



The Impact of the Ethanol Boom on Rural America

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The views expressed are those of the author and do not necessarily reflect the positions of Federal Reserve Bank of Kansas City or the Federal Reserve System.



Photos courtesy of USDA

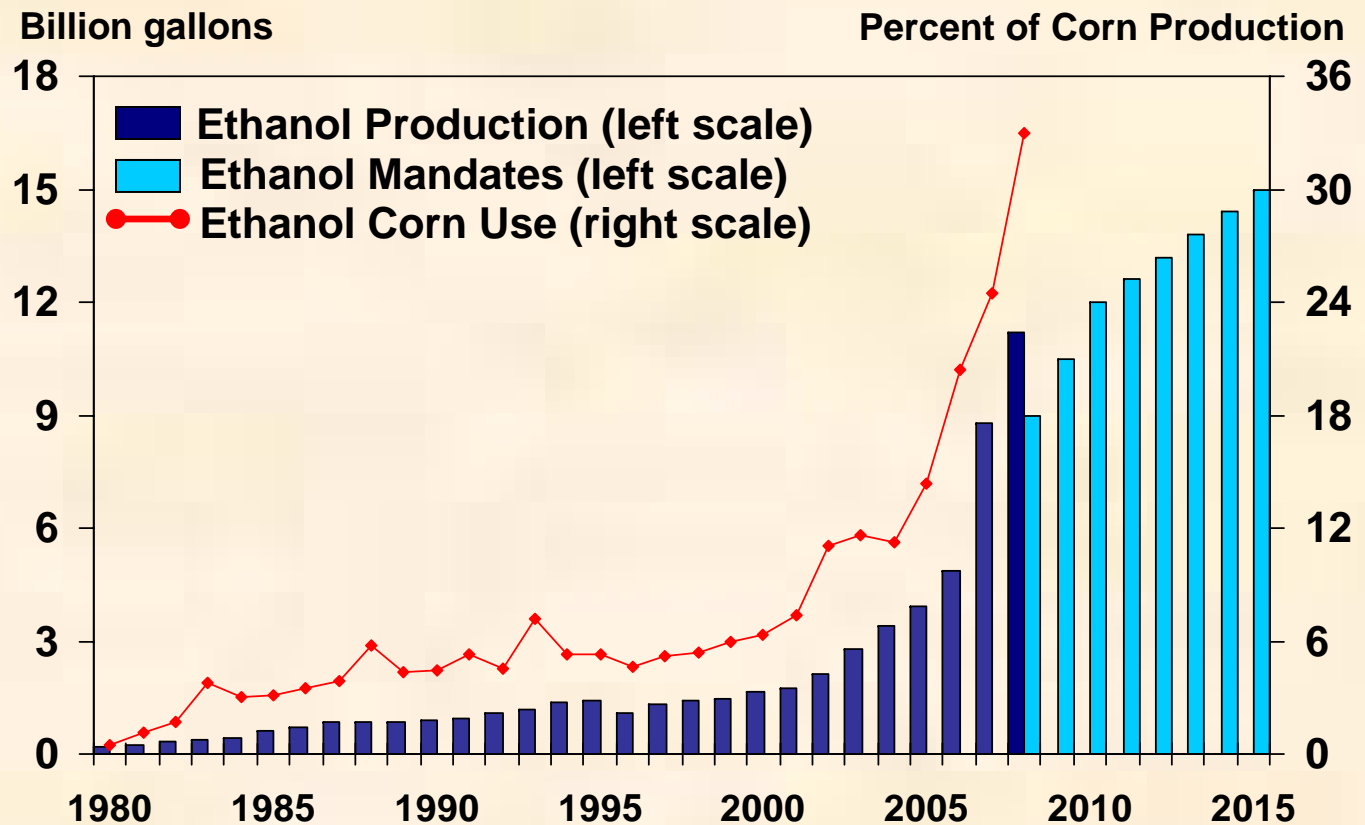
The Impact of Ethanol

- Today's Outline:
 - Farm sector impacts are mixed.
 - Nonfarm impacts are probably not as large as people think.
 - The future of ethanol.



