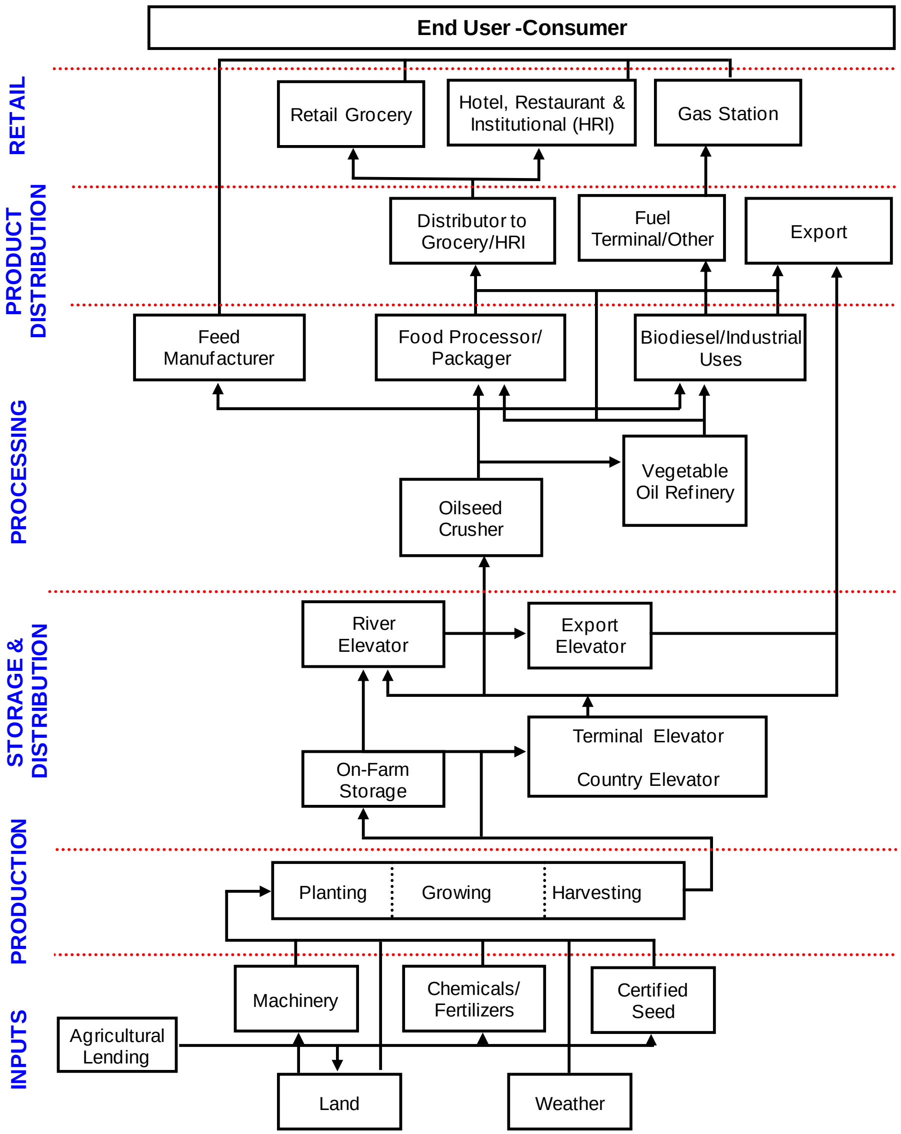


Figure 113: Soybean Logistics Flow

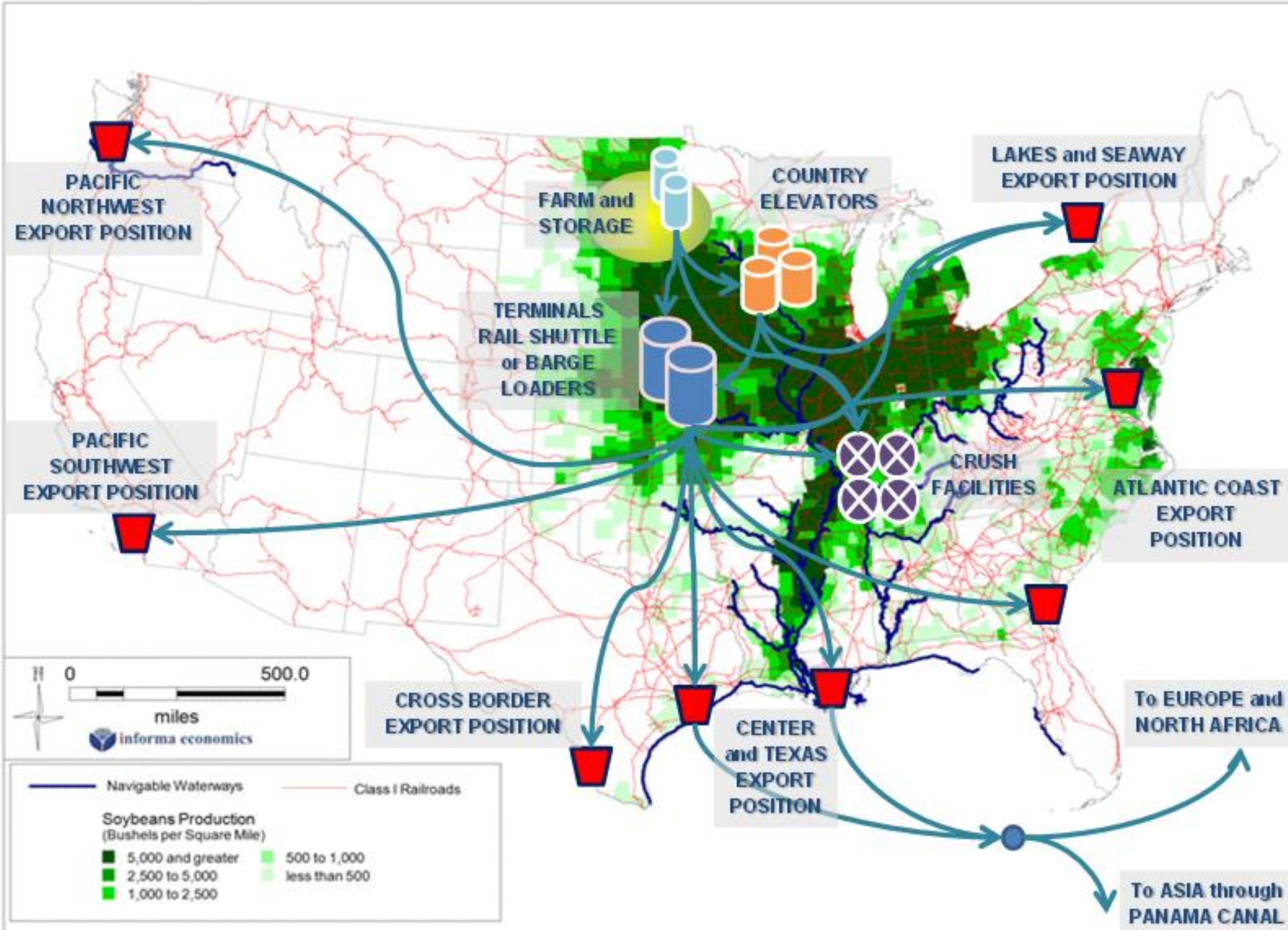


Figure 114: Corn Value Chain

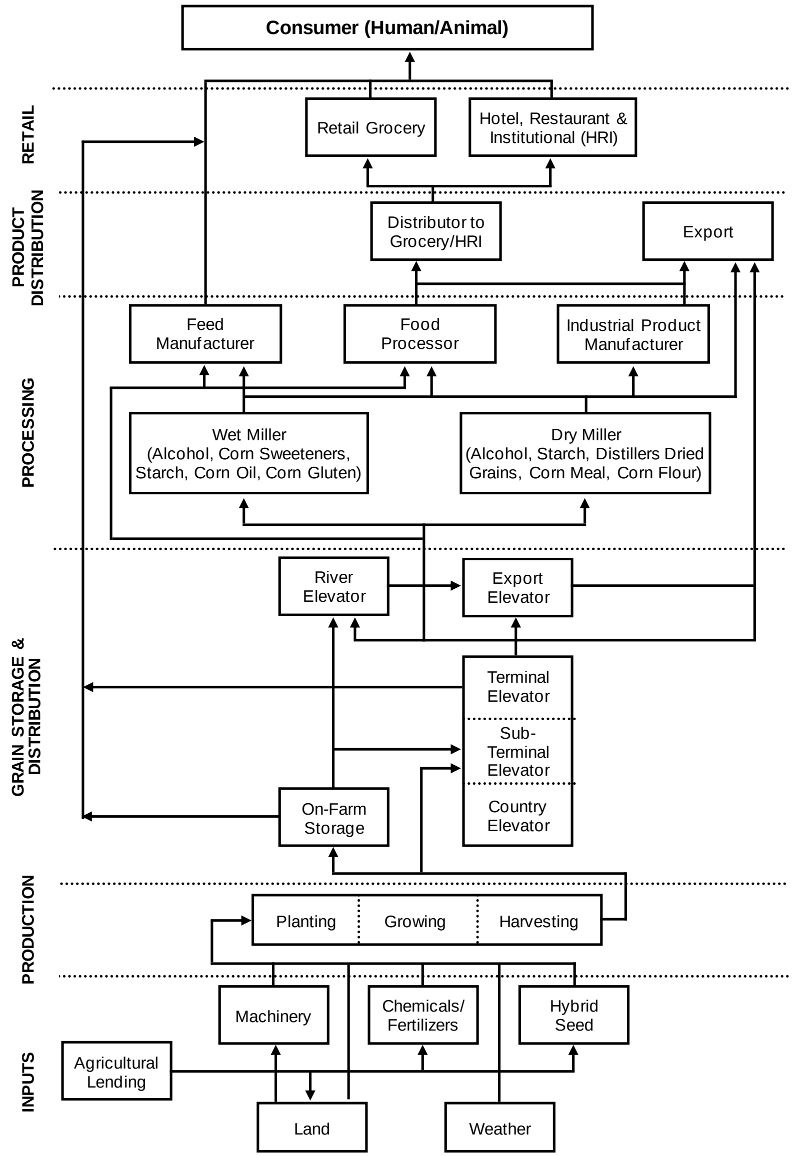


Figure 115: Wheat Value Chain

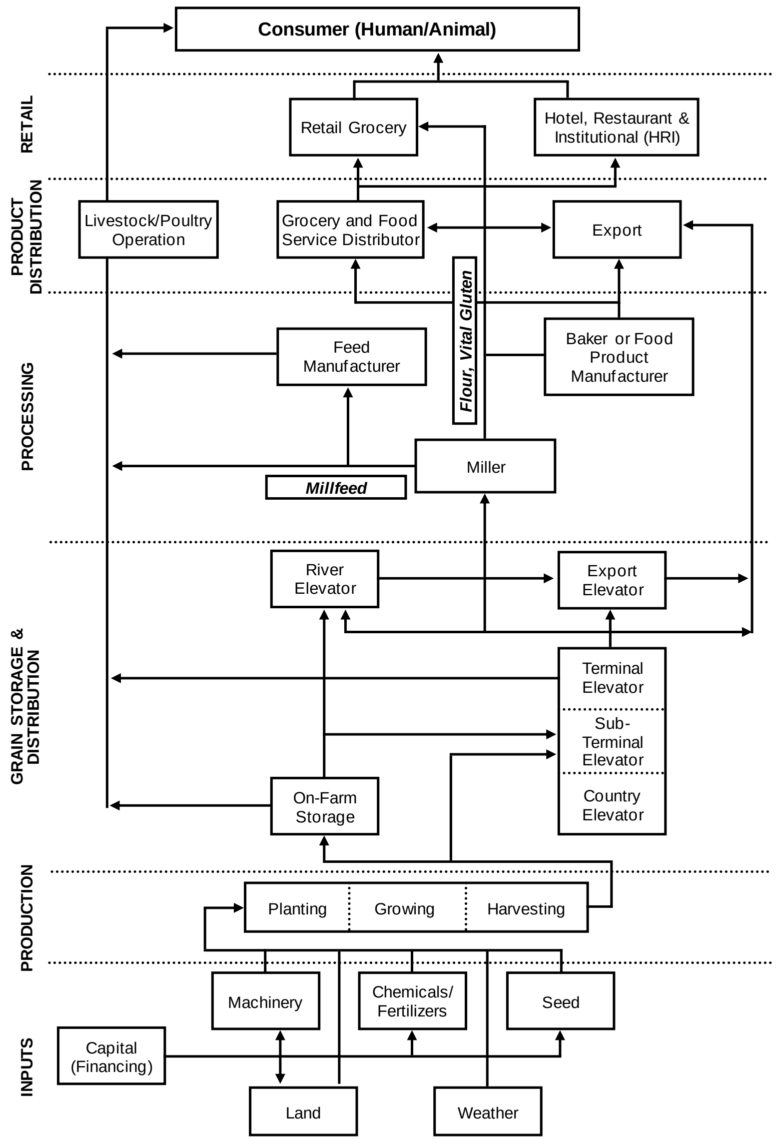


Figure 116: Broiler Value Chain

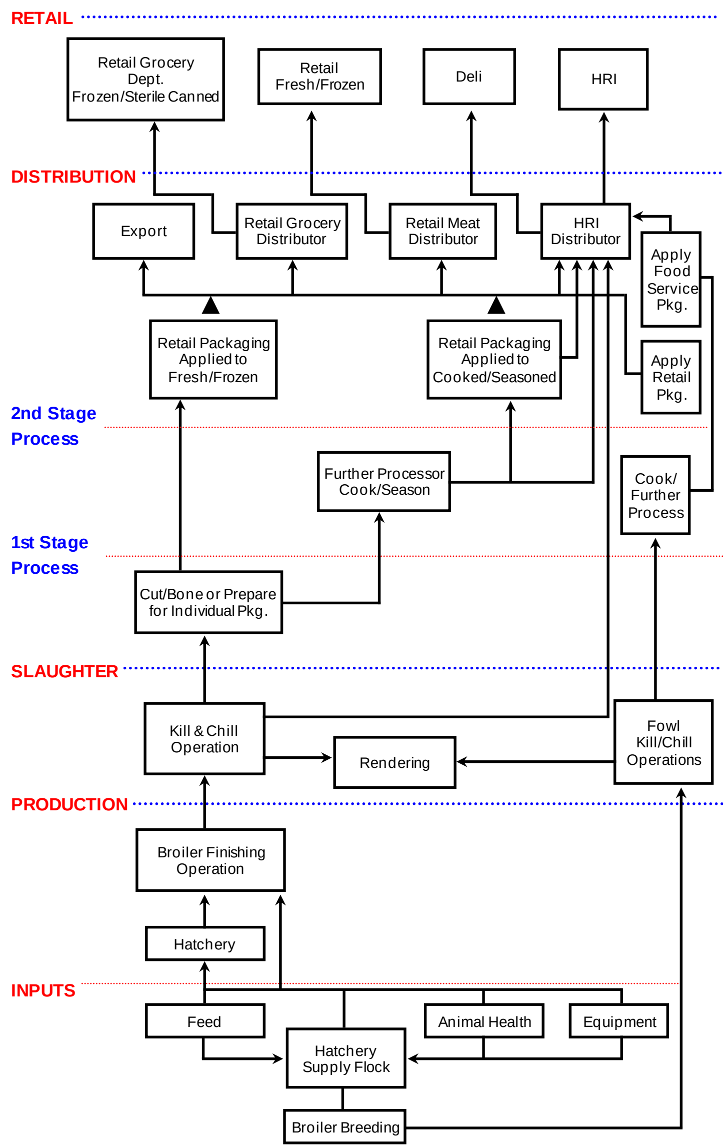


Figure 117: Dairy Value Chain

