12. The Changing Competitive Structure of the Kansas Grain Handling and Transportation Industry

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Daniel O'Brien was raised on a grain and livestock farm in south central Nebraska. He received bachelors and masters degrees in Agricultural Economics from the University of Nebraska-Lincoln. After completing his Ph.D. at Iowa State, he worked as the Extension Agricultural Economist at the Northwest Research and Extension Center in Colby and was Northwest Area Extension Administrative Director starting in 2003 before returning to his Extension Agricultural Economist position in January 2007. His ongoing extension and applied research interests and efforts are in the areas of a) grain market supply-demand analysis, bioenergy impacts and risk management strategies, b) grain industry market structure, conduct and performance – focusing on grain handling and transportation issues, and c) economic analysis of irrigated and dryland cropping systems, and associated cropland leasing arrangements.

Abstract/Summary

Changes in the competitive structure of the Kansas grain storage, handling, and transportation industry at the local level between the 2007-2008 and 2014-2015 are examined – along with changes in factors that are hypothesized to have influenced these adjustments in Kansas grain industry structure. The analysis focuses on changes in Kansas rail capacity access, trends in business location consolidation and ownership-type by region of the state, the locational proximity of grain elevator storage capacity and numbers of competitors to intensity of grain production and livestock feeding, ethanol plants, and wheat mills.

A complementary focus of this paper is on how trends in Kansas production of corn, sorghum, wheat and soybeans compare to the evolution of both off-farm (commercial) and on-farm storage of these same crops over the 1969-2015 period. Of particular interest will be how Kansas production and quarterly stocks data over time coincide with the more comprehensive Kansas grain industry data during the 2007-2008 and 2014-2015 periods.

The Changing Competitive Structure of the Kansas Grain Handling & Transportation Industry

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The Situation – *Changes in the Kansas Grain Industry*

- **Changes have occurred in…**
  - Physical grain storage & handling capacity of elevators
  - Competitive organization & consolidation of Agribusinesses
  - Access to railroad transportation

- **Other factors…**
  - Periods of both short & large crops ⇨ grain storage issues
  - Ethanol plants, Cattle Feeding, Dairy Industry growth

Purpose & Focus of this Study

- **To examine changes in the competitive structure of the Kansas grain storage, handling & transportation industry during the 2008 – 2015 period & their causes**
- **Analysis of trends in Kansas grain production relative to changes in *on-farm* & *off-farm* grain storage (1969-2015)**
  - Compared to 2008 & 2015 Kansas grain storage

Data – Grain Industry Structure

1) Grain elevator location, business type & storage capacity
2) Access to rail service (by grain elevators) & by which Railroad
3) Rail car capacity of Elevators, including Shuttle Train facilities
4) Proximity & #s of competing elevators (affiliated & non-affiliated)
5) Ethanol plant & wheat mill proximity to grain elevators
6) Intensity of grain-livestock production by county & region to each grain elevator

Data Resources

- **Grain Elevator Characteristics**
  - 2007-2008 & 2014-2015 **Kansas Grain & Feed Assoc. Directories**
- **Railroad Info**: BNSF, Union Pacific, & Other online sources
- **Public information** (via the Web & personal contacts)
  - Directories, google satellite images, grain business websites, etc.
- **USDA NASS Quick Stats** (National Agricultural Statistics Service)
- **Interviews with Managers Kansas Grain Elevators** – 2015/2016

More Data
– USDA Grain Production & Storage info

- **On-Farm & Off-Farm Grain Storage & Production #s**
  - Corn, Grain Sorghum, Wheat & Soybeans
  - Both Kansas & United States data
  - Time Period: 1969-2016

Kansas Grain Elevators & Processors

- **All Grain Elevators (#):** 695 (2008) > 687 (2015)
- **Grain Elevators by Business Type**
  - **Cooperative** 484 (2008) = 484 (2015) (no change)
  - **Independents** 205 (2008) > 198 (2015) (-3.4%)
  - **Joint Ventures** 6 (2008) > 5 (2015) (-17%)
- **Kansas Agricultural Crop Processors**
  - **Wheat/Grain Processors** 12 (2008) = 12 (2015) (no change)
  - **Soybean Processors** **2** (2008) = 2 (2015) (no change)
  - **Ethanol Plants** 8 (2008) = 8 (2015) (no change)

Kansas Off-Farm Grain Storage Capacity

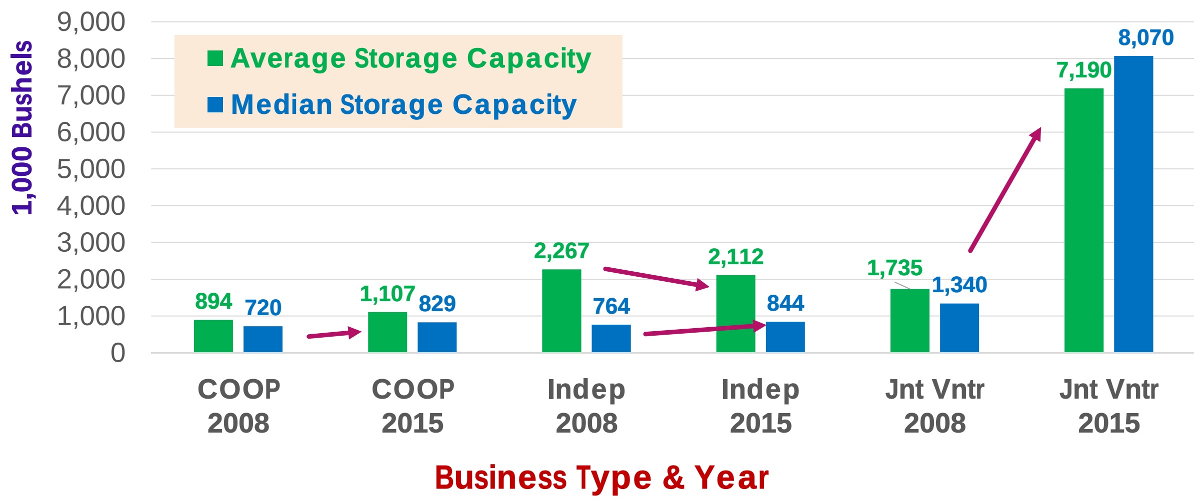
- **Total Kansas Grain Elevator Storage Capacity**
  - **Upright Storage** 774 mln bu(2008) < 809 mln bu(2015) (+4.5%)
  - **Flat Storage** 135 mln bu(2008) < 176 mln bu(2015) (+30%)
  - **Total Storage** 907 mln bu(2008) < 985 mln bu(2015) (+8.6%)
  - **Warehouse #s** 77.4 k-tons(2008) < 93.7 k-tons(2015) (+21%)

Kansas Grain Storage Capacity by Elevator

- **Total Grain Storage Capacity per Elevator**
  - Average: 1,304,075 bu$^{(2008)}$ < 1,433,357 bu$^{(2015)}$ (+10%)
  - Median: 725,500 bu$^{(2008)}$ < 840,000 bu$^{(2015)}$ (+16%)
  - Maximum: 47,000,000 bu$^{(2009)}$ < 40,100,000 bu$^{(2015)}$ (-15%)
- **"Upright" Grain Storage Capacity per Elevator**
  - Average: 1,127,758 bu$^{(2008)}$ < 1,179,347 bu$^{(2015)}$ (+4.6%)
  - Median: 656,500 bu$^{(2008)}$ < 733,500 bu$^{(2015)}$ (+12%)
- **"Flat" Grain Storage Capacity per Elevator**
  - Average: 199,490 bu$^{(2008)}$ < 256,099 bu$^{(2015)}$ (+28%)
  - Median: 0 bu$^{(2008)}$ = 0 bu$^{(2015)}$

Grain Storage Capacity by Business Type

2008 vs 2015



Factors Affecting Elevator Competition in Kansas Grain Markets

- **Feedgrain Demand for Livestock Feeding**
- **Consolidation of Local Grain Elevators**
  - Formation of multi-location cooperatives
  - "Strategic" entry of national firms into local markets
- **Grain Ethanol Plant Development**
- **Railroad Infrastructure Changes**
  - Emphasis on Shuttle (75-110 cars) Train facilities
  - "Short Line" de-emphasis &/or abandonment over time

Market Factors Expected to Affect Local Basis & Cash Grain Prices…

- **Competitive Environment** (# of competitors)
  - **Issue:** *Affiliated versus Nonaffiliated Firms*
- **Supply/Demand Conditions in Local Market**
  - **Issue:** *Equilibrium $ for grain S/D in local markets*
- **Elevator Grain Handling & Storage Capacity**
  - **Issue:** *Local market share (cost structure & market power-leadership)*
- **Form of Business Organization & Multi-Site Area Coverage**
  - **Issue:** *Cooperative dividends reflected in grain $s* (????)