A Surge in U.S. Ethanol Production

U.S. Ethanol Production, Mandates, and Corn Use



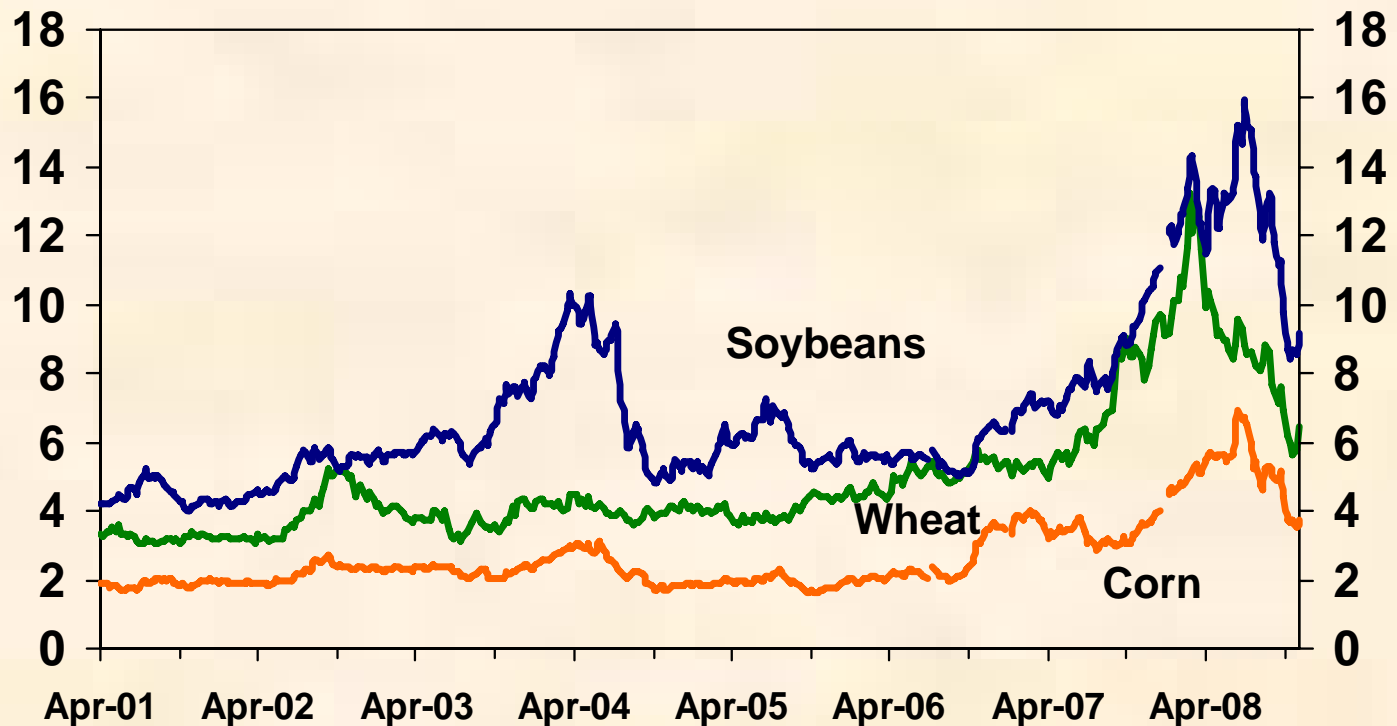
Source: USDA and Renewable Fuels Association



Ethanol demand helped fuel a crop price boom.

U.S. Crop Prices

Dollars per bushel



Source: Wall Street Journal



How Much of an Impact Did Ethanol Have on Crop Prices?

- **National impacts**

- **1% increase in ethanol yields a 0.16% increase in corn prices.**

(Fortenberry and Park 2008)

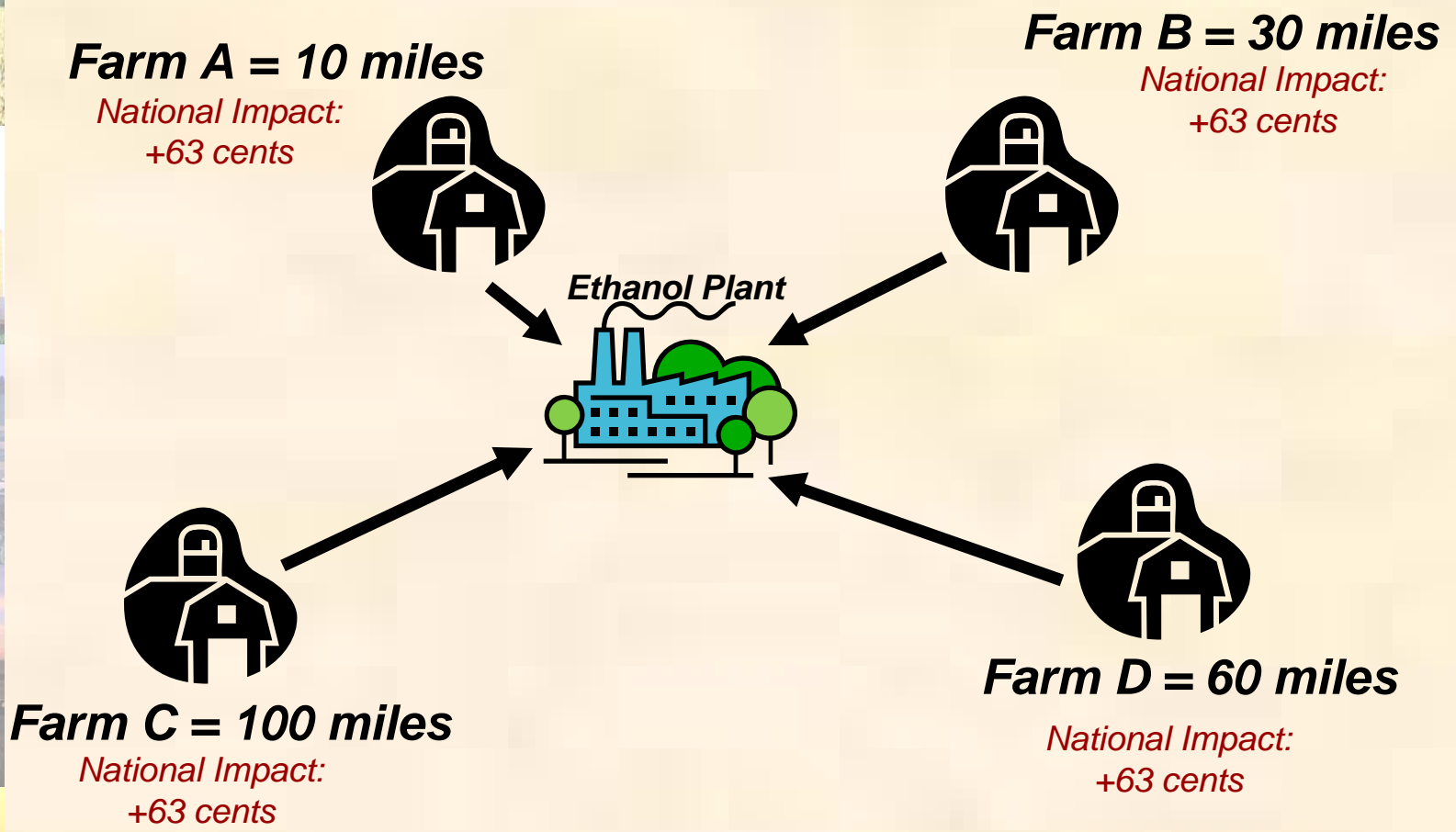
- **From 2006 to 2008, ethanol production rose 197.2% yielding a 31.6% increase in corn prices.**