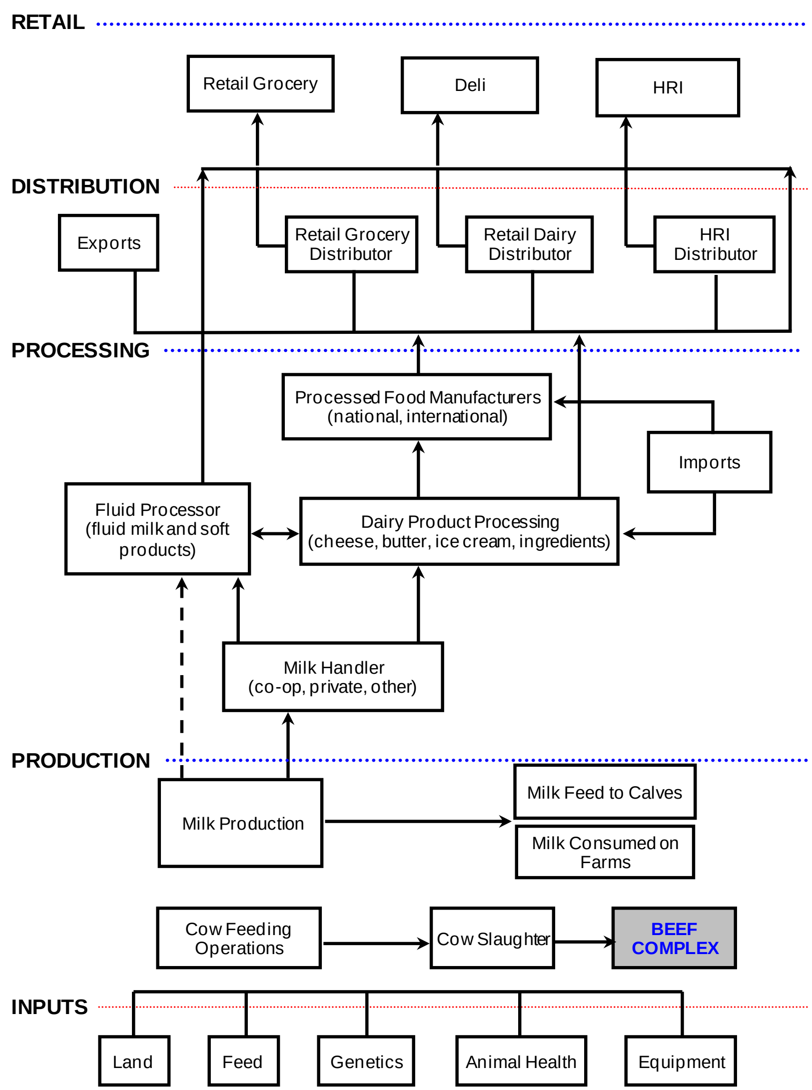


Figure 118: Beef Value Chain

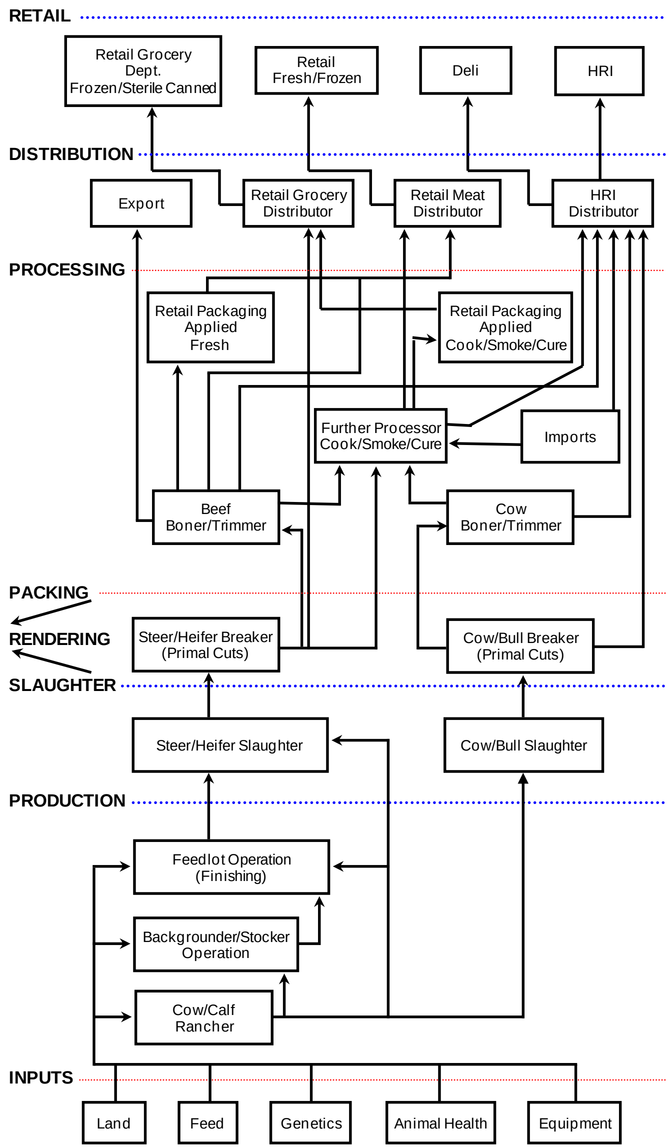
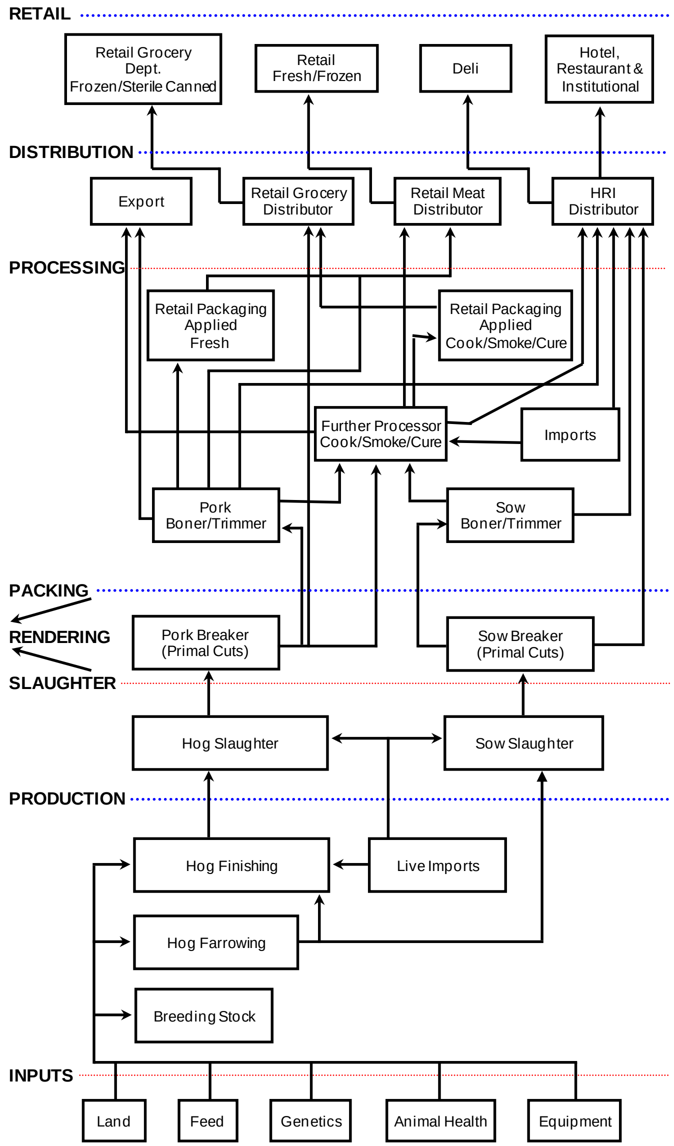


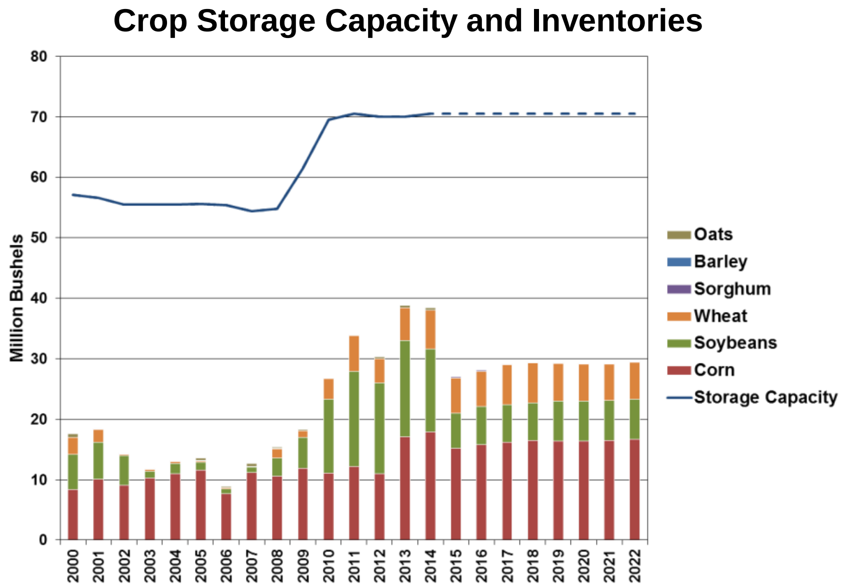
Figure 119: Pork Value Chain



B. State December 1 Crop Storage Capacity and Inventories

December 1 crop storage capacity and inventories among the key reporting states are shown in this Appendix section.