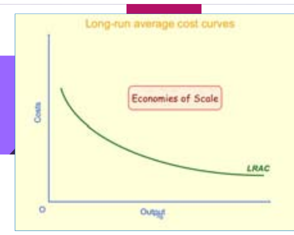
Economic Principles @ Work

***"Oligopsonistic"* Competition** likely exists among grain elevators in local-regional grain markets

- **Regional competition among a small # of non-affiliated grain elevators (i.e., competing grain buyers)**
  - Reflected in competitive local grain basis bids

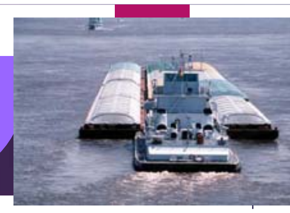
- **Barriers to entry into local markets**
  - Cost of facilities for grain handling & storage
  - Rail car handling facilities access & scale/size issues
  - Affiliated elevators seek to secure procurement areas for grain

Economies of Scale & Scope



- **Scale Economies**
  - **Theory**: "Average cost falls as firm output increases"
    - ⇨ *Cost efficiency improves as firm – facilities grow larger*
- **Scope Economies**
  - **Theory**: "It is less costly for **1** firm to perform **2** integrated activities than for 2 specialized firms to perform them separately"
- **Relevance to the Kansas Grain Industry**
  - Grain procurement ability of multiple elevator companies
  - Efficiencies of large scale grain handling facilities

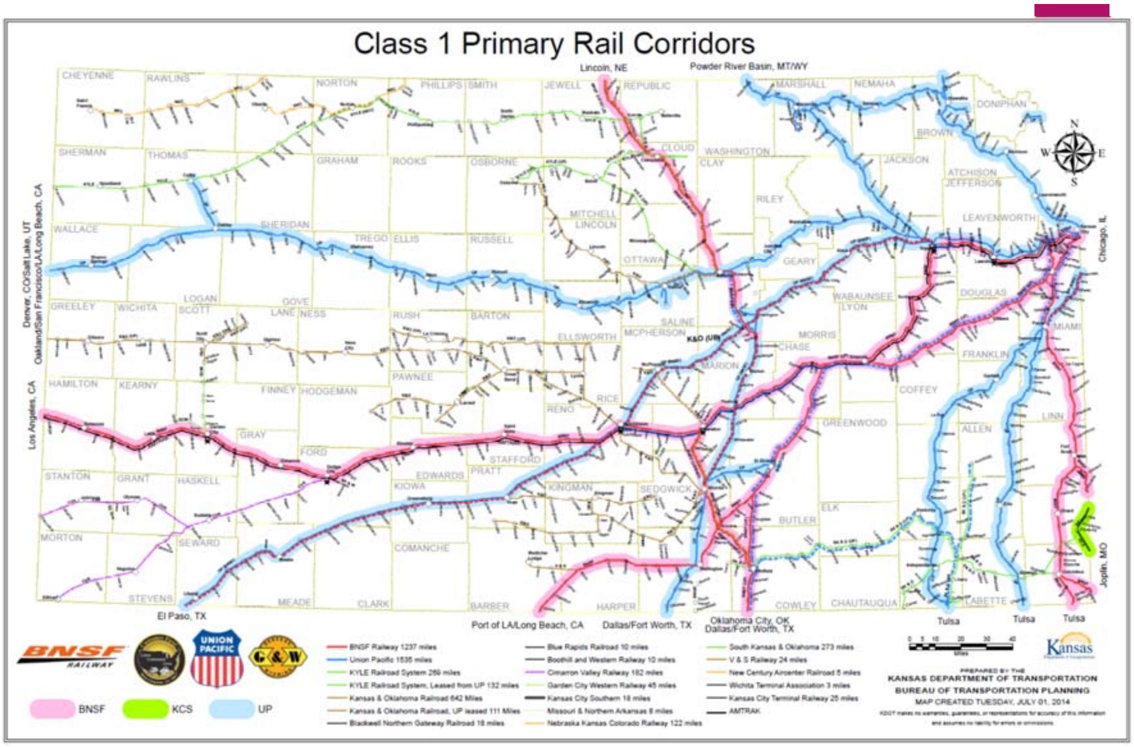
Transmitting Grain Prices$ Through Grain Market Systems



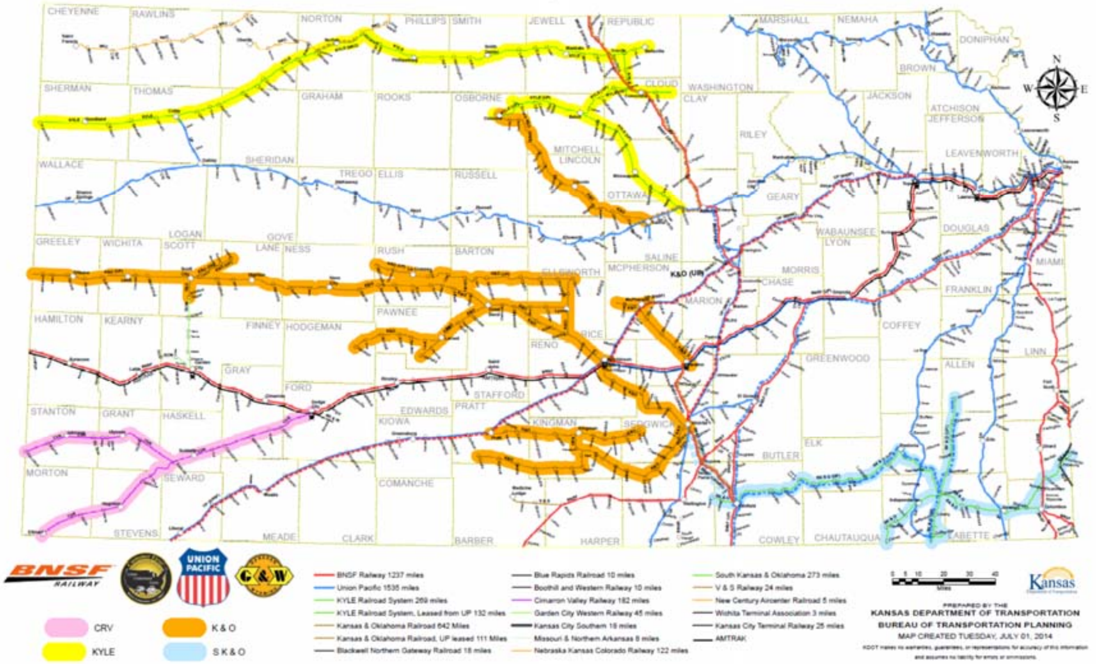
- **Impact of Shuttle Train Facilities on local grain prices?**
  - Lower rail carrier rates & access during peak demand
- **"*Upstream*" vs "*Downstream*" locations**
  - **"Upstream"** – Coming from an *upstream* location through a grain elevator to get to another final grain user located *downstream*
  - **"Downstream"** – A location *closer to a final grain user* than an *upstream* grain elevator
  - **"Cross Region Arbitrage"** – Often via truck transportation
    - Responding to grain bids from outside regular sales region

Focus on Rail Transportation by Location & Region in Kansas

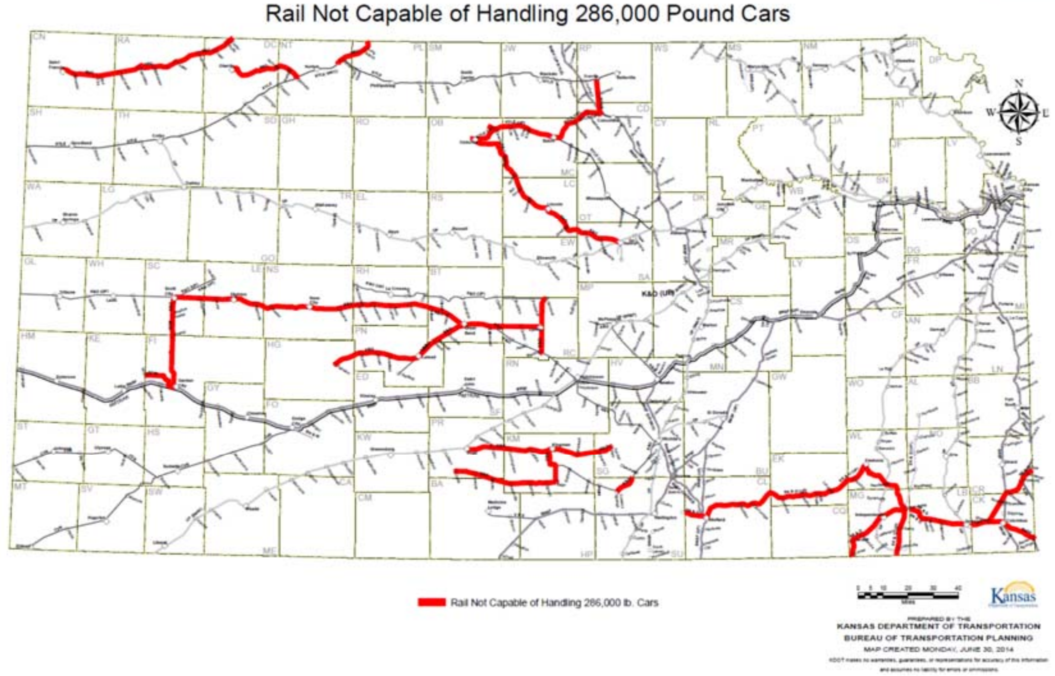
Kansas Railroad Lines & Grain Elevator Map - 2013