- **With \$2.00 per bushel corn in 2005, 2005 to 2008 corn price increase attributed to ethanol = 63 cents.**

($197.2 * 0.16 = 31.6 * \$2.00 = \0.63 cents per bushel)



Ethanol Plant Impacts on Corn Prices



Photos courtesy of USDA



Ethanol Impacts Less than Expected

Returns to U.S. Corn Production

	2006	2007	2008f	2008f Without Ethanol expansion
Total Production Costs	\$410	\$444	\$567	\$567
Total Revenues	\$478	\$659	\$748	\$651
Market Revenues	\$453	\$635	\$724	\$627
Yield (<i>bushel/acre</i>)	149.1	151.1	154.0	154.0
Farm Price (<i>bushel</i>)	\$ 3.04	\$ 4.20	\$ 4.70	\$ 4.07
Government Receipts	\$ 24	\$ 24	\$ 24	\$ 24
Net Returns (per acre)	\$ 68	\$215	\$181	\$84

Calculations based on USDA and FAPRI data



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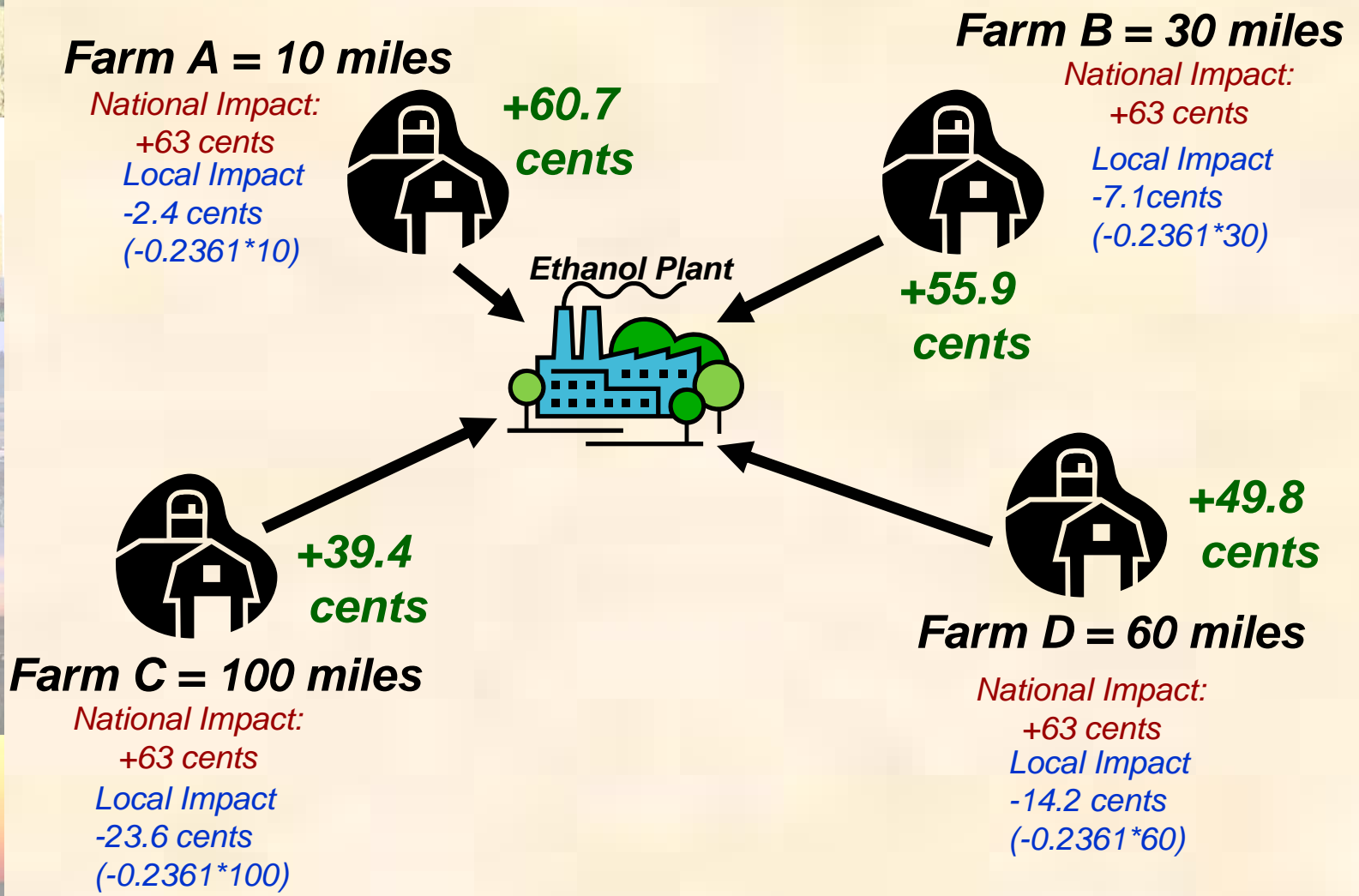
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- **Local impacts**