Figure 120: Alabama December 1 Crop Storage Capacity and Inventories



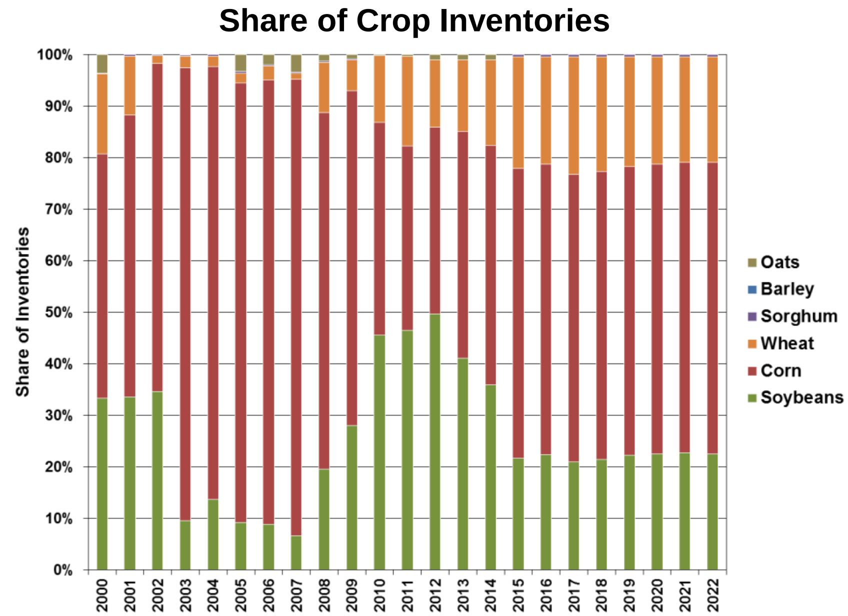
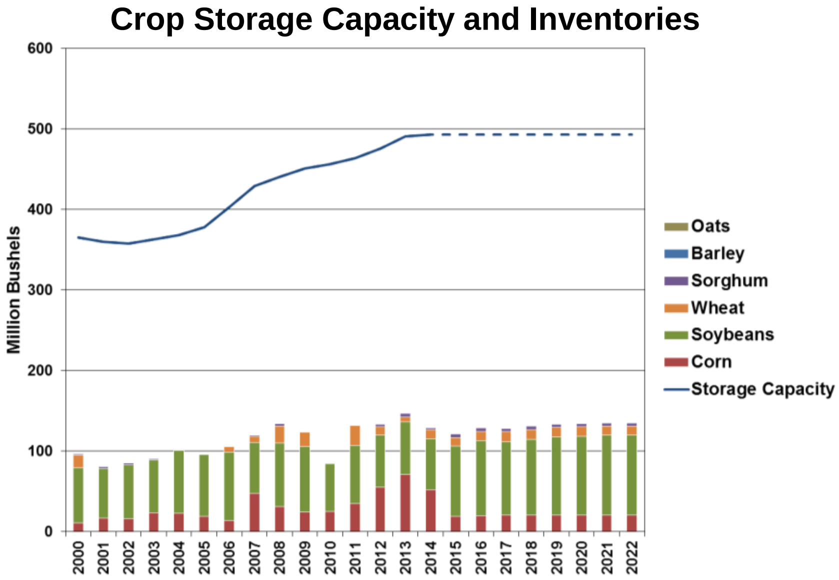


Figure 121: Arkansas December 1 Crop Storage Capacity and Inventories



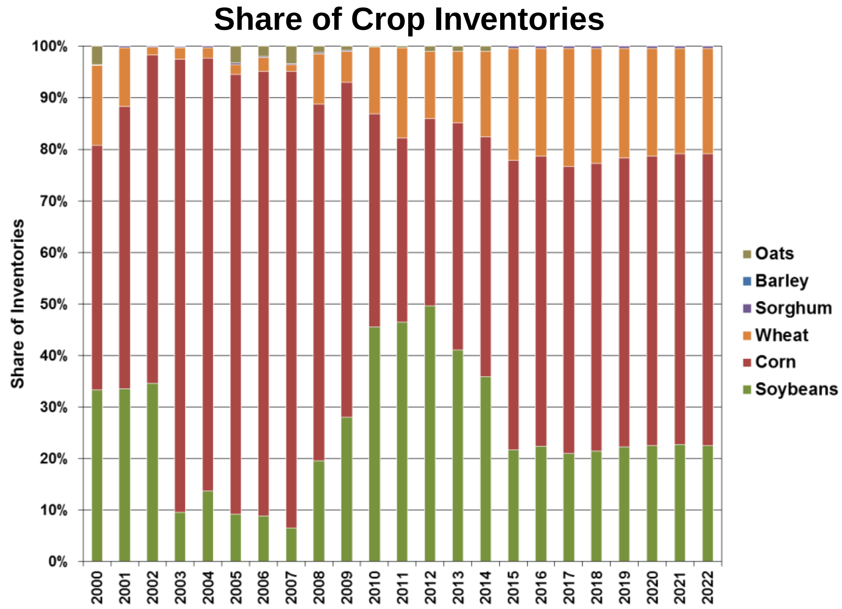
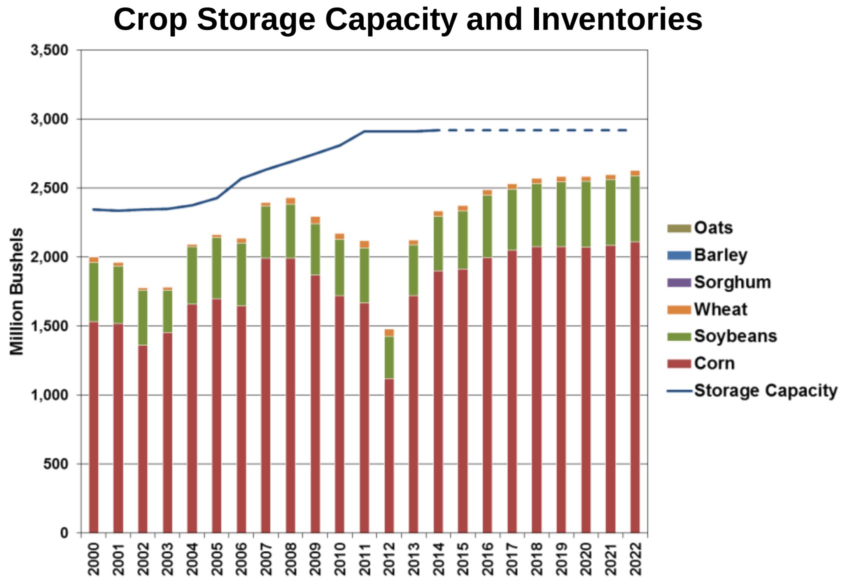


Figure 122: Illinois December 1 Crop Storage Capacity and Inventories



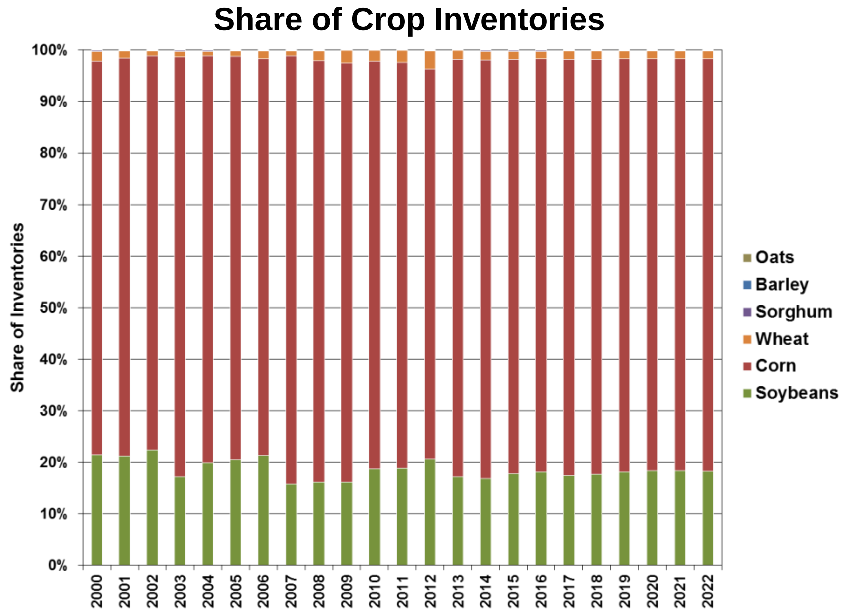
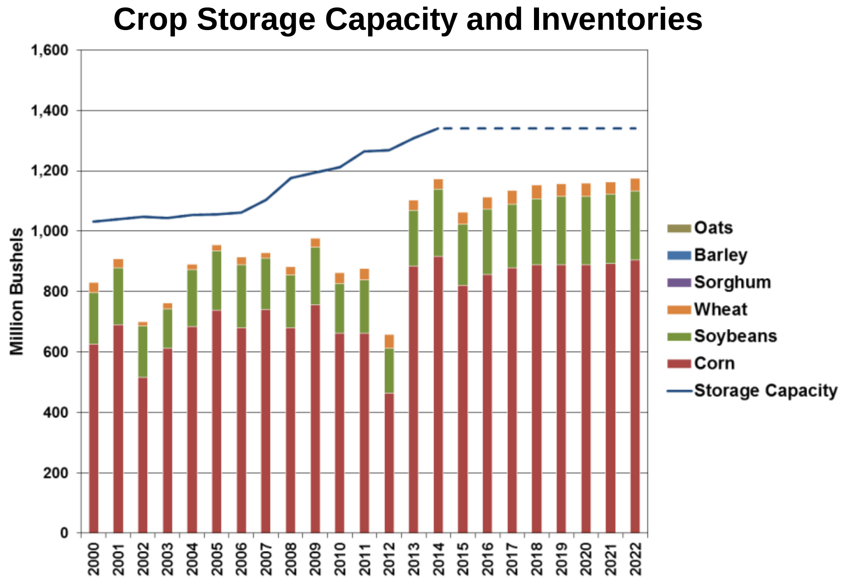