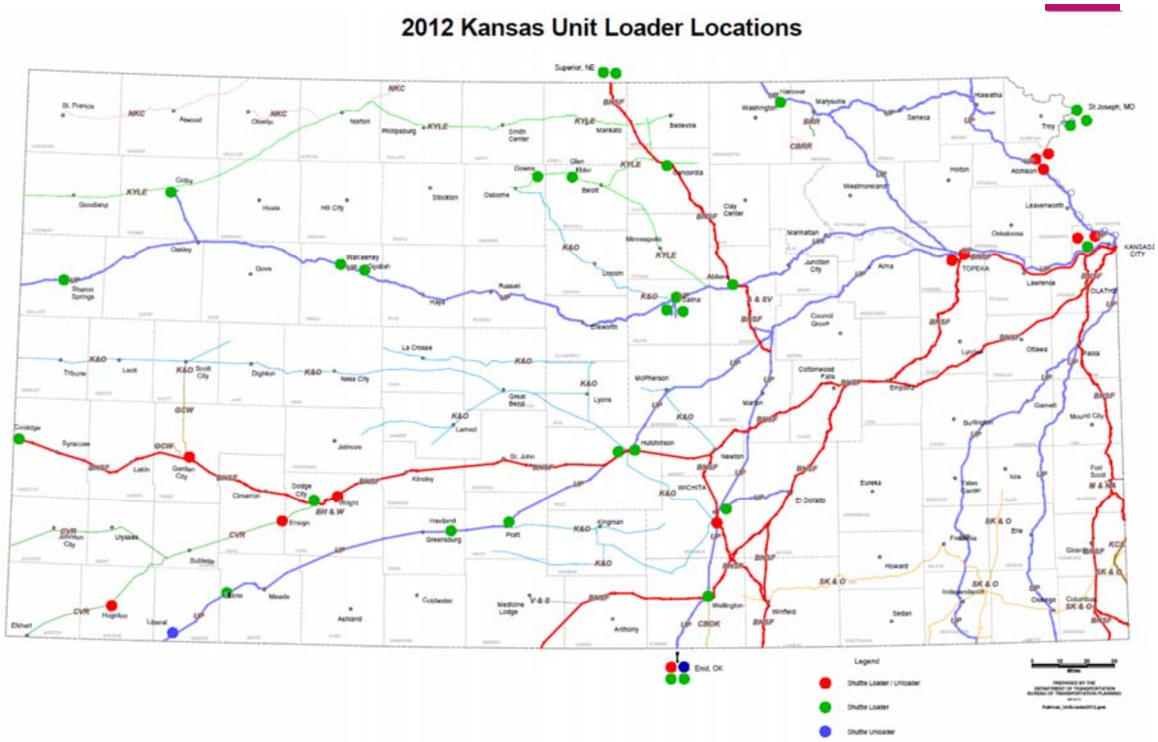


Short Line Primary Rail Corridors

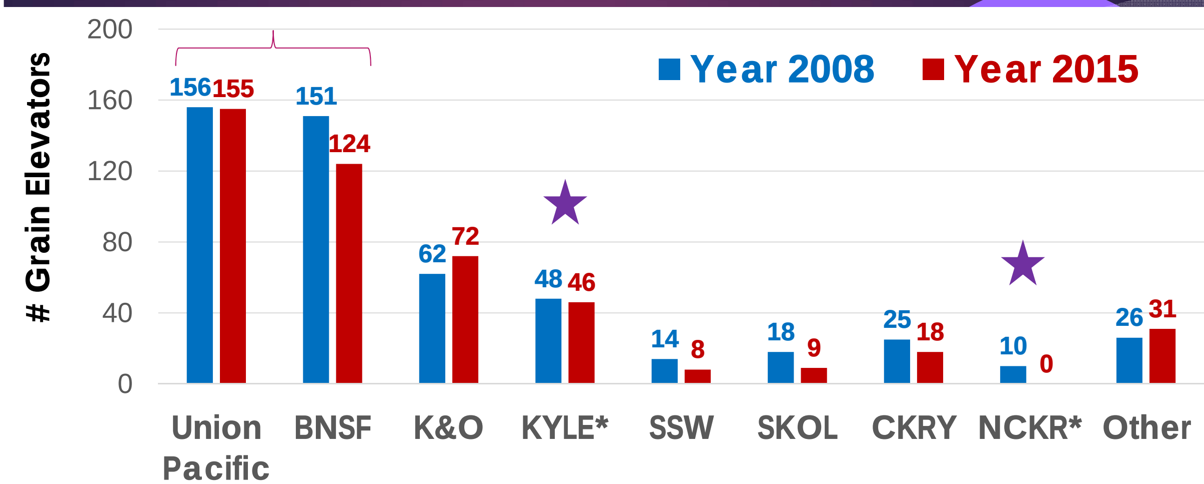


Rail Not Capable of Handling 286,000 Pound Cars

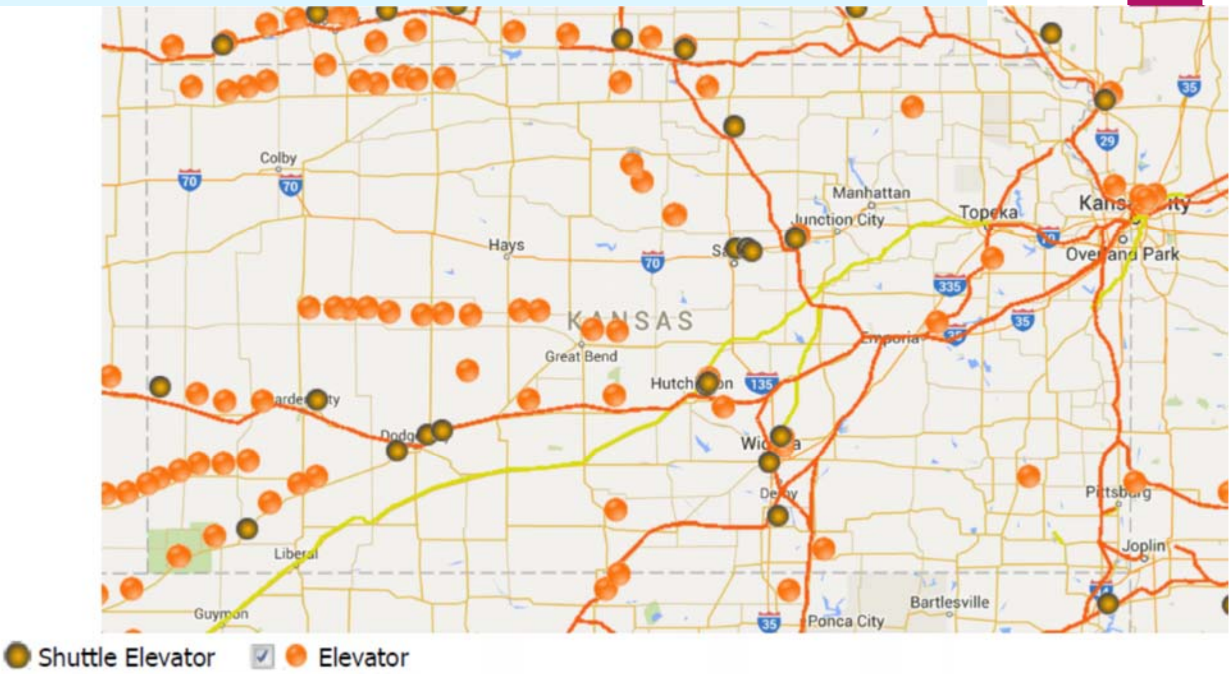




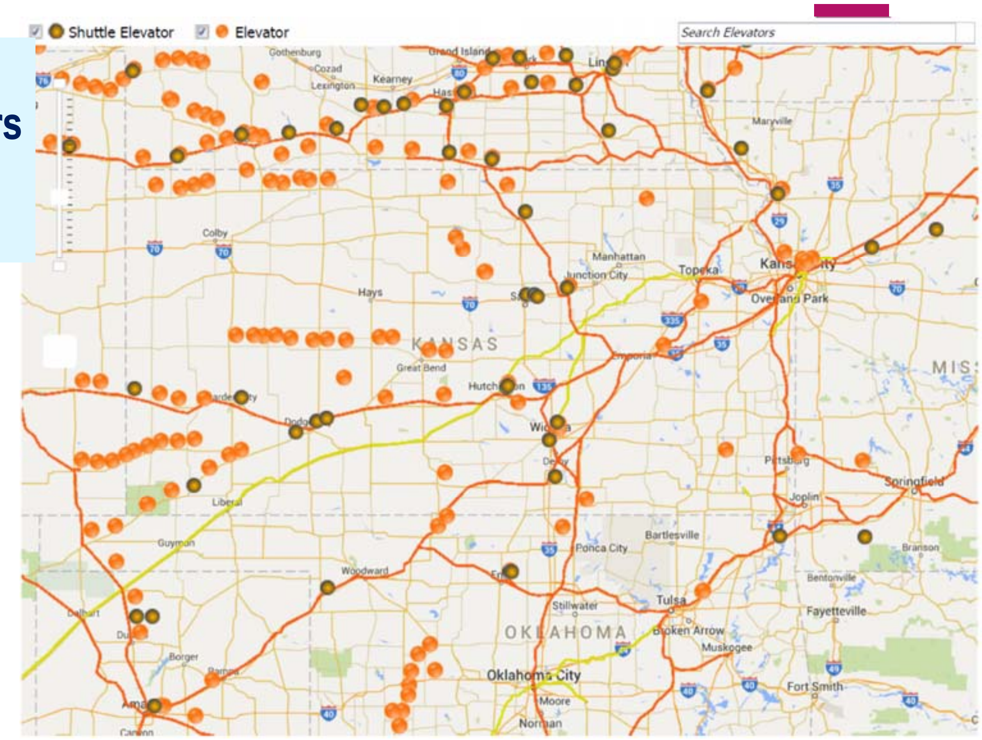
of Kansas Grain Elevators Served by Railroad Companies - 2008 vs 2015