- **Corn prices rose 12.5 cents with an ethanol plant within 150 square miles.**
(McNew and Griffith, 2005)
- **Corn prices fall 0.2361 cents per bushel for every mile from an ethanol plant.**
(Gallagher, Wisner, and Brubaker, 2005)



Ethanol Plant Impacts on Corn Prices



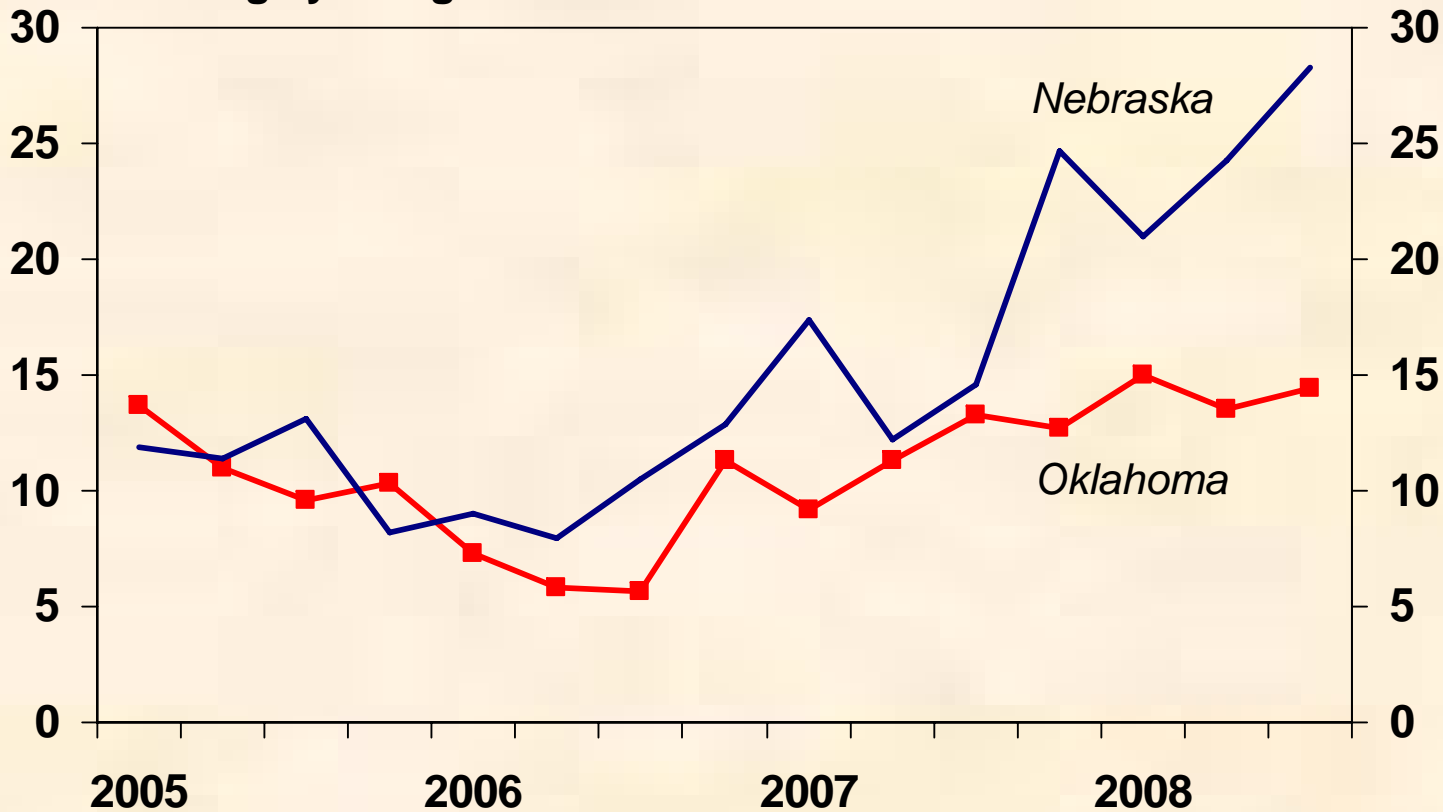
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Non-irrigated Cropland Value Gains by Distance to an Ethanol Plant