Figure 123: Indiana December 1 Crop Storage Capacity and Inventories



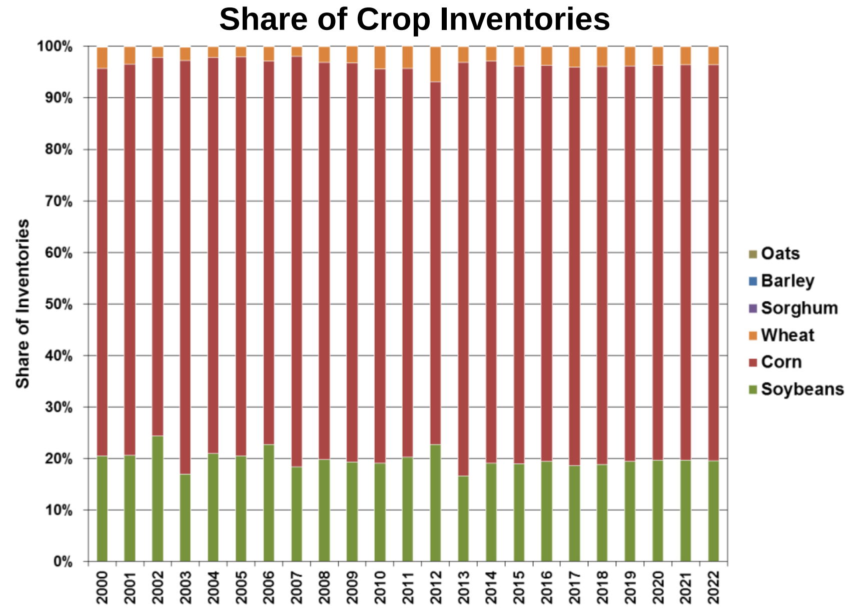


Figure 124: Iowa December 1 Crop Storage Capacity and Inventories

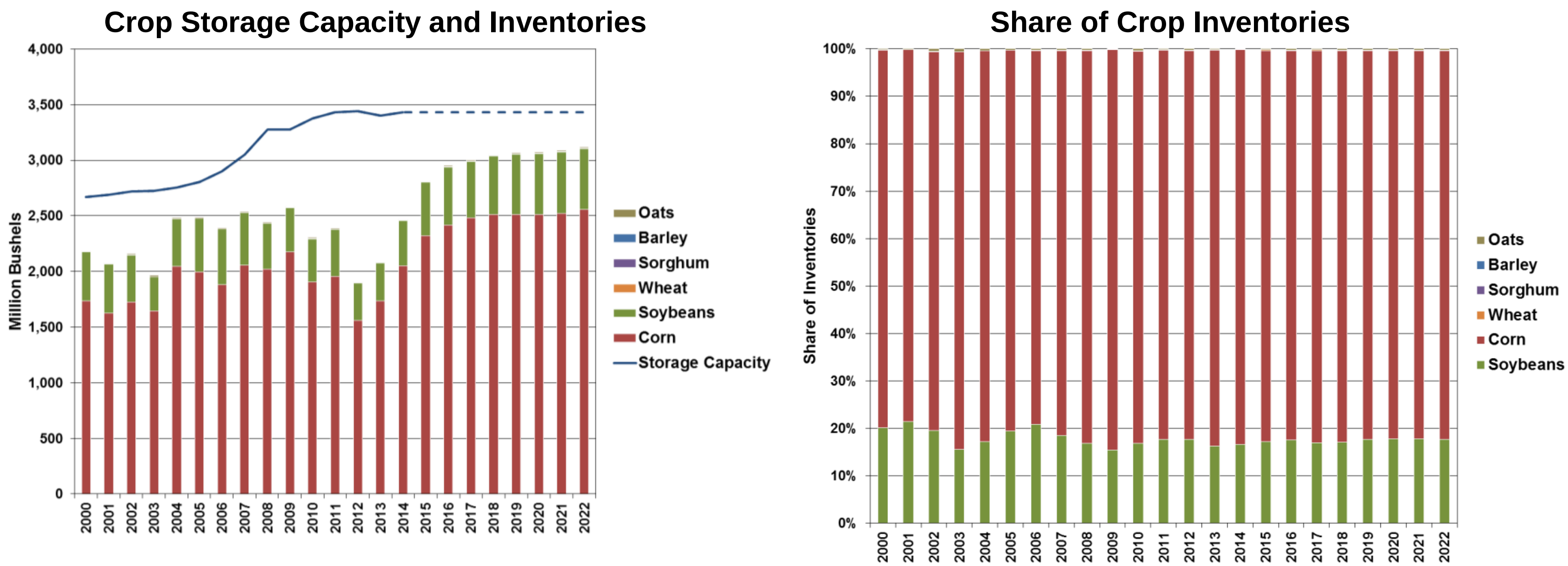
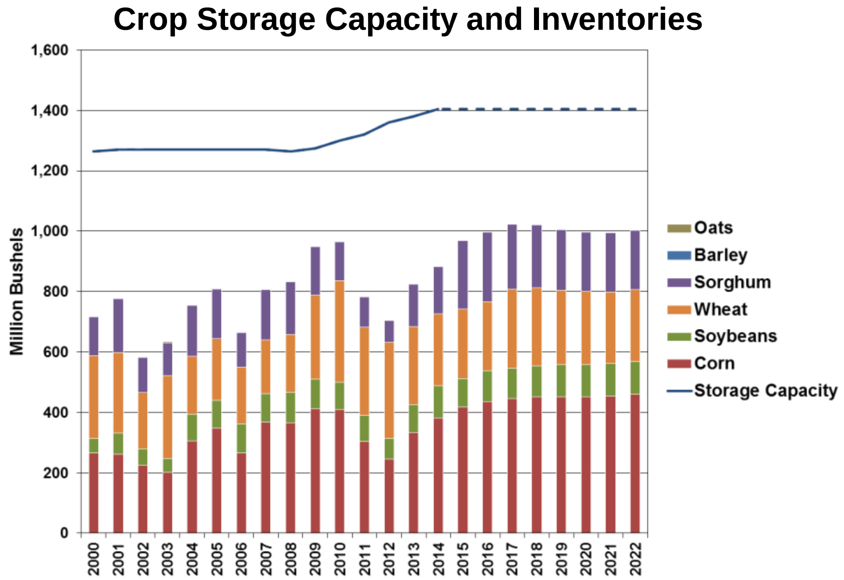


Figure 125: Kansas December 1 Crop Storage Capacity and Inventories



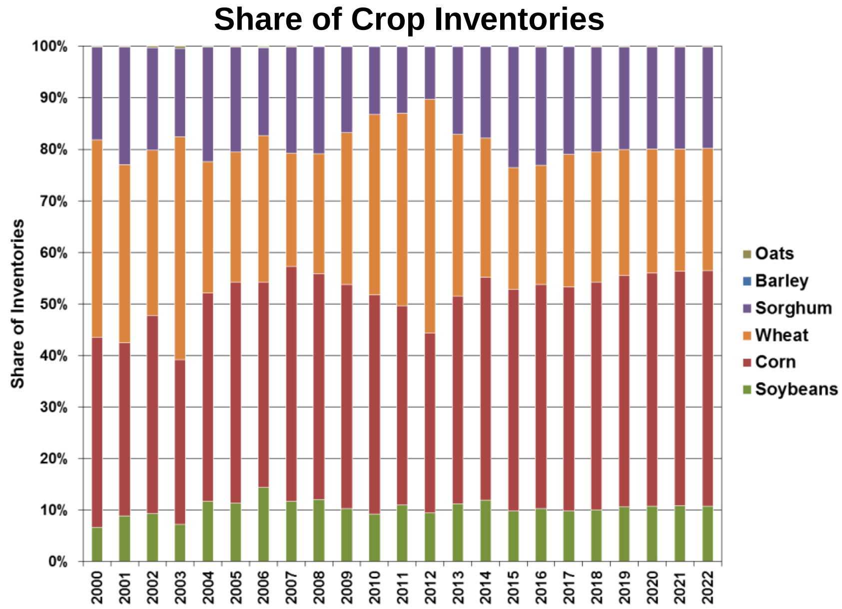


Figure 126: Kentucky December 1 Crop Storage Capacity and Inventories

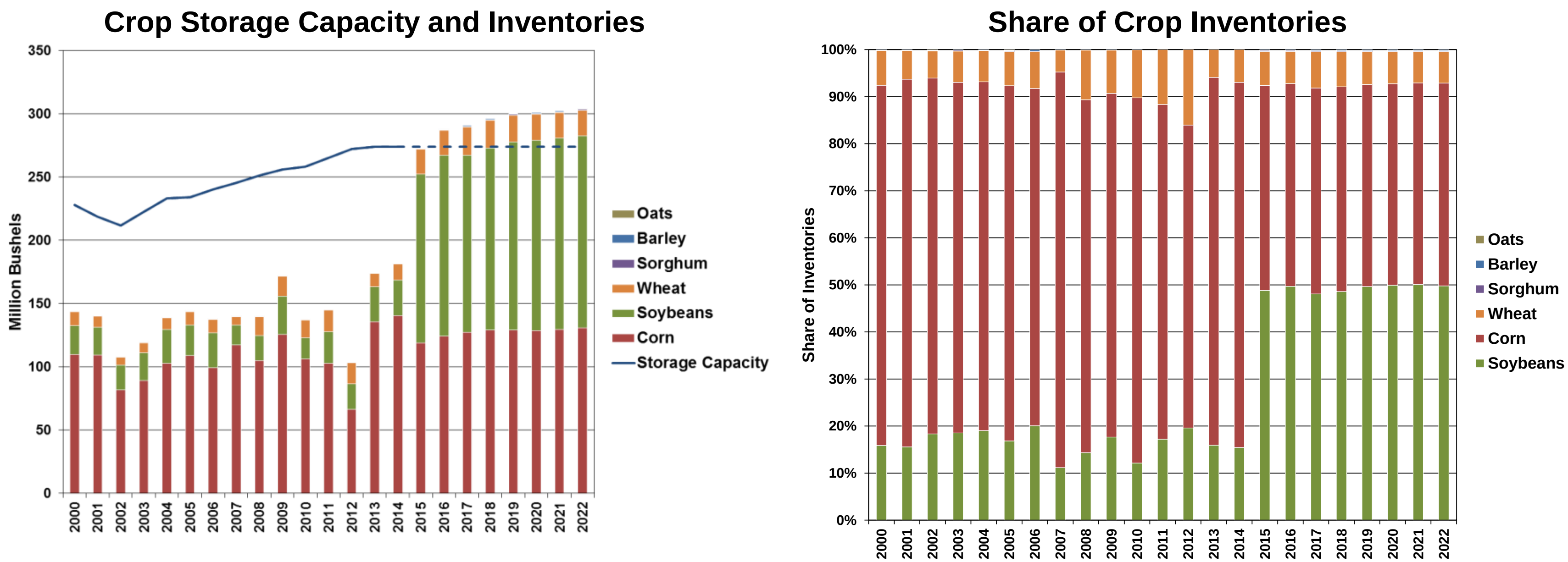
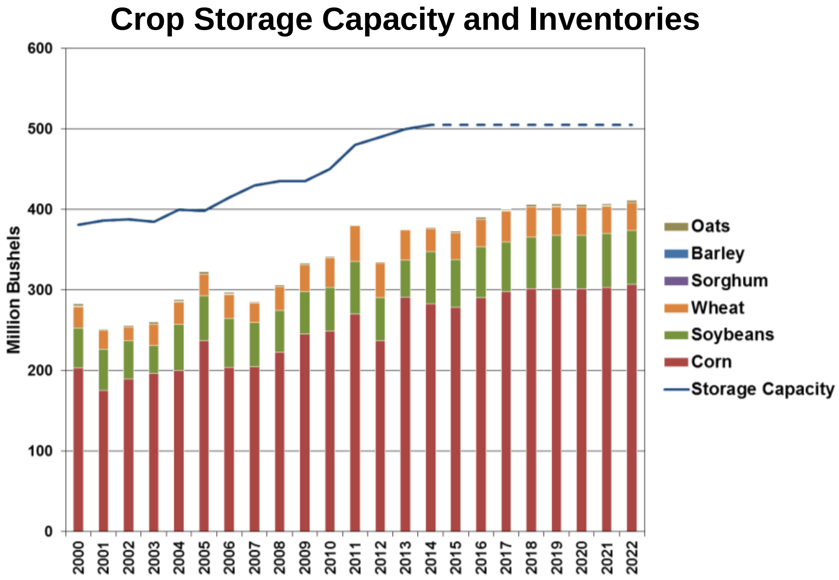