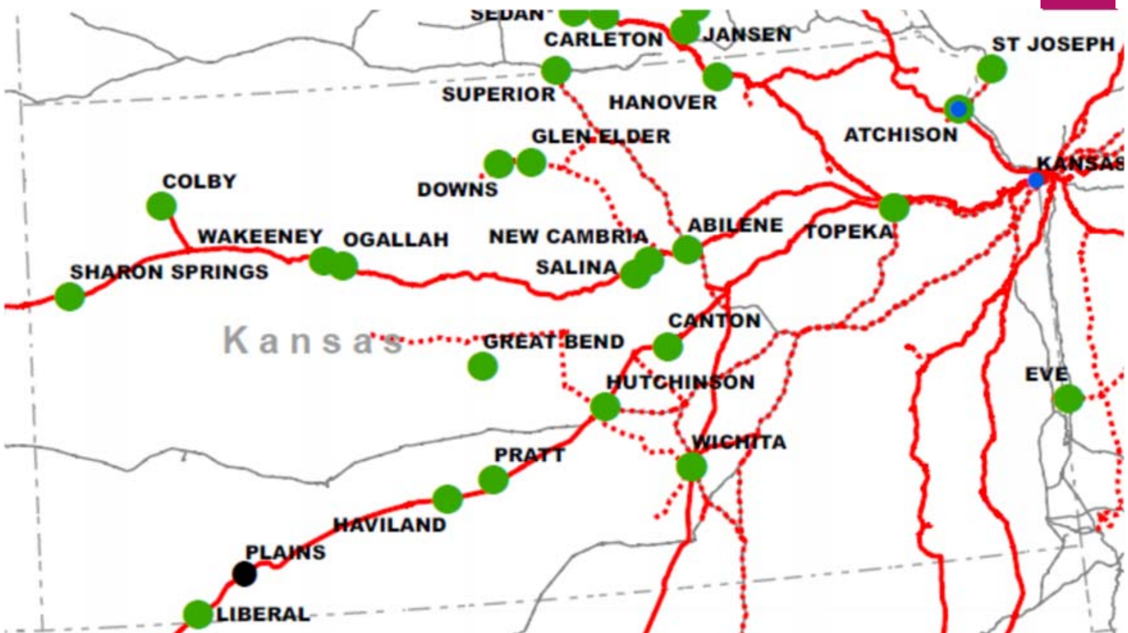


BNSF Shuttle Loader Locations in Kansas



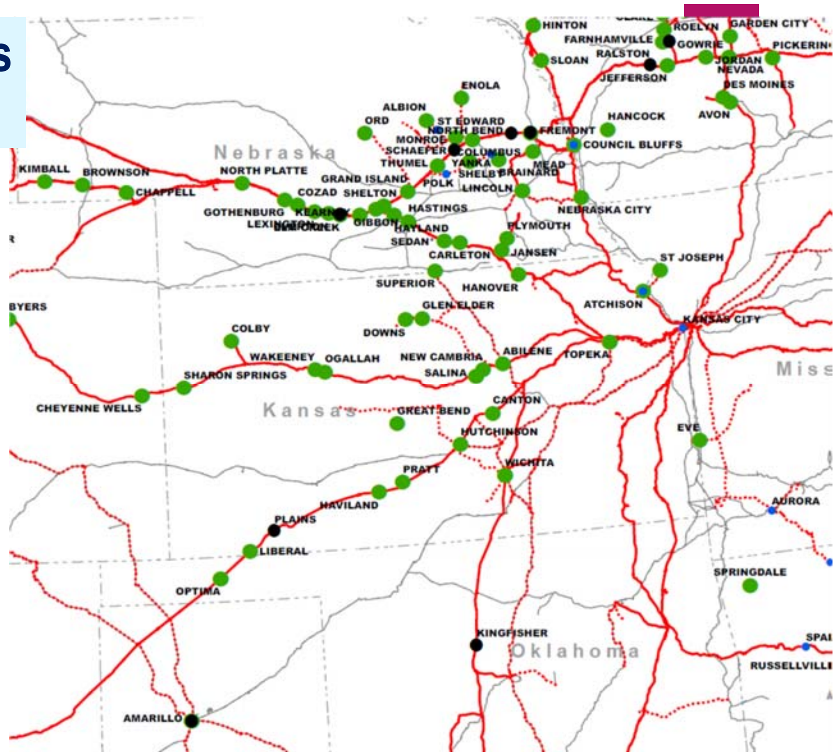
BNSF Shuttle Loaders in NE, KS, OK, IA





UP Shuttle Loader Locations in Kansas

UP Shuttle Loaders in NE, KS, OK, IA



Kansas Rail Access & Handling Capacity

Category	2008 # Elevators	2008 % of Total	2015 # Elevators	2015 % of Total
No Rail Service	233	33.5%	280	40.8%
Rail Access	457	66.5%	407	59.2%

Kansas Rail Access & Handling Capacity

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No Rail Service	233	33.5%	280	40.8%
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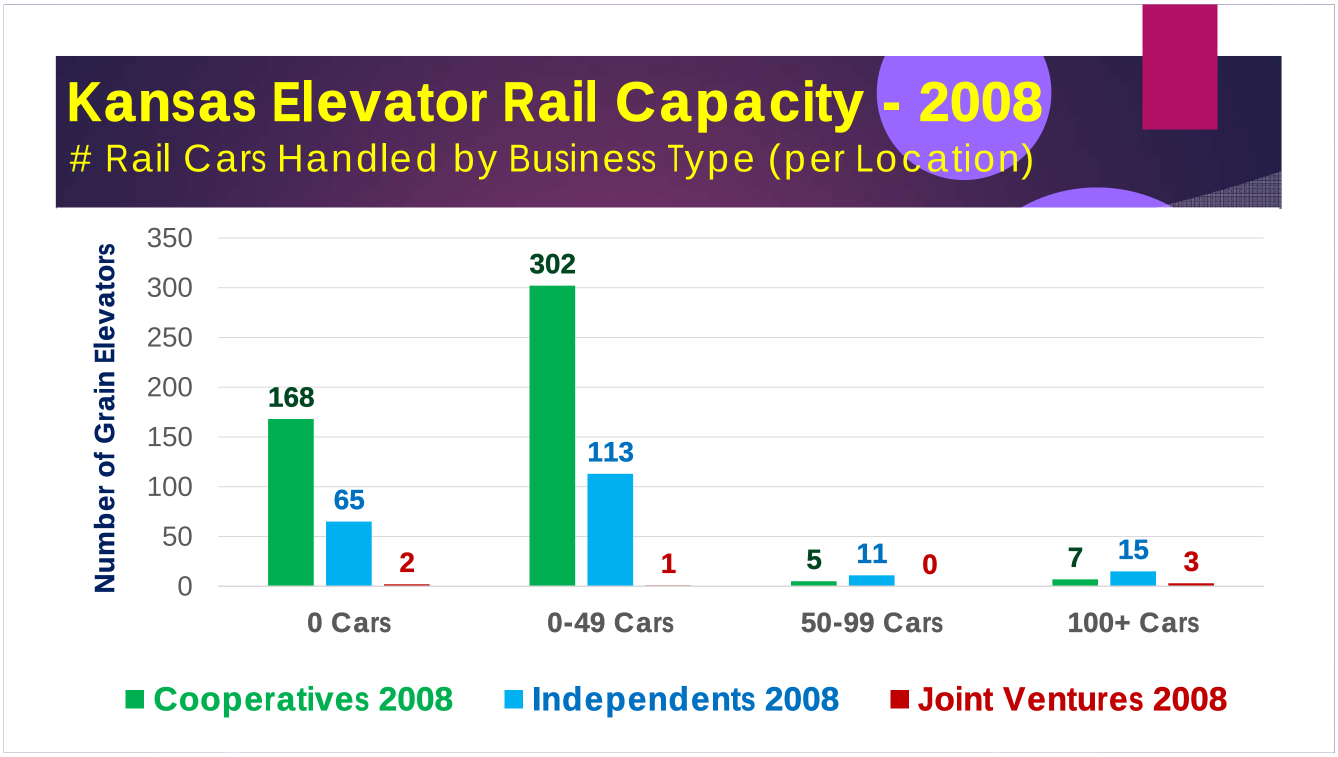
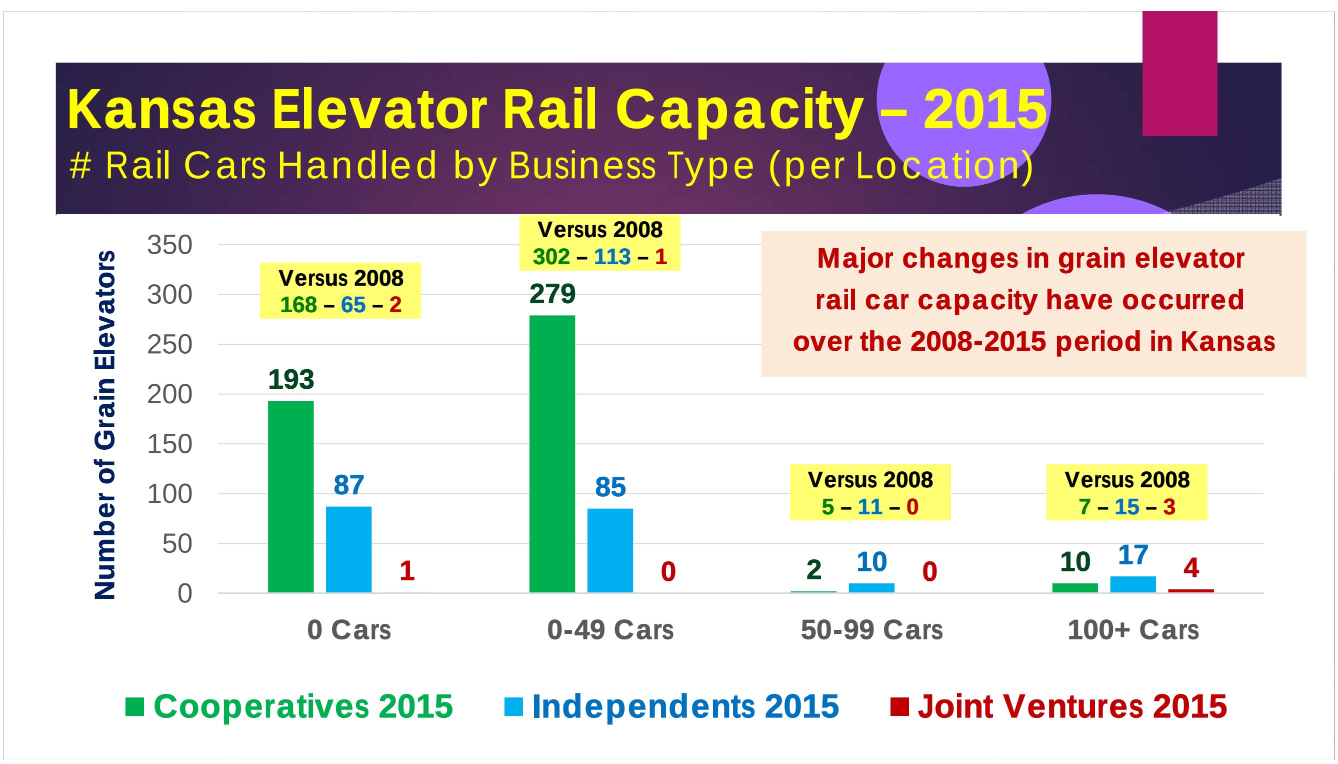
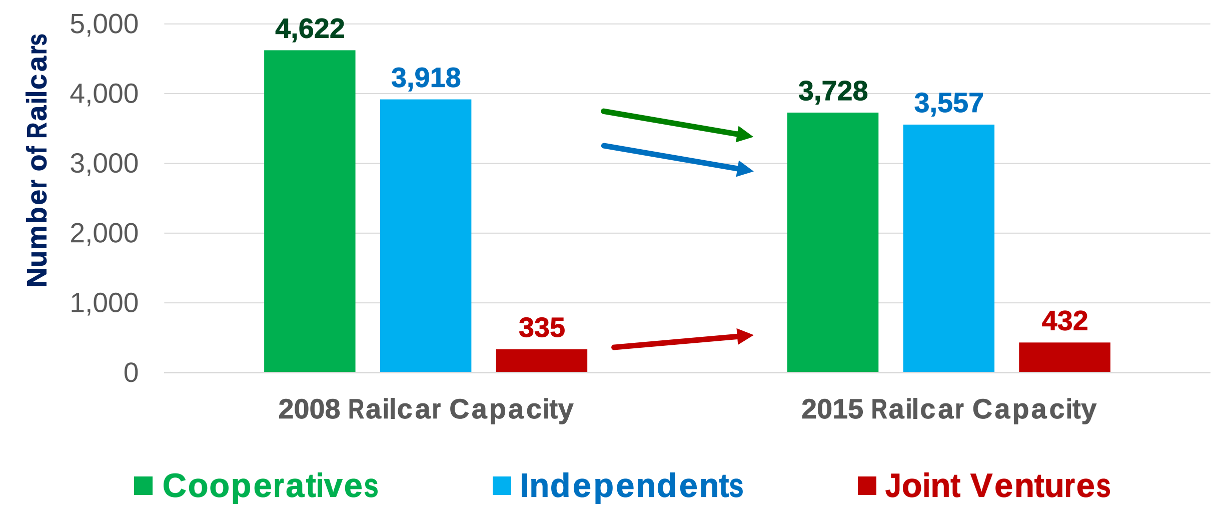
Category	2008 # Elevators	2015 # Elevators	% Change 2008 to 2015
0 to 49 rail cars	416	364	⇨ Down 13%
50 to 99 railcars	16	12	⇨ Down 25%
100+ railcars	25	31	⇨ Up 24%
All KS Railcars	8,875	7,717	⇨ Down 13%