Nonirrigated Cropland Value Gains (Tenth Federal Reserve District)

Percent change year ago



Source: Federal Reserve Bank of Kansas City

Ethanol Transportation Issues

Rail Summary: 2006-2008, and 2016 Marketing Years

	2006	2007	2008	2016
Ethanol Production (<i>billion gallons</i>)	5.8	9.4	11.2	15.0
Number of Projected Rail Carloads:				
Ethanol Production	119,347	190,816	227,755	306,122
Distiller's Dried Grains with Solubles	26,338	41,650	49,533	66,576

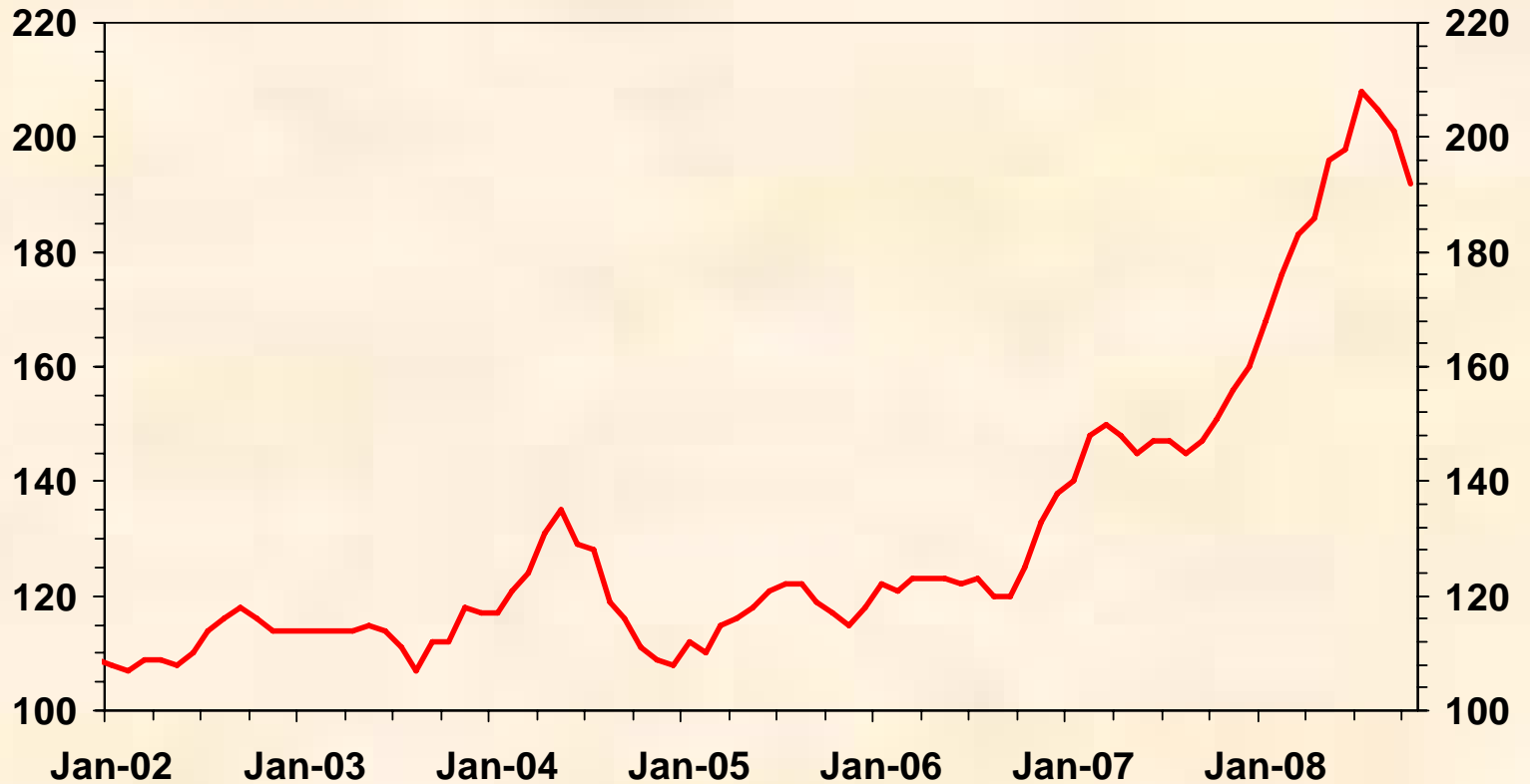
Source: USDA Ethanol Transportation Backgrounder, September 2007 obtained from
<http://www.ams.usda.gov/AMSV1.0/getfile?dDocName=STELPRDC5063605&acct=atpub>



The Livestock Industry Struggles with Feed Costs

U.S. Feed Costs

Index (1990-1992 = 100)