Figure 127: Michigan December 1 Crop Storage Capacity and Inventories



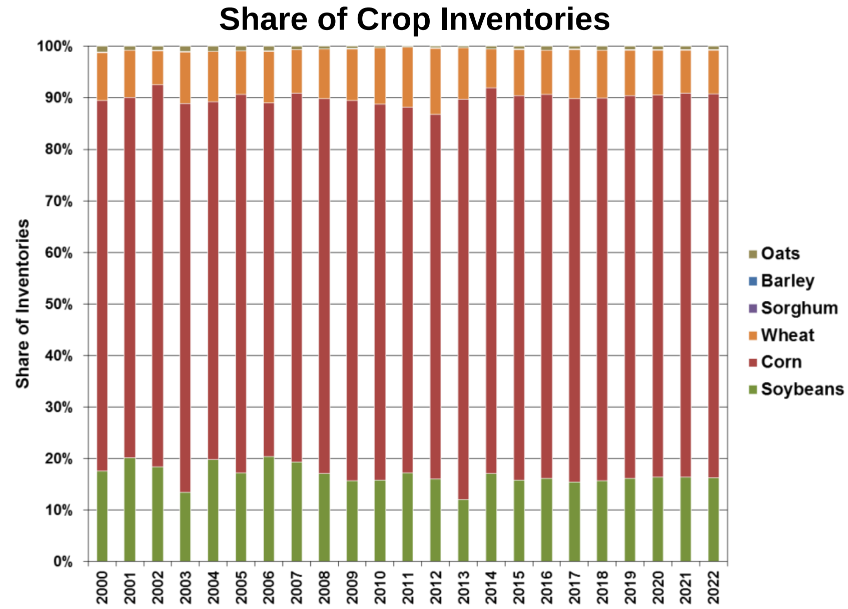
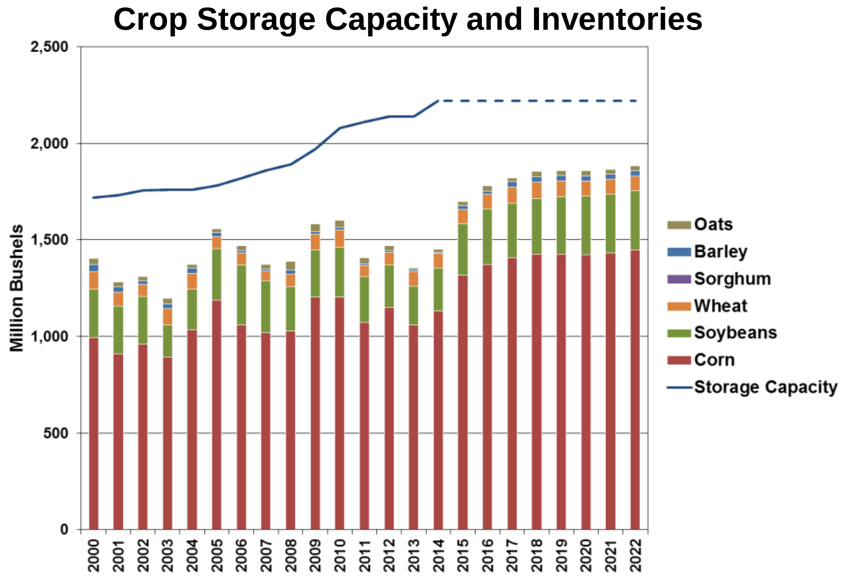


Figure 128: Minnesota December 1 Crop Storage Capacity and Inventories



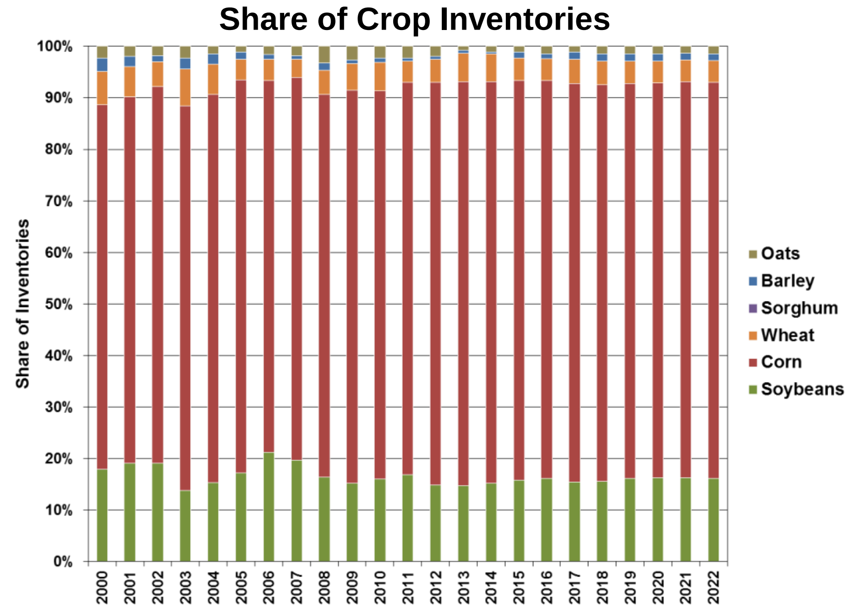


Figure 129: Mississippi December 1 Crop Storage Capacity and Inventories

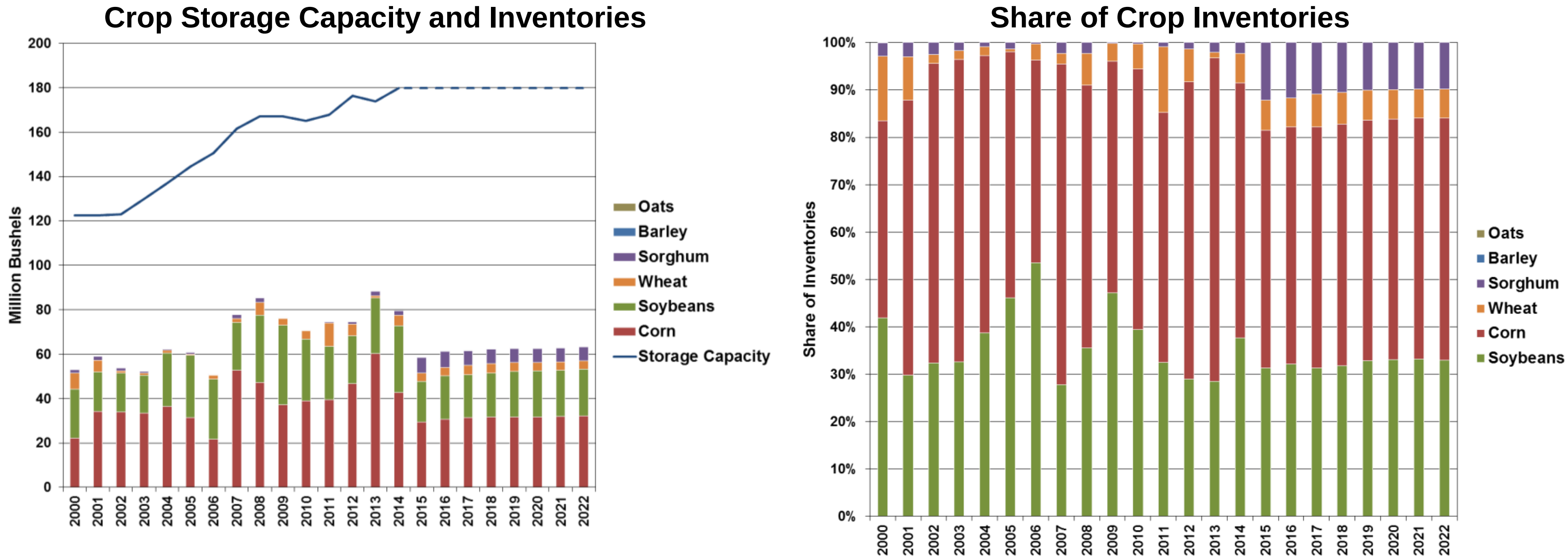


Figure 130: Missouri December 1 Crop Storage Capacity and Inventories

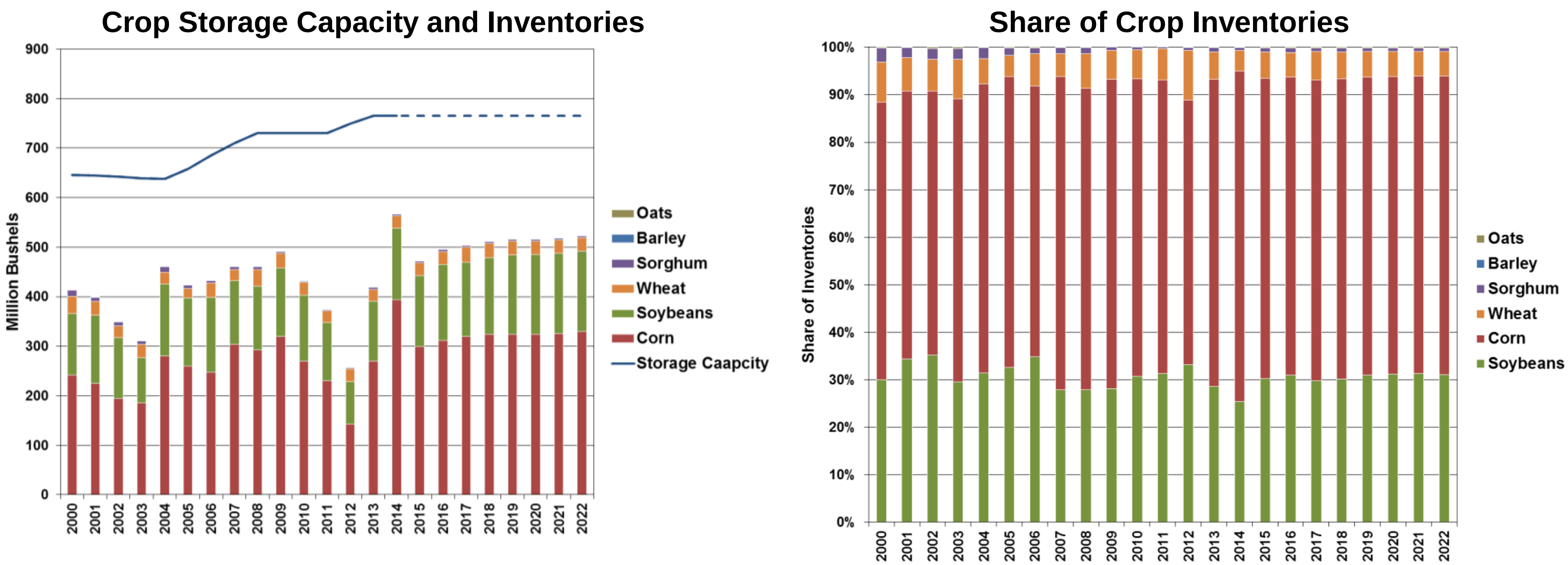
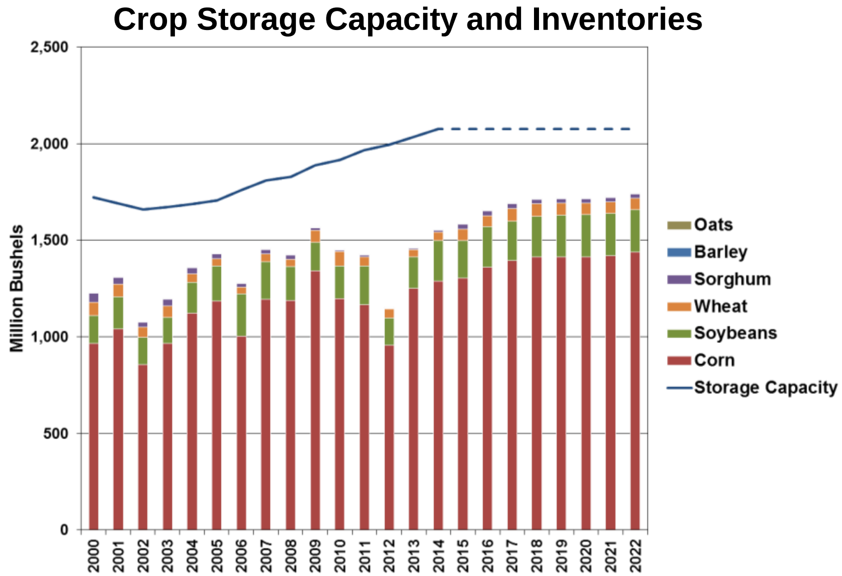