Kansas Elevator Rail Capacity - 2008
Rail Cars Handled by Business Type (per Location)
Number of Grain Elevators
350
300
250
200
150
100
50
0
168
65
2
302
113
1
5
11
0
7
15
3
0 Cars
0-49 Cars
50-99 Cars
100+ Cars
Cooperatives 2008
Independents 2008
Joint Ventures 2008

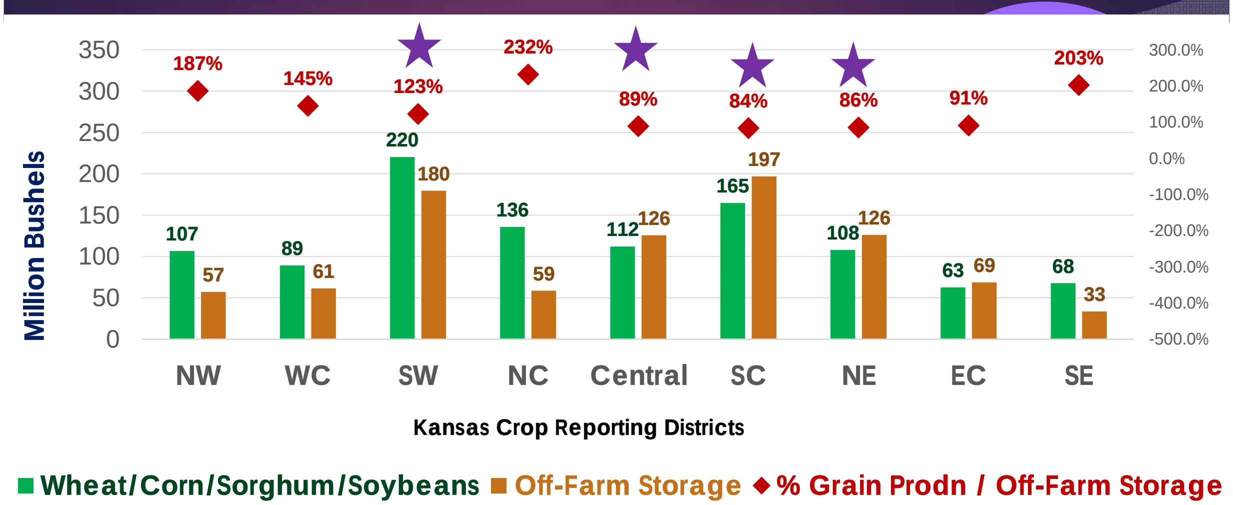

Kansas Elevator Rail Capacity – 2015
Rail Cars Handled by Business Type (per Location)
Major changes in grain elevator rail car capacity have occurred over the 2008-2015 period in Kansas
Number of Grain Elevators
350
300
250
200
150
100
50
0
Versus 2008
168 – 65 – 2
Versus 2008
302 – 113 – 1
Versus 2008
5 – 11 – 0
Versus 2008
7 – 15 – 3
193
87
1
279
85
0
2
10
0
10
17
4
0 Cars
0-49 Cars
50-99 Cars
100+ Cars
Cooperatives 2015
Independents 2015
Joint Ventures 2015

KS Elevator Railcar # Changes: 2008-2015

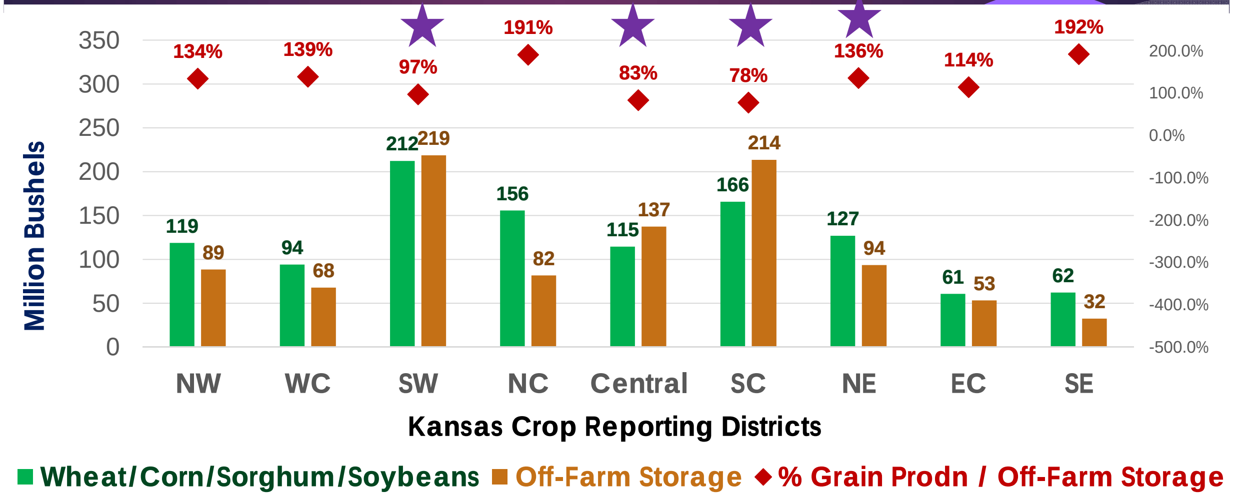
Rail Cars Handled by Business Type (per Location)



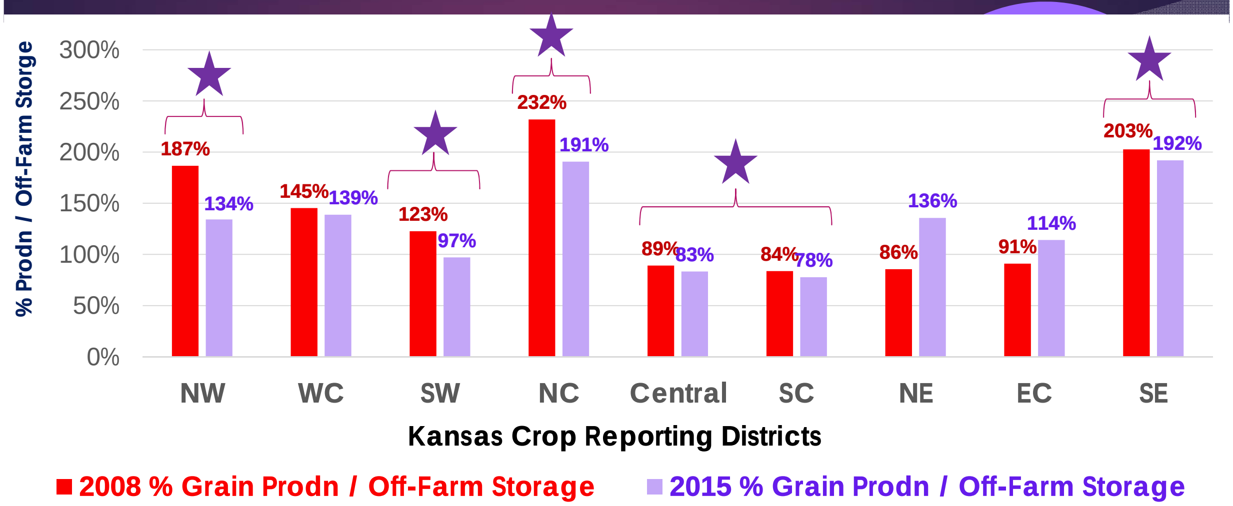
Crop Production 2005-2008 vs Elevator Capacity 2008 by Kansas CRD*