Source: USDA

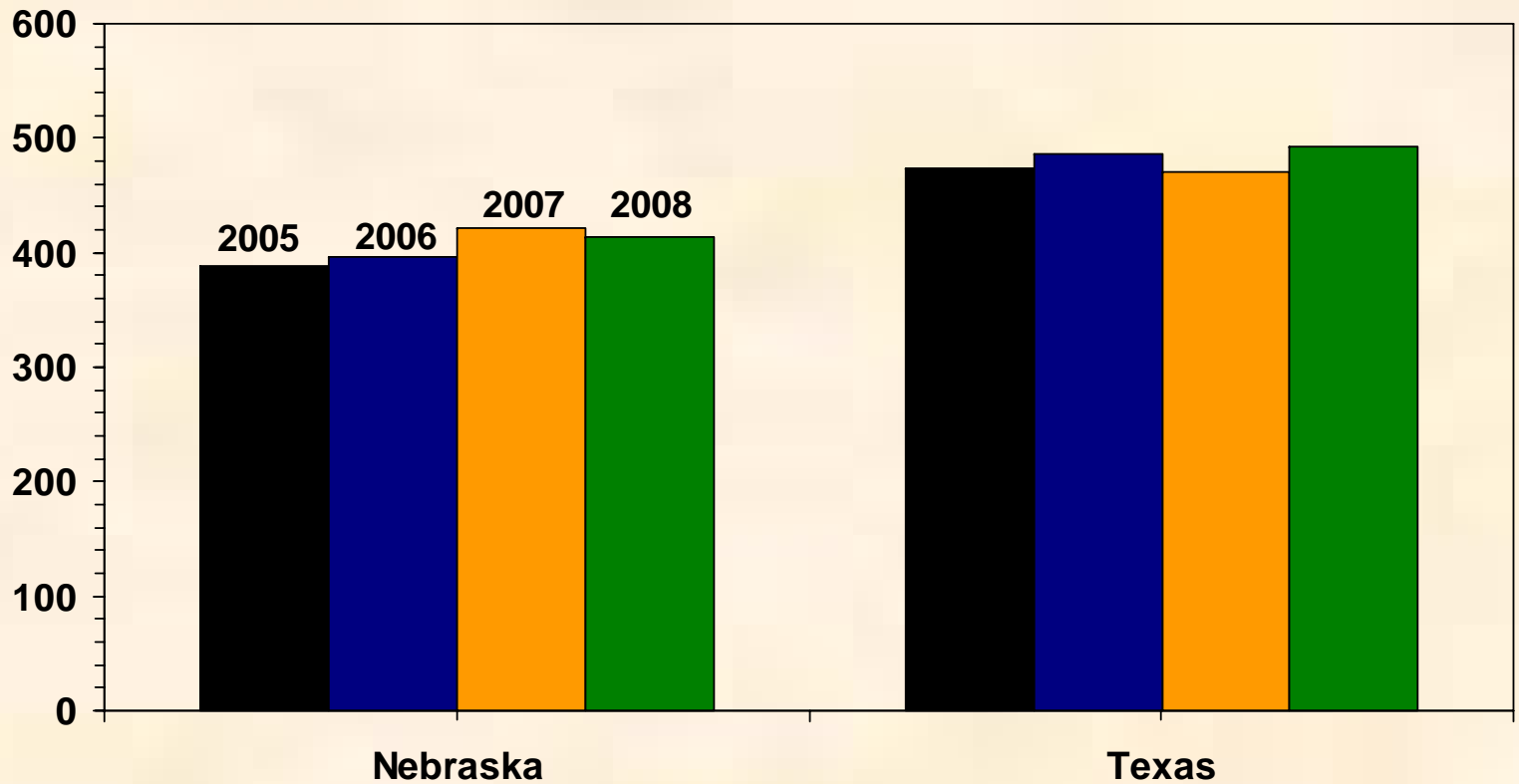
Photos courtesy of USDA



Will the Livestock Industry Locate Near Ethanol Plants?

Cattle on Feed: Placements

Monthly Average (Thousand head: YTD through September)