Figure 131: Nebraska December 1 Crop Storage Capacity and Inventories



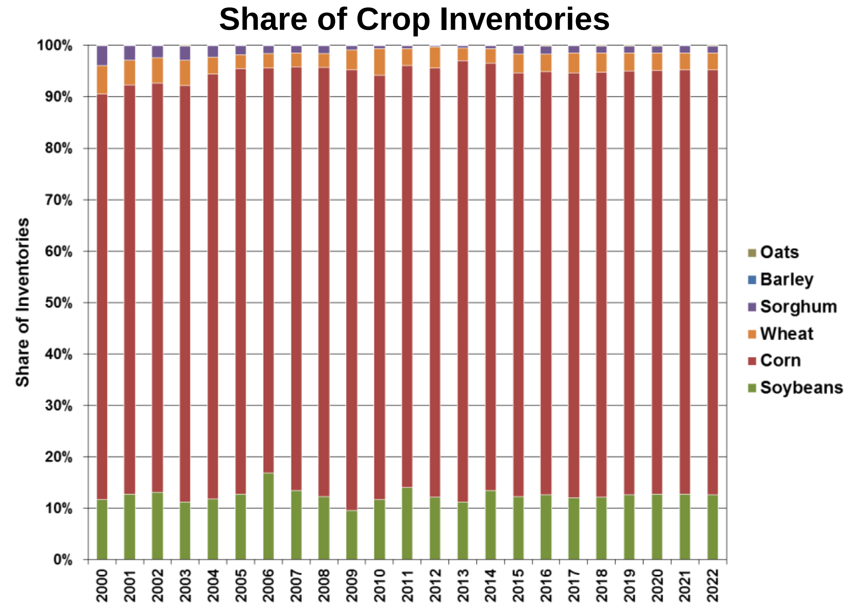
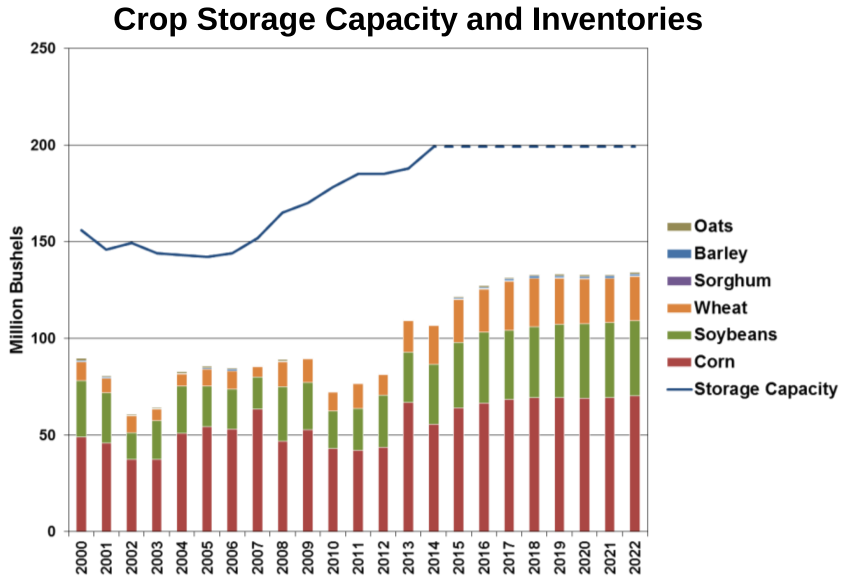


Figure 132: North Carolina December 1 Crop Storage Capacity and Inventories



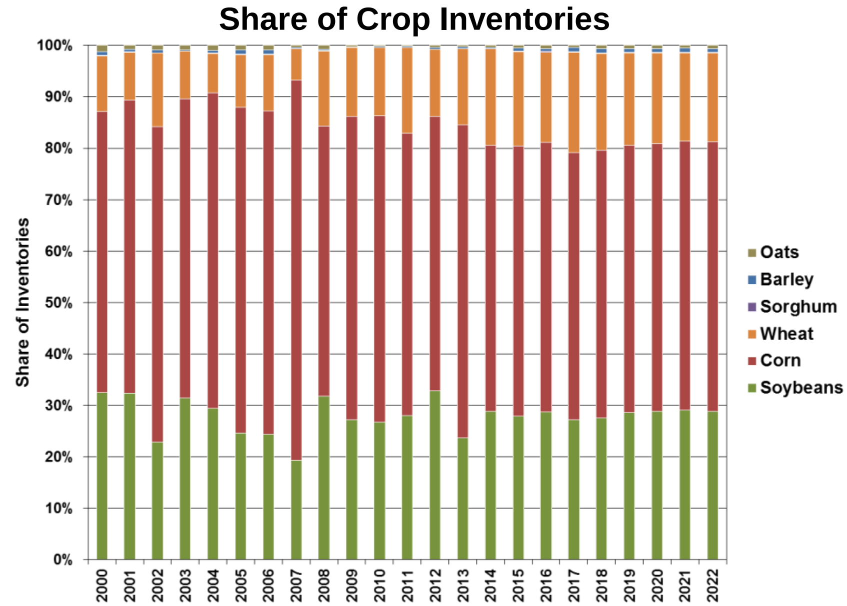


Figure 133: North Dakota December 1 Crop Storage Capacity and Inventories

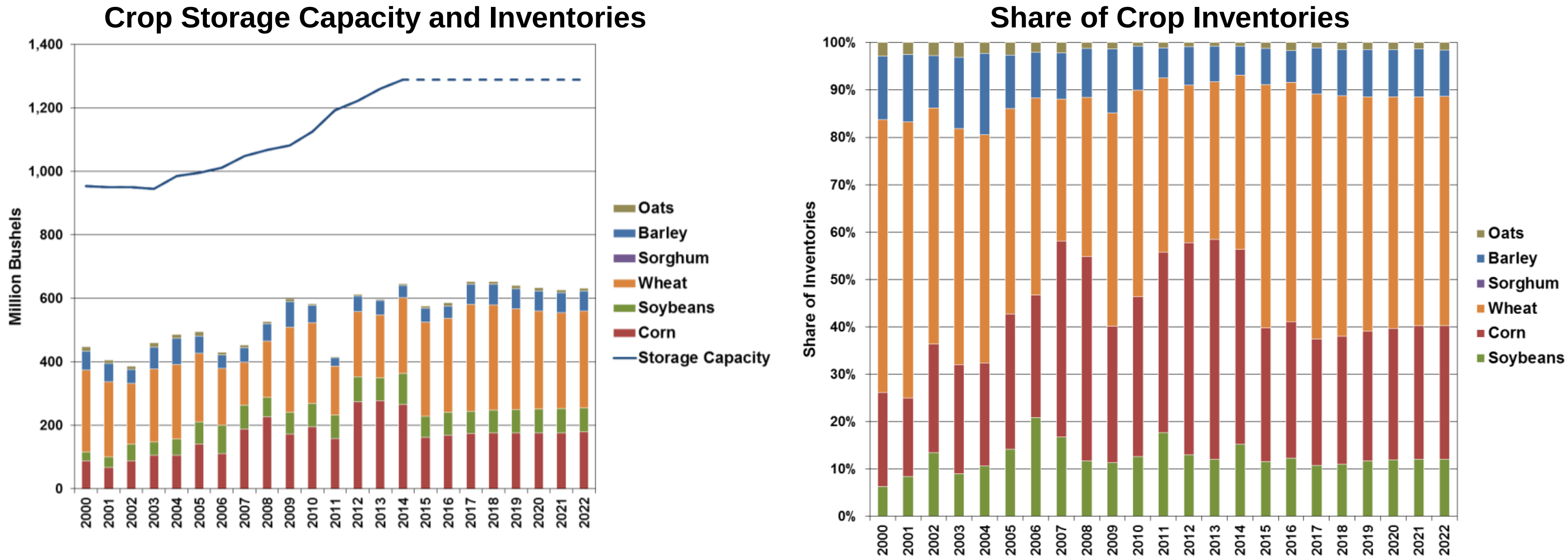
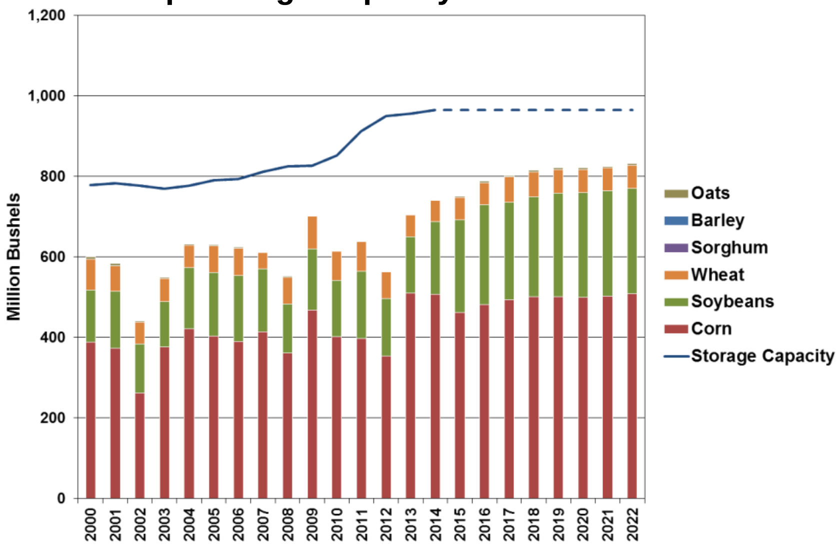


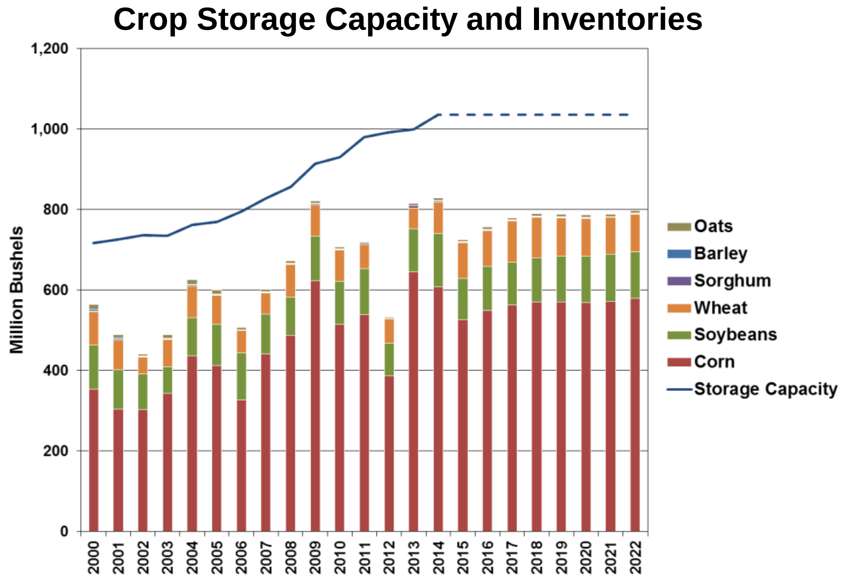
Figure 134: Ohio December 1 Crop Storage Capacity and Inventories