Crop Production 2012-2015 vs Elevator Capacity 2015 by Kansas CRD*

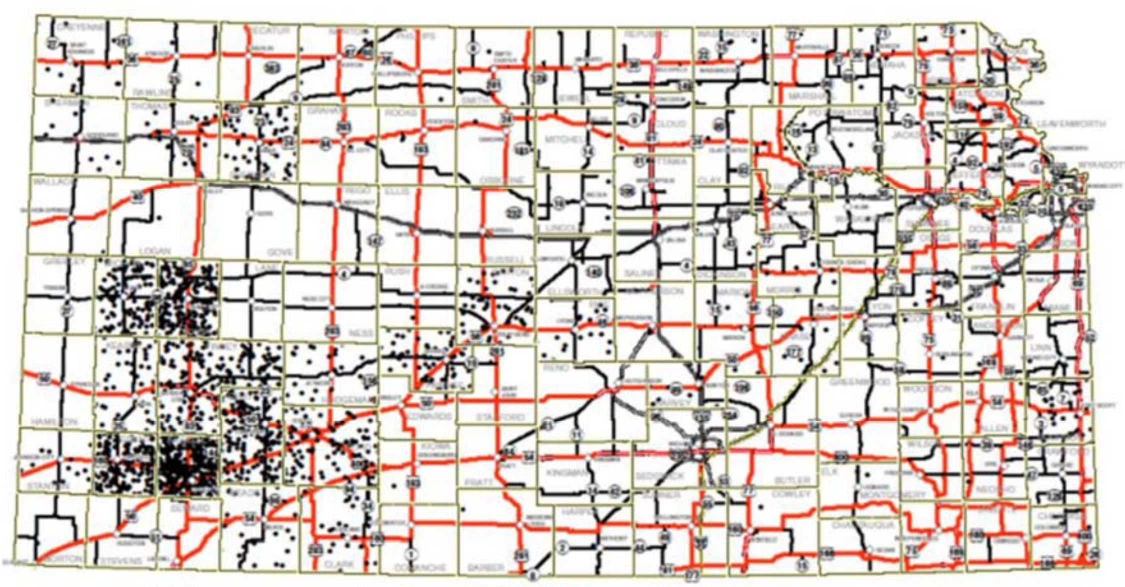


Changes in Crop Production ÷ Elevator Capacity by Kansas CRD from 2008 to 2015



Focus on Grain Truck Transportation by Location & Region in Kansas

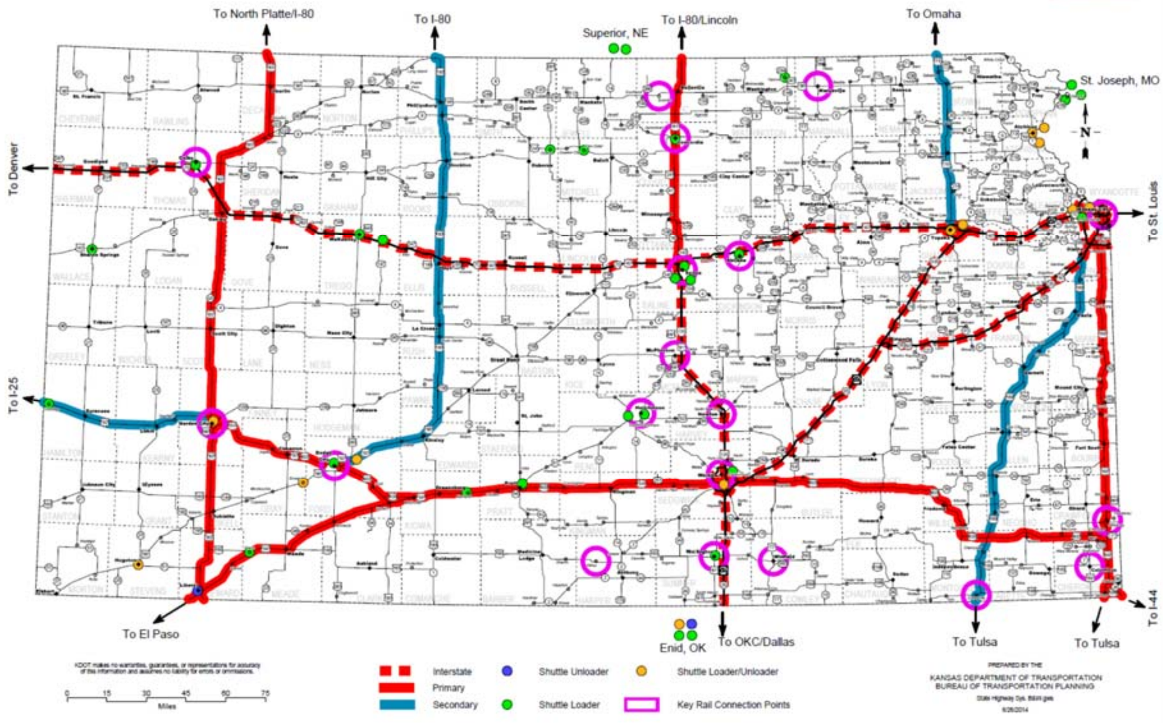
2012 Livestock and Transportation



prepared by the
KANSAS DEPARTMENT OF TRANSPORTATION
BUREAU OF TRANSPORTATION PLANNING
KDOT makes no warranties, guarantees, or representations for accuracy of this information and assumes no liability for errors or omissions.

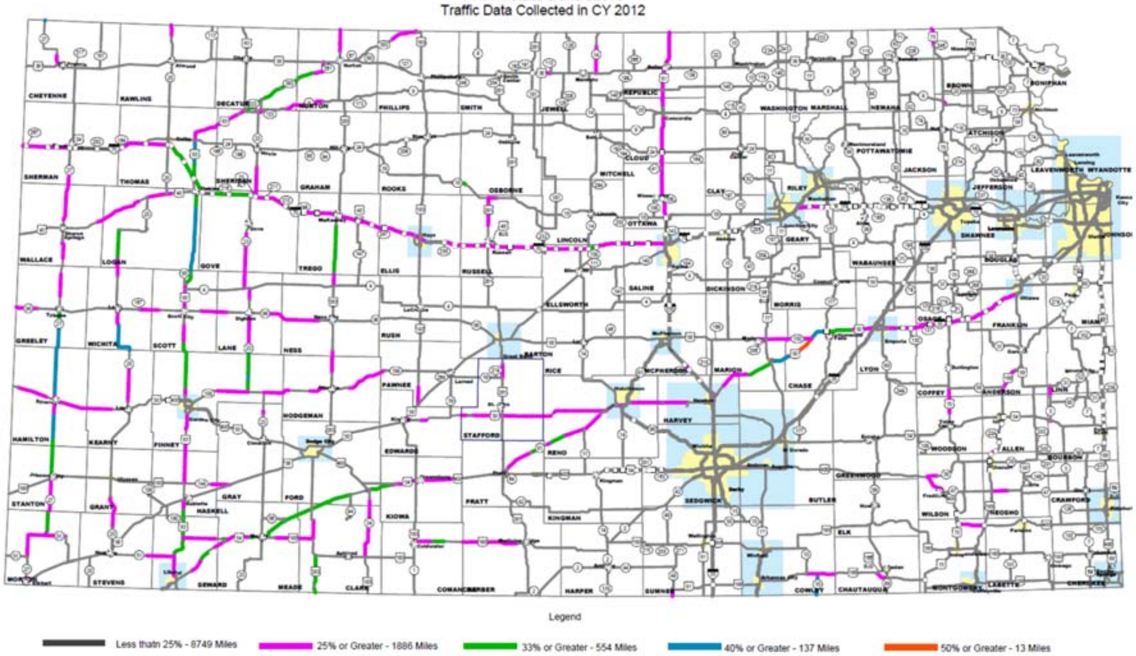
2012 Cattle on Feed
1 Dot = 1,000 head

DataSource
USDA, NASS, Kansas Field Office
Kansas Farm Facts 2012

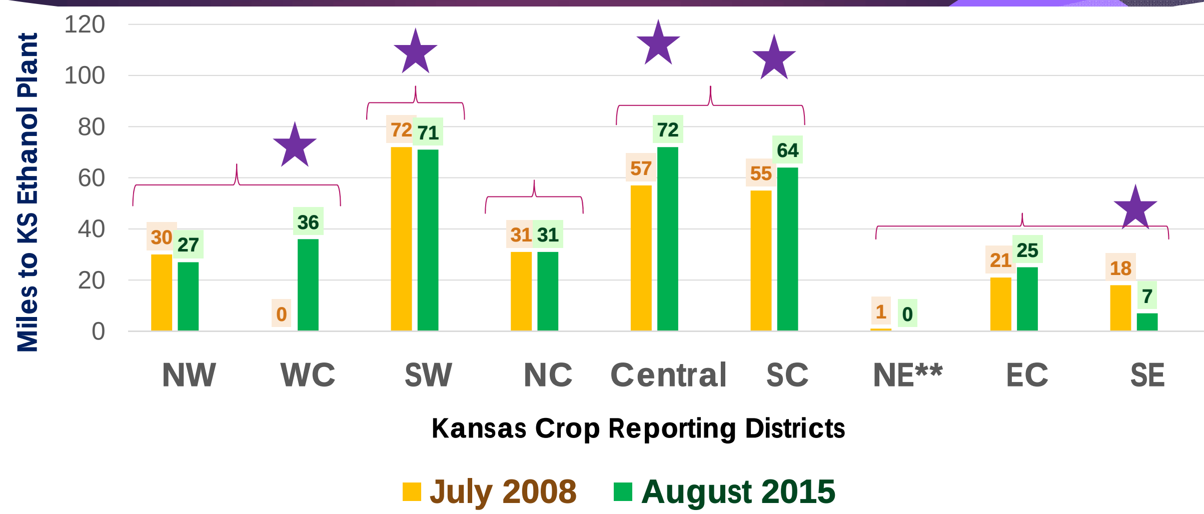


Average Daily Truck Counts

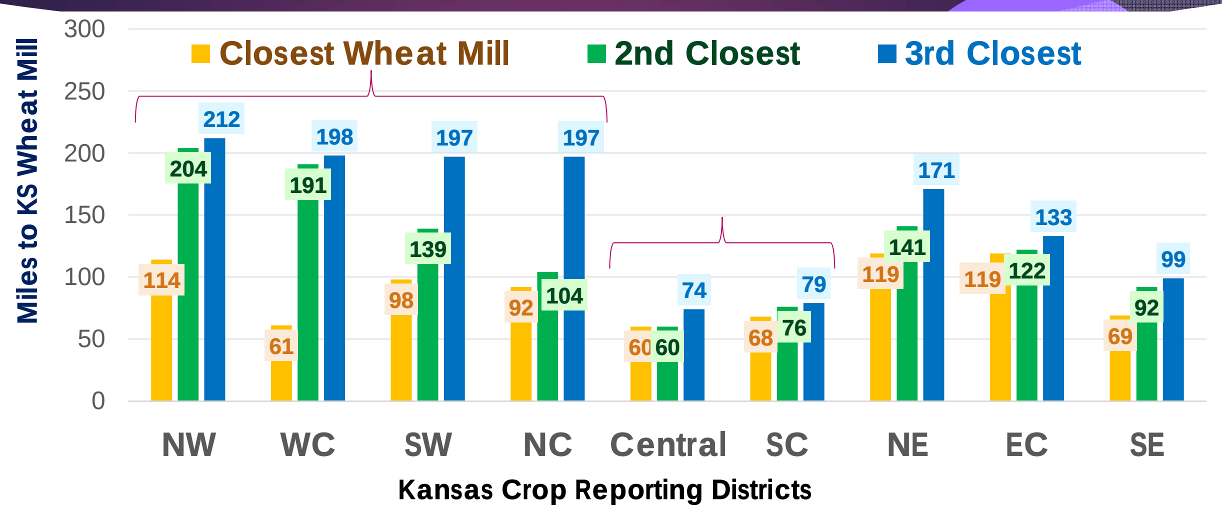
FHWA Class 8 and above
Traffic Data Collected in CY 2012