Source: USDA

Photos courtesy of USDA



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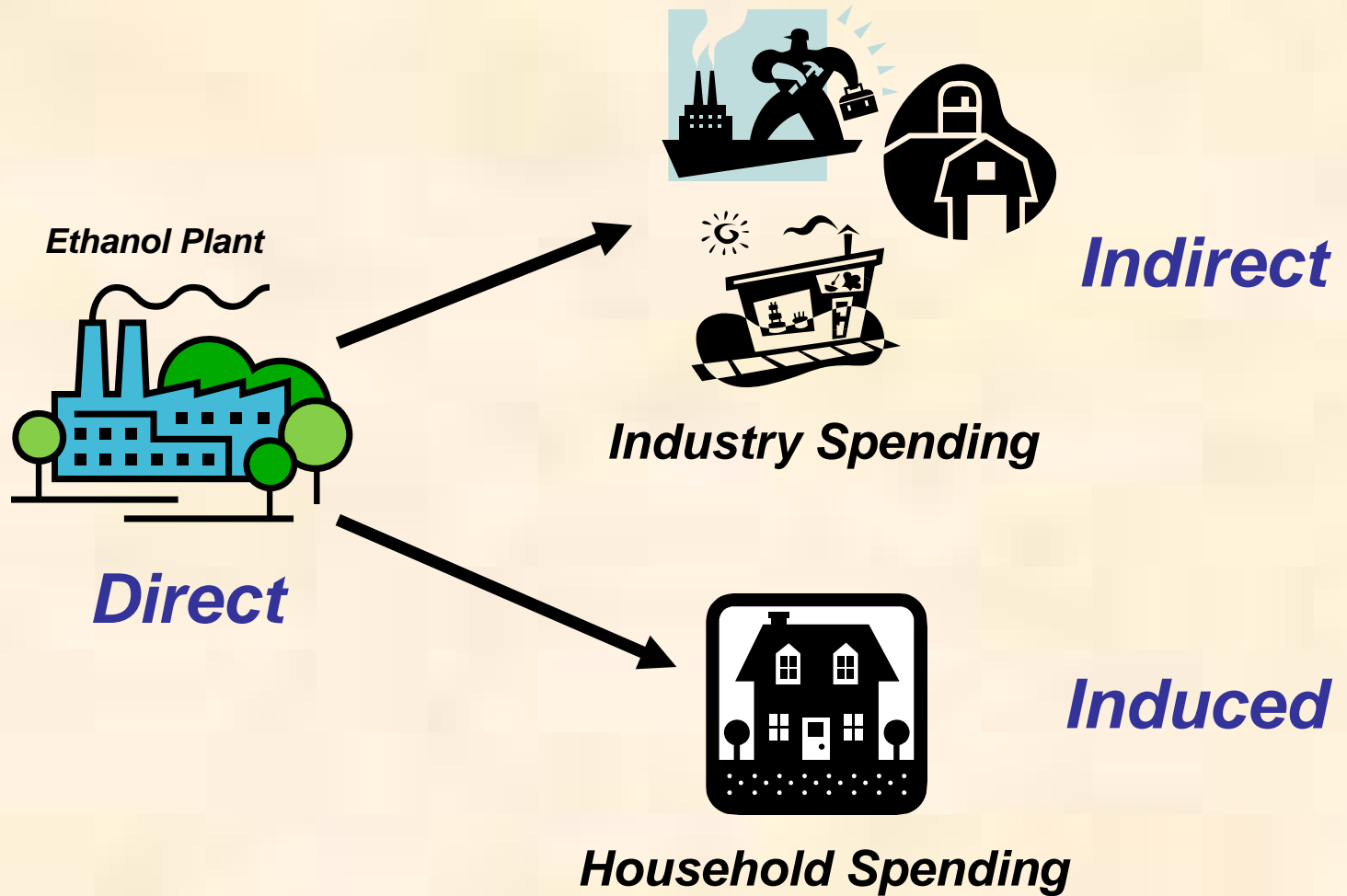


Photos courtesy of USDA

Nonfarm Impacts of Ethanol

- Construction phase
 - In Missouri, 4 plants 2098 jobs (Pierce, Horner, and Milhollin 2007)
 - Challenge
 - Jobs are temporary
 - Use out-of-area workers
 - Use out-of-area materials
 - Boon to the hotel and restaurant industry

Ethanol Plant Impacts on Local Economy



Photos courtesy of USDA



Economic Impacts of 100 Million Gallon Plant

	Iowa		
	Output (million \$)	Jobs (number)	Value-Added (million \$)
Direct (Ethanol Plant)	227.0	46	35.5
Indirect (Industry)	25.3	95	11.0
Induced (Households)	2.0	29	1.2
Total	254.2	170	47.7

Source: Swenson, 2008.



Photos courtesy of USDA

Economic Benefits Vary by Community Size

Economic Impacts of 100 Million Gallon Plant

	Hamilton, Illinois		Kankakee, Illinois	
	Output (million \$)	Jobs (number)	Output (million \$)	Jobs (number)
Direct (Ethanol plant)	214.6	39	214.6	39
Indirect (Industry)	14.6	97	27.2	152
Induced (Households)	1.6	17	5.7	59
Total	230.8	153	247.5	250

Source: Low and Isserman, forthcoming.