Crop Storage Capacity and Inventories



Share of Crop Inventories

Figure 135: South Dakota December 1 Crop Storage Capacity and Inventories



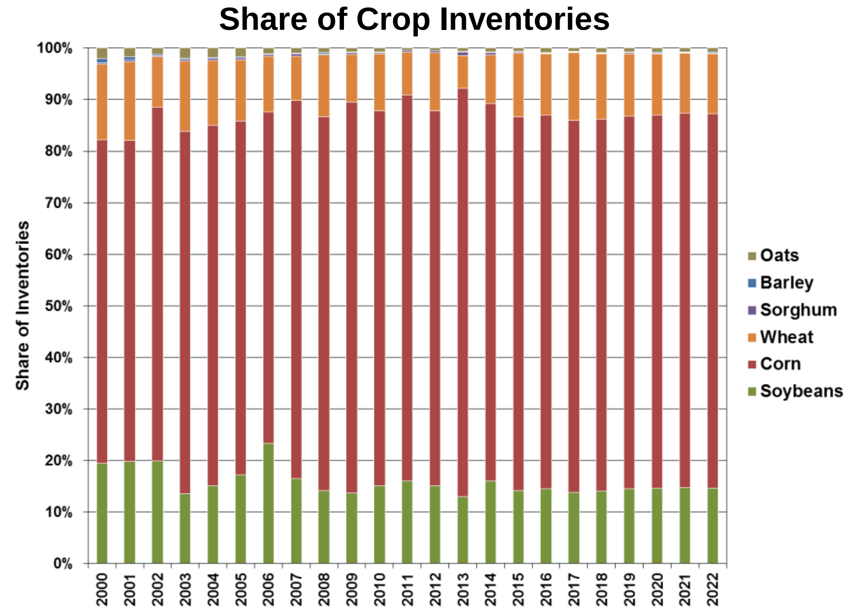


Figure 136: Tennessee December 1 Crop Storage Capacity and Inventories

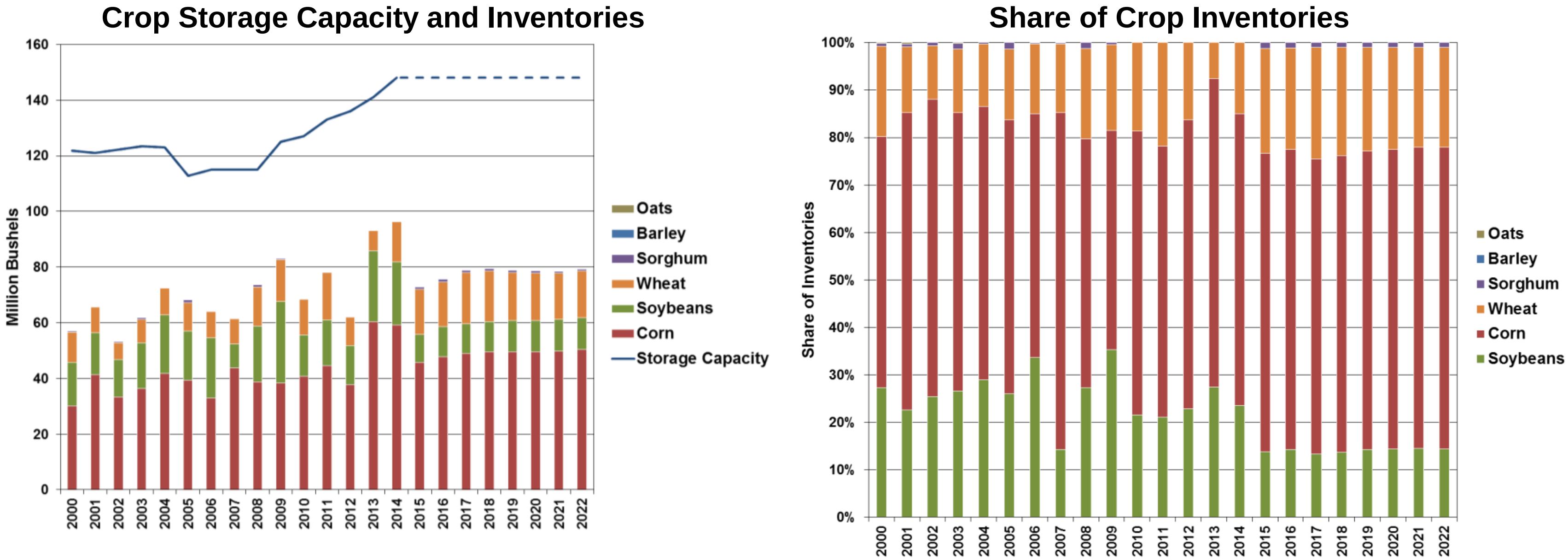
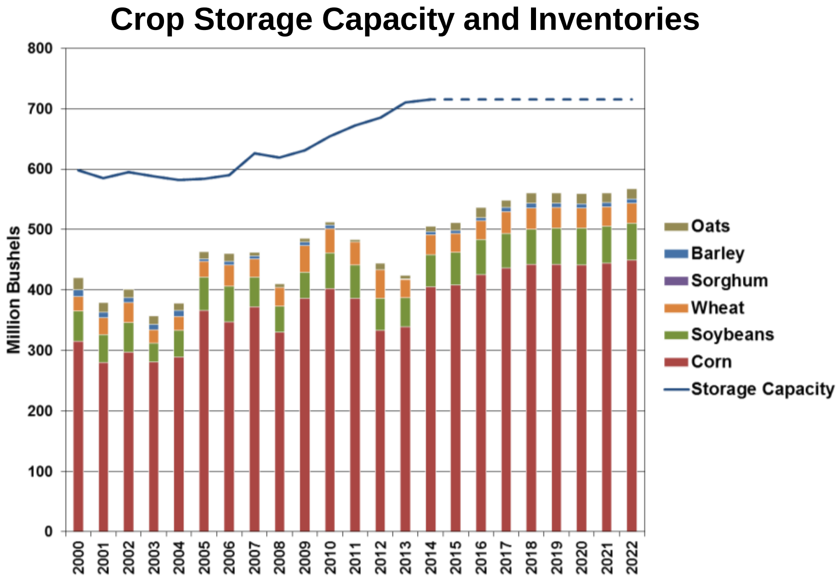
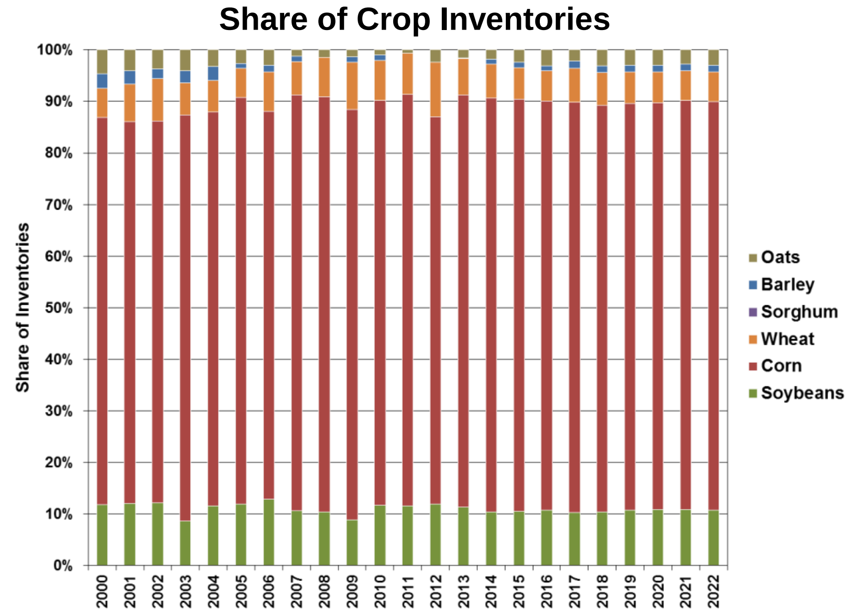


Figure 137: Wisconsin December 1 Crop Storage Capacity and Inventories





C. Background and Information about Informa Economics, Inc.

Informa Economics, Inc.

Informa Economics, Inc. (formerly known as Sparks Companies, Inc.) is a world leader in broad-based domestic and international agricultural and commodity/product market research, analysis, evaluation and consulting. The company was founded in 1977 and, in 2003, was acquired by Informa plc ("Informa").

Informa Economics, Inc. serves hundreds of firms, institutions and trade organizations worldwide from our headquarters in Memphis, Tennessee. We also have integral business partnerships with Informa Economics FNP South America, CEAS in London and Brussels and WPA in Washington DC.

Informa Economics broad categories of services include:

- Management Consulting for Agribusiness;
- Agricultural Commodity Market Analysis and Evaluation;
- Risk Management Strategies;
- Education and Training;
- Newsletters and Other Publications; and,
- Transportation, Industrials and Energy Market Analysis.

The company's professional depth and experience allow us to provide a wide range of services related to the economic and management concerns of clients, as well as to focus on broader issues concerning markets, facilities, resources and many others. In addition, Informa Economics is a world leader in the collection, analysis, and dissemination of agriculture and food information.

The Informa Economics team has also has extensive experience in agricultural policy analysis, especially since many employees formerly held senior policy, analysis or advisory positions in government; worked for major trade associations; held positions in land grant universities; or held senior management positions in leading agribusiness companies; most hold advanced degrees in agricultural economics or related fields. (For more information on Informa Economics, its staff and the services it provides see www.informaecon.com)

Informa Economics FNP South America

Informa Economics FNP South America operates in consulting and agribusiness information. It represents the Brazilian division of Informa Economics, based in the United States. Informa Economics is now the global leader in information for agribusiness.

Informa Economics FNP offers consulting services to various clients through a multidisciplinary team that involves renowned professionals in the sector.

The consulting projects take in technical and economic analysis of investments, analysis of sectors, asset evaluations, strategies for new investors, technical due diligences, mergers and acquisitions, market research, competitive intelligence studies, macro-market and sector studies.

One of Informa Economics FNP's strengthens on the market is having one of the most complete databanks on varied areas of agribusiness, built up since the foundation of FNP Consultancy, in 1989 - later to be Informa Economics FNP with its incorporation by the English group in 2005.

In the informant area, Informa Economics FNP publishes the traditional ANUALPEC and AGRIANUAL yearbooks of statistics for the cattle farming and agriculture sectors, used for years by professionals and companies in the agribusiness sector, in academia, in research and by students and public bodies in Brazil and in other countries.

Other specialized publications produced by Informa Economics FNP are also references in the agribusiness sector. In partnership there are market newsletters and the Long Term Strategic Consultancy (CELP). Produced in English for Brazilian and international clients, the weekly Brazilian Meat Monitor and the special reports (Brazilian Livestock and Meat Industry and Brazilian Poultry Meat Study) offer a complete approach to the sector.

In agriculture the company publishes market newsletters on soy and corn, the Agricultural Market Consultancy (COMAG) involving the main commodities in the sector, and special reports and Biofuels Brazil, in English.

The company is also the only one to publish the results of a detailed survey on the land market in Brazil, in the two-monthly Land Report and the six-monthly Yield Report, publications which are also available in English.

Transportation & Logistics Services

The transportation and logistics services group at Informa provides exceptional analytical, modeling, forecasting, network systems analysis, infrastructure assessment, and supply-chain expertise for a broad array of freight clients, local/state/federal governments and industry organizations. Below is a brief description of the variety of services available.

❖ Grain Transportation Retainer Service

- ***Weekly Updates*** delivered electronically detailing up-to-date analysis and data on freight activity, grain exports by port and a wide range of transportation statistics to monitor weekly changes.
- ***Monthly Outlooks*** delivered electronically with rotating emphasis on rail, barge, exports, grain flows, and general outlook discussions
- Telephone and e-mail access to analysts
- Quarterly meetings with client
- Client rates to Informa Economics events and schools

❖ Transportation, Logistics and Infrastructure Research and Consulting

Project based consulting, including evaluation of fleets, commodity flow modeling, feasibility studies, assessing transportation providers, modal selection, port selection analysis, port master plans and economic impact assessments, dredging feasibility studies, grain elevator location analysis, expert witness report and testimony, and other project consulting work related to transportation and logistics; providing transportation and logistics audits, and coordinating and advising lane analysis; and performing interim port director functions. Strategic transportation consulting, transportation management outsourcing services and transportation services for all modes of transportation, audits of transportation and logistics services, and advising and coordinating RFQs for lanes of business.

❖ Spatial Modeling, Network Analysis, Mapping and GIS Services

Standard to customized services provided for all network related analysis, including route/shipment optimization of freight flows (highway, rail, water), infrastructure assessment, facility/plant location analysis, market and buffer zone analysis (supply/demand), geographic transportation cost contours and custom tailored maps depicting a myriad of geographic/spatial information including all transportation and infrastructure, business facilities, ports, production and consumption regions, etc.

❖ Transportation, Logistics and Fuel Report and Database

Monthly outlook report and database available electronically, focusing on truck, intermodal and general economic outlook with discussion on drivers, truck and rail capacity, truck and railcar loadings, etc.

❖ Transportation and Logistics Roundtable Series

Three meetings annually that take place where transportation happens, bringing together experts and industry leaders to engage one another in transportation, logistics and infrastructure issues and challenges. Meeting locations and agenda based on participant input and interest. Each roundtable includes Informa's a transportation and logistics update.

❖ Annual *Barge Fleet Profile* and *Barge Commodity Profile* reports, available each March

- Annual *Barge Fleet Profile* fee is $100
- Annual *Barge Commodity Profile* fee is $450

❖ Annual **Commodities Transportation Conference** held in St. Louis

❖ Annual **Waterways Symposium** jointly sponsored with Waterways Council, Inc. and the Waterways Journal, held in various locations.