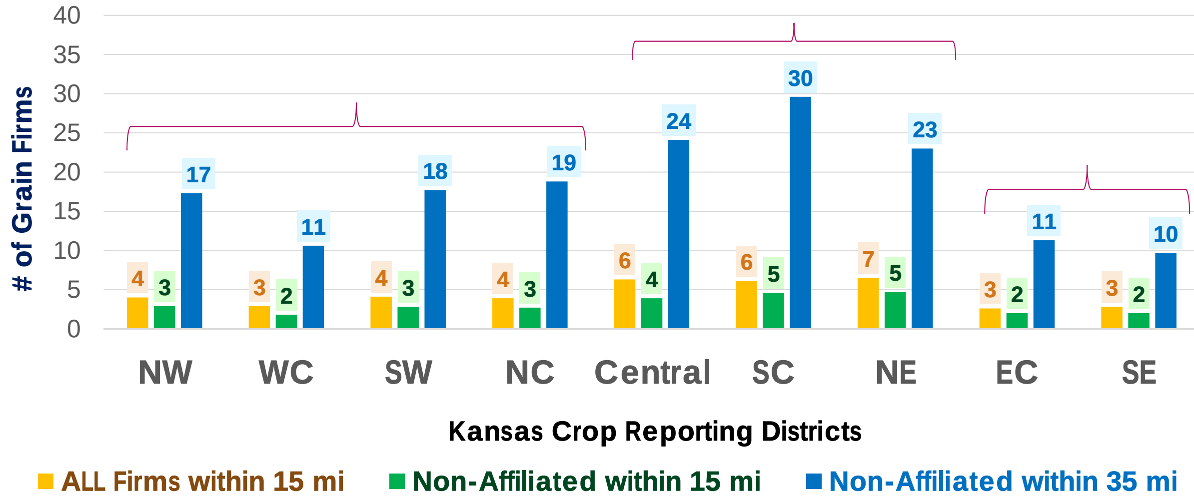
Elevators Within 55 Miles of an Ethanol Plant by Kansas CRD in 2008 & 2015



Minimum Distances to Wheat Mills by Kansas CRD in 2015



Competitive Elevators within 15 & 35 miles by Kansas CRD in 2015 (Affiliated & Non-affiliated)

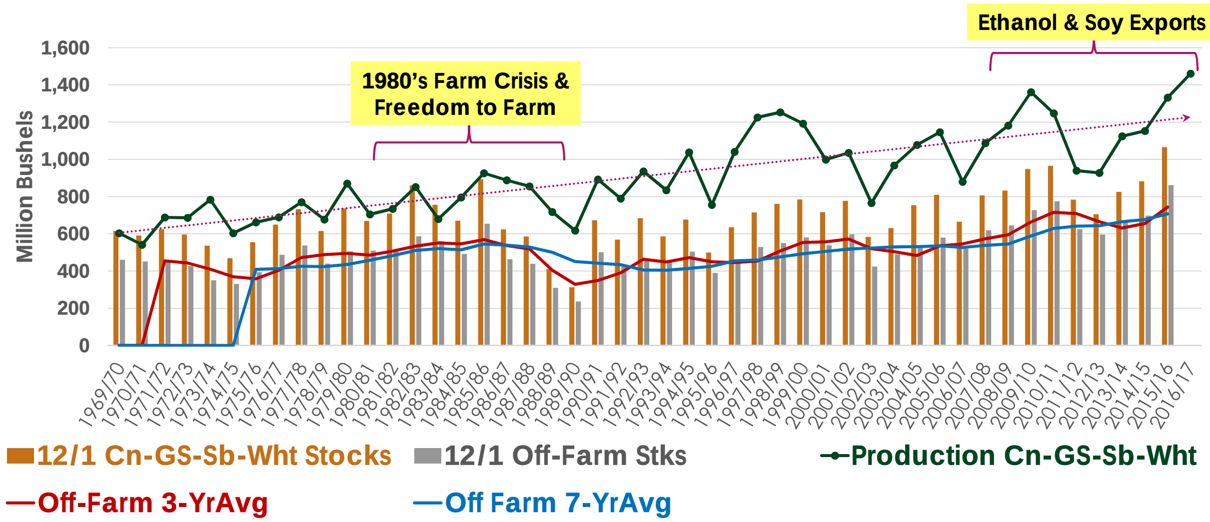


Comparing Grain Production to Grain Stocks

- **Analysis of trends in Kansas & U.S. grain production relative to changes in *on-farm* & *off-farm* grain storage**
  - 1969/70 - 2015/16 marketing years
  - Combined Corn, Grain Sorghum, Soybeans & Wheat production & grain stocks
  - **Kansas** - compared to 2008 & 2015 commercial grain storage
- **Hypothesis**: ***The Kansas & U.S. grain industry will construct enough storage capacity to meet its needs over time***

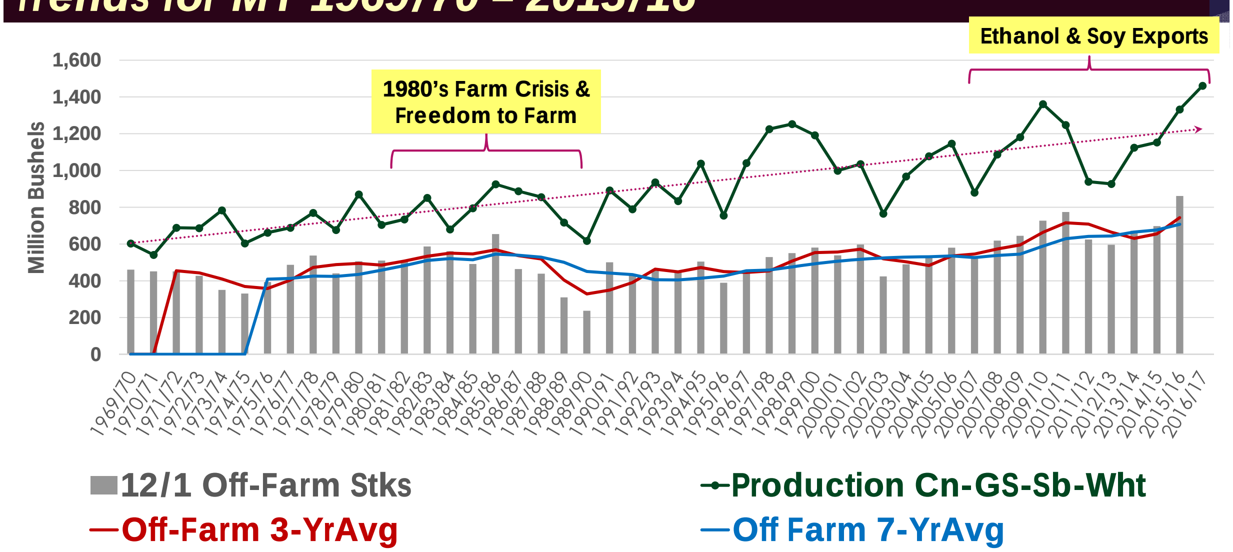
Kansas Grain Production & Grain Stocks

Trends for the 1969/70 – 2015/16 Marketing Years



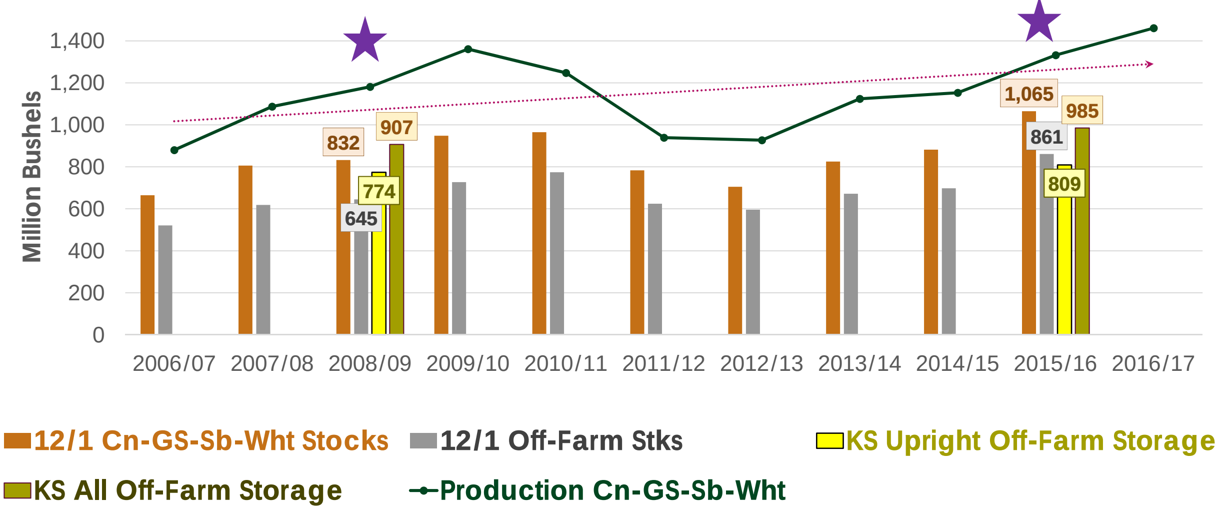
Kansas Grain Production & Off-Farm Stocks