Photos courtesy of USDA

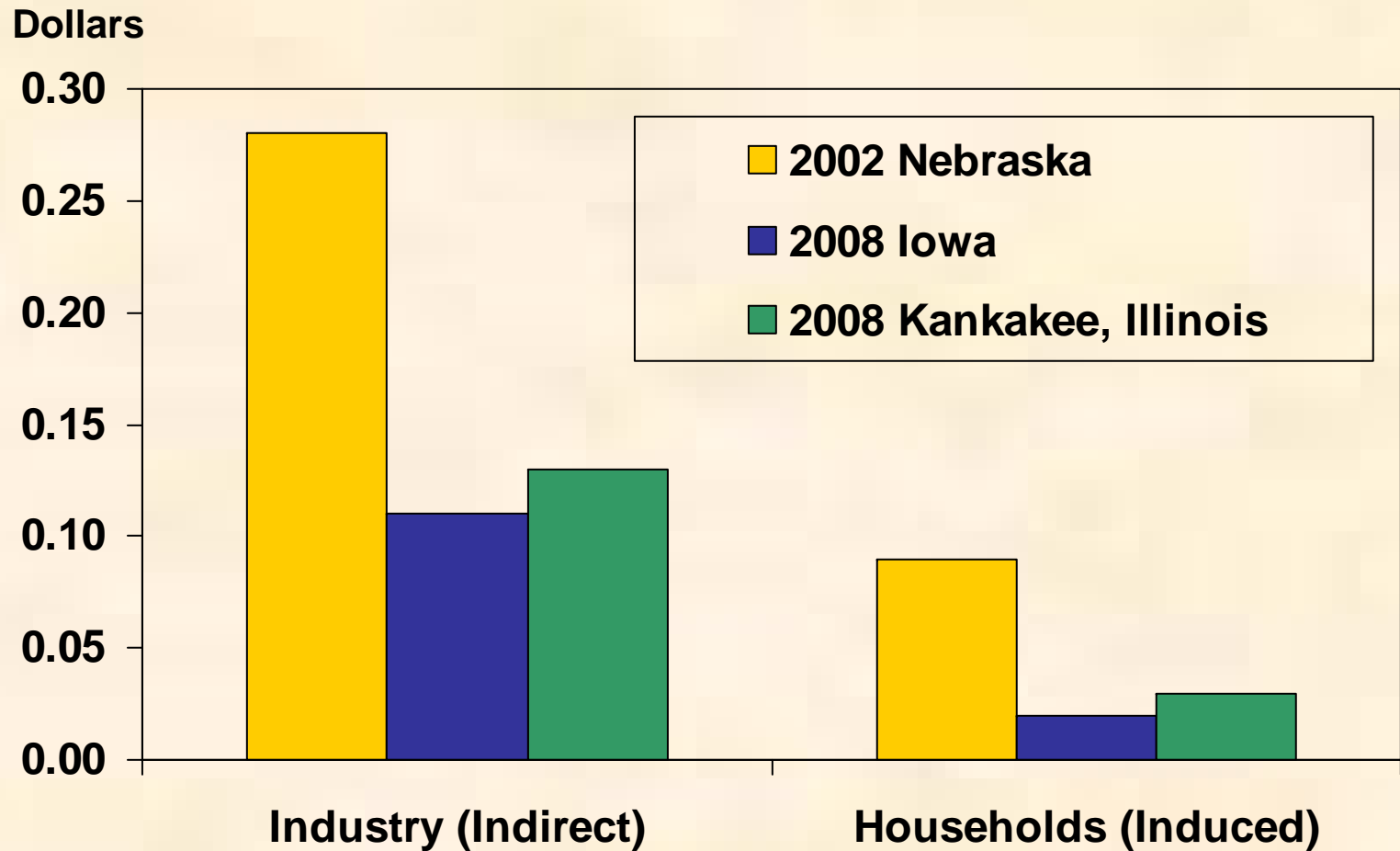
Multipliers of Ethanol Plants

- Ethanol plants locate in places with lots of corn.
- Leads to crop switching (more corn, less soybeans)
- Do these locations have available acres?
- Over time, what does the market do?
 - Raises the price of soybeans
 - Boosts input costs, especially those to corn.
 - Equalizes net returns at a higher level.

Source: Swenson 2008, Low and Isserman forthcoming

Perceived Economic Benefits Have Declined.

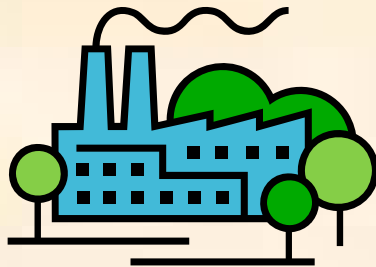
Industry and Household Economic Multipliers



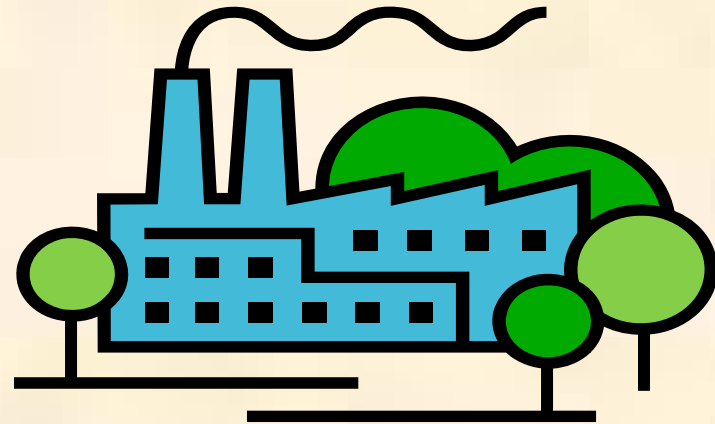
Source: Petersan (2002), Swenson (2008) and Low and Isserman (forthcoming)



Job Impacts of Ethanol Plants



50 million plants
Approx. 35 workers



100 million plants
Approx. 40 workers

*With economies of scale,
what happens to the job impacts?*

Source: Swenson 2008, Low and Isserman forthcoming



Photos courtesy of USDA