Current and Recent Informa Economics, Inc.
Grain Transport and Logistics
Projects and Analysis

- Interim Port Director for the Port of Cates Landing, Tiptonville, TN. (Ongoing)
- Evaluation and Market Potential for Container On Barge. (Underway)
- Intermodal Site Identification and Analyses. (Underway)
- Preparation and execution of an assessment and tours of the Panama Canal Expansion for a corporate board of directors. (Underway)
- Barge Fleet Profile – Informa Economics' conducts a yearly profile of the inland barge fleet include age of fleet data, equipment by company and value of used assets. (On-going)
- Barge Commodity Profile – Informa Economics' annually prepares a commodity barge report, a compendium of barge movements by commodity and barge type. (On-going)
- Conducting and preparing an annual compilation and analysis of shallow-draft/inland vessel operating costs for a federal government agency. (On-going)
- Conducting and preparing annual compilation and analysis of ocean going barge vessel operating costs for a federal government agency. (On-going)
- Conducting and preparing annual compilation and analysis of Great Lakes vessel operating costs for a federal government agency. (On-going)
- Bond Financing Alternatives for Transportation Infrastructure Supporting Agriculture for two state commodity associations. (2012 to present)
- Engagement of Participants in a Container-On-Barge Program Transporting Agricultural Products. (2012 to present)
- Evaluation and Assessment of Inland Ports for an Economic Development Association. (October 2015)
- Preparation and execution of a Brazilian Soybean Infrastructure Assessment and Tours during August 2015. (September 2015)
- Development of a Container Strategy for an Agribusiness. (August 2015)
- Site Identification and Analyses of Feed System Supporting Livestock Supply-Chain. (June 2015)
- Evaluation of Companies Loading and Unloading Liquid Cargoes on and off the River System. (May 2015)
- Evaluation of Export Capacity Requirements through the U.S. Center Gulf. (April 2015)

- Evaluation of Rail Impacts on the 2014 Grain Flows Situation. (February 2015)
- Due Diligence on a Supply-Chain Network Supporting an Export Facility. (April 2015)
- Evaluation and Due Diligence of an Agricultural Transportation Provider. (October 2014)
- Bridge Infrastructure Assessment Summary for 12 Midwest States. (September 2014)
- Review of Rail Regulations for Canada, United States, Brazil, Argentina, Australia and the United Kingdom" for a foreign government. (August 2014)
- Evaluation and Assessment of Chemical and Liquid Product Market Opportunities for the Inland Tank Barge Market. (July 2014)
- Evaluation and Assessment Exporting Biofuels to Mexico. (June 2014)
- Evaluation and Requirements of Grain, Soybean and Product Export Capacity in the United States. (May 2014)
- Economic Outlook for the Dry Barge Market Operating on the Inland Navigation System. March 2014
- An Economic Evaluation of Road Weight Limits for a national commodity association. (December 2013)
- Evaluation of the Canadian grain handling system. (November 2013)
- Global Sustainable Soybean Transportation, Comparing Argentina, Brazil and the United States. (September 2013)
- Development of Infrastructure and Transportation Strategy for State Commodity Association. (July 2013)
- Economic Impact Analysis of the Low Water Event between St. Louis and Cairo. (June 2013)
- Roads and Bridges Framework to Identify Entities with Vested Interests to Improve Bridge Funding for a state commodity association. (June 2013)
- Analysis and Identification of Bridge Infrastructure Impacting Agriculture for a state association. (June 2013)
- Development of a Port Master Plan for a Public Port. (February 2013)
- Analysis of Canadian Grain Port Terminals. (October 2012)
- Renewable Fuel Source Supply Chain Logistics Analysis. (August 2012)
- Quality Analysis for Soybean Intermodal Shipments for a state commodity association. (August 2012)
- Lock Maintenance Needs Relative to Commodity Product Value for a state association. (July 2012)
- Analysis and assessment of a merger between agriculture entities for a Canadian provincial government. (June 2012)
- Peer Review of Long Term Market Studies for a Central American infrastructure entity. (June 2012)
- Rural Infrastructure Study for national agriculture transportation association. (June 2012)
- Study to Identify Opportunities within a Grain Origination Network for a transportation provider. (May 2012)
- Assess a targeted soybean utilization impact on transportation and infrastructure for a state association. (May 2012)
- Analysis of the Reefer Supply Chain Relative Commodity Producers for a state association. (May 2012)

- Impact of a Targeted Commodity Utilization on the Transportation, Distribution and Logistics for a state association. (March 2012)
- Analysis of Dry Bulk Shipment Logistics to and from the Middle East for a Middle East food company. (March 2012)
- Summary and Review of Agriculture Transportation and Infrastructure for a private equity company. (February 2012)
- Analysis of Increasing Road Weight Limits for Agricultural Commodities for a state commodity association. (November 2011)
- Farm to Market Study for national agricultural association. (September 2011)
- Long Term Outlook of Agriculture's Impact on Infrastructure for a private banking group (October 2011)
- Panama Canal Expansion: Impact on US Agriculture study for national grain association. (September 2011)
- Evaluation and Outlook for Investment Alternatives of Global Grain Storage Opportunities for a private investment firm (August 2011)
- Assessment and evaluation of inland of marine assets for a transportation provider. (August 2011)
- Expert report (assessment of fuel surcharges and other business fees, and review of plaintiff expert report, August 15, 2011) and deposition (September 13, 2011, Memphis, TN) for defendant (confidential, pursuant to protective order)
- Evaluation of terminal investment alternatives for a private grain company. (June 2011)
- Profile and Assessment of US Grain Export Capacity for two state grain associations. (June 2011)
- Grain and soybean impact analysis for infrastructure impediments and failures for a state association. (July 2011)
- Evaluation and Feasibility of Acquiring a Liquid Truck Company Engaged in Biofuels Transportation for a private investment firm. (June 2011)
- Infrastructure Assessment and Economic Impact Relative to Grain Movements, Biofuels, Livestock and Further Food Processing study for a state association. (May 2011)
- Impacts of Higher Truck Weights on Grain Producers for a specific state. (May 2011)
- Trends and Forecasts of Macro-Level Business Environment for Grain Origination System for a private grain company. (May 2011)
- Impact Analysis of Climate Change Policy and Evaluation and Outlook of the Supply and Demand Situation of the Inland Barge Fleet. (February 2011)
- Analysis of transportation factors impacting feed stock and ingredients. (February 2011)
- Analyze the commodity flows and competitive situation for Mapleton, IL and Bussen Spur. (September 2010)
- Market and logistic study of palm oil in the US. (September 2010)
- Analysis of Center Gulf Export elevators and river terminals. (September 2010)

- Impacts of Higher Truck Weights on Indiana Grain Producers, (August 2010)
- Economies of scale assessment for a Lake Charles, LA grain export facility. (May 2010)
- Terminal analysis along Illinois River. (May 2010)
- Expert report ("Impact of Hurricane Katrina on Tyson Foods, Inc. International Chicken Leg Quarter Logistics, Supply Chain and Transportation," July 24, 2009) and deposition (December 16, 2009, Ropes & Gray, New York, NY) to Dickstein Shapiro, LLP for defendant Tyson Foods, Inc. in the matter Certain Underwriters at Lloyd's et al v. Tyson Foods, Inc., in Superior Court of the State of Delaware, Case No. 07c-06255 JEB; 2009-2010
- Origination dynamics for corn, soybeans and wheat in IL, IA, NE and SD. (May 2010)
- Grain storage and river loading terminal analysis on Danube River in Bulgaria. (March 2010)
- Review and Analysis of Corn Rail Rates, prepared for National Corn Growers Association. (December 2009)
- Long Term Outlook and Evaluation of the Operating Capacity for Grain, Soybeans and By-Products Exports Through the Pacific Northwest. (December 2009)
- Barge lock study for the Upper Mississippi and Illinois Rivers. (December 2009)
- Barge fuel tax revenue study of inland navigation systems for state association. (December 2009)
- Evaluation and Selection of Transportation Management Service. (2009)
- An Economic Evaluation of Road Weight Limits for Indiana Soybean Association and Indiana Corn Marketing Board. (2009)
- Evaluation of National Energy and Transportation Corridors for a national association. (2009)
- Indiana Infrastructure Assessment and Economic Impact Relative to Grain Movements, Biofuels, Livestock and Further Food Processing study for Soybean Association and Indiana Corn Marketing Board. (2009)
- Evaluation and Outlook of the Towing Industry Servicing the Inland Barge Market Along the Gulf Intracoastal Waterway for a transportation provider. (2009)
- Market Evaluation and Outlook of the Liquid Barge Market for a holding company. (2009)
- Review and Analysis of Fuel Surcharge Programs for an association. (2008)
- Strategic Review of Transportation and Fleet Requirements for Operating Companies of a corporation. (2008)
- Analysis of river barge and grain elevator operations on Mississippi, Illinois and Ohio Rivers for a cooperative. (2008)
- Evaluation and outlook of the towing industry servicing the inland dry barge market along the Gulf Coast for a transportation provider. (2008)
- Evaluation and Analysis of Fertilizer Logistics Chains for a terminalling company. (2008)
- Economic Analysis of Army Corps of Engineers Barge Locking Fee for an association. (2008)
- Commodity and Barge Situation and Outlook Report for a Barge Operator. (2008)
- Analysis of the US grain origination system for an international grain buyer. (2008)

- Valuation of Grain Elevators in North Dakota and Minnesota for an international grain buyer. (2008)
- Expected Incidence of Grain Contamination in U.S. Corn Exports for a seed company. (2008)
- Evaluation of Existing Maritime Assets and Potential Markets. (2008)
- Analysis of grain barge loading terminals for a cooperative. (2008)
- Evaluation of drybulk terminalling on the inland navigation system. (2008)
- Evaluation of company's transportation and logistics program. (2008)
- Prepare and facilitate transportation Request for Bid for a steel shipper. (2008)
- Dry barge market study for a leasing company. (2008)
- Evaluate competitive trends for soybean products in key international ports from the US, Brazil and Argentina. (2007)
- Strategic evaluation of a client's terminalling operations and practices (2007).
- Study on the transportation of DDGS for the U.S. Grains Council. (2007)
- Feasibility of a River Barge Terminal on the Lower Mississippi River. (2007)
- Evaluation of an additional truck dump and increased storage capacity. (2007)
- Strategic assessment of a western Corn Belt grain origination system. (2007)
- Evaluation and assessment of South America's navigation system and barge industry. (2007)
- Long-term barge movement forecast for farm and non-farm commodity movements for a federal government agency. (2006)
- An evaluation and profile of liquid tank barge fleet and the movement of liquid commodities and products by barge on the inland navigation system. (2006)
- An outlook for the supply of jumbo covered barges for a major US equipment leasing company. Forecasts of future demand for the transportation asset were compared with the demand for these assets. (2006)
- Black Sea Port evaluation and selection for new dry and liquid port terminals for an international shipper. (2005)
- Evaluate for an international shipper the Port of Suape, Brazil for a terminal to handle fertilizer imports and grain and soybean exports. (2005)
- Assess for an international shipper global dredging cost factors and drivers for an international shipping company. (2005)
- Evaluate and modeled for the World Bank the distribution and infrastructure system of Russia's grain trade. (2004)
- Barge market outlook and a general overview of US transportation system for a major equipment manufacturer. Movement of major agricultural commodities, by mode, was forecast five years into the future and compared with barge, rail and truck assets. (2004)
- For a major financial institution, an analysis of a barge company's earning potential based the outlook for barge movement over the next ten years and the company's cost position relative to competitive carriers. (2003)

- A comparison of the US rail grain system with the Canadian system including policy, infrastructure and operating practices comparisons. (2003)
- Gdansk – Poland deep-water port feasibility study for a major lending institution and the project principle. Work included forecasted amounts of throughput and logistical analysis of capabilities. (2003)
- Evaluation and Outlook of Inland Barge Market Multi-Client Study. Conducted operator surveys, commodity forecasts for barge supply and demand outlook for 5-years. (2003)
- Barge market outlook and a general overview of transportation system for a major barge line participant. Grain exports and movement to Gulf export facilities was forecast and strategies for development of extra volume from the upper river was explored. (2002)
- Studied the impact of fuel surtax on barge operators and farmers. Calculated the economic loss to farmers of increased levels of barge fuel tax.
- Transportation Multi-Client Study – overall review of the US transportation system for several North American transportation entities. Analysis included by-mode projection of movement and future availability of transportation assets.
- For at least two major owners and operators of covered hopper cars, conducted an outlook for the supply and demand of covered hopper cars in the US. Analysis included projections of car fleet and car fleet demand.
- An evaluation of selected sites for the development of high through put elevators in Western Canada, including the design and development of an optimization model employing linear programming to assess the greatest potential for a high throughput elevator under a variety of market and transportation related scenarios.
- An assessment of the costs of building and operating high through put elevators in Western Canada, in the context of market related issues such as shifts in cropping mix, competition from increased processing demand and potential shifts in transportation policy.
- The development of long term projections (5 to 10 years) of Western Canadian grain flows for a major railroad, including projections of export demand, demand for rail equipment due to directional movements of grain to export positions.
- An evaluation of the grain collection network for a major Canadian grain company, including an analysis of various potential sites for high throughput elevators.
- A review of the grain handling network restructuring and rationalization for Transport Canada.
- Port Competitiveness study for Transport Canada (part of the Estey/Kroeger process) analyzing the potential for Western Canadian grain to flow through non-traditional ports.
- Ocean Freight Analysis, looking at the implications of changing ocean freight rates and spread on the inland routing of grain in Canada and the United States.
- Strategic analyses for Inland high-throughput elevators for grain companies.
- Detailed analysis of rail transportation policies (such as car pooling and car allocation formulae) as they relate to

west coast movement, for a Vancouver terminal operator.

- An analysis of railway competitiveness in Western Canada.