Trends for MY 1969/70 – 2015/16



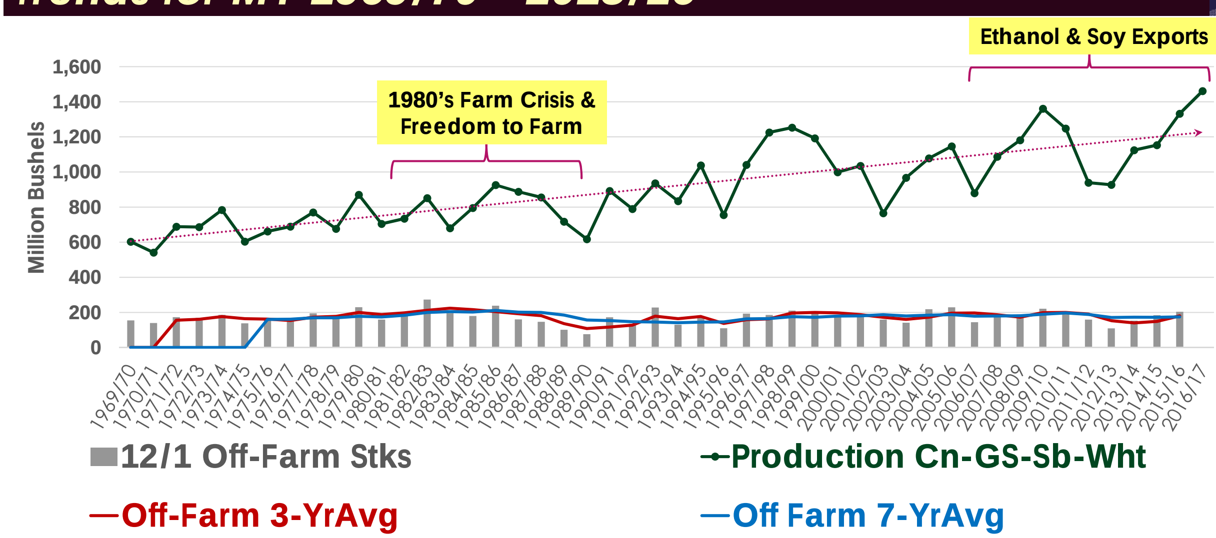
Kansas Grain Production & Off-Farm Stocks

Trends Since MY 2006/07 Plus Kansas Storage (2008 & 2015)



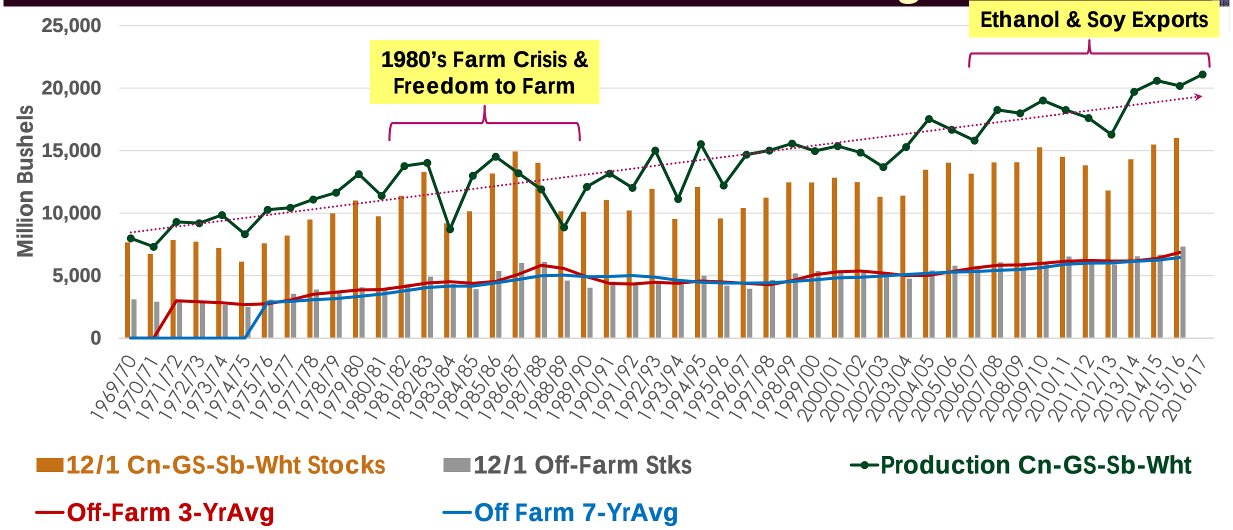
Kansas Grain Production & On-Farm Stocks

Trends for MY 1969/70 – 2015/16



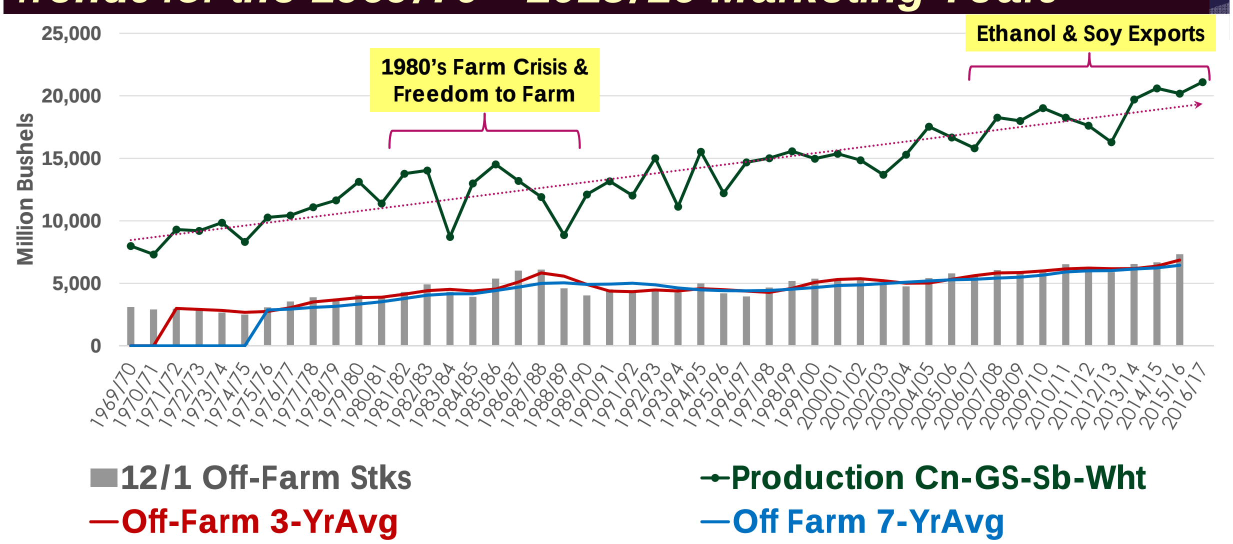
U.S. Grain Production & Grain Stocks

Trends for the 1969/70 – 2015/16 Marketing Years



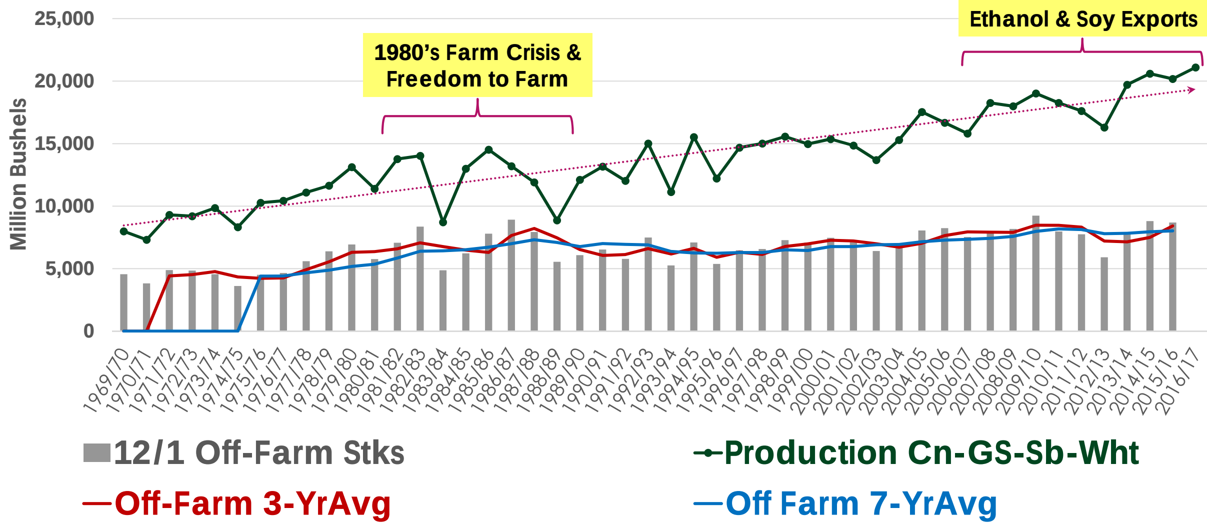
U.S. Grain Production & Off-Farm Stocks

Trends for the 1969/70 – 2015/16 Marketing Years



U.S. Grain Production & On-Farm Stocks

Trends for MY 1969/70 – 2015/16



Causes of Kansas Grain Industry Changes

- **Large crops in 2013-2016 are straining local grain handling & storage capacity** ⇨ Building more storage
- **Railcar Shuttle Loaders have been built by grain elevators to assure they have access to railcar shipping**
  - Fits preference of major Railroad's for 100+ railcar shuttle trains
  - Local consolidation of grain elevators is partly driven by need for adequate procurement areas & supplies to have enough volume of grain to efficiently operate 100 railcar shuttle loaders

Causes of KS Grain Industry Changes (more)

- **With more large multiple-location firms the # of locally competitive non-affiliated grain bids may have declined**
- **Kansas ethanol plants have affected....**
  - The function of local grain elevators *(some "store & feed" plants)*
  - The directional flow of grain to the "demand center" plants
  - Regional feed supply-demand due to availability of DDGS
- ⇧ **Farmer use of Semi-Trucks for regional hauls** *(arbitrage!)*

Questions?

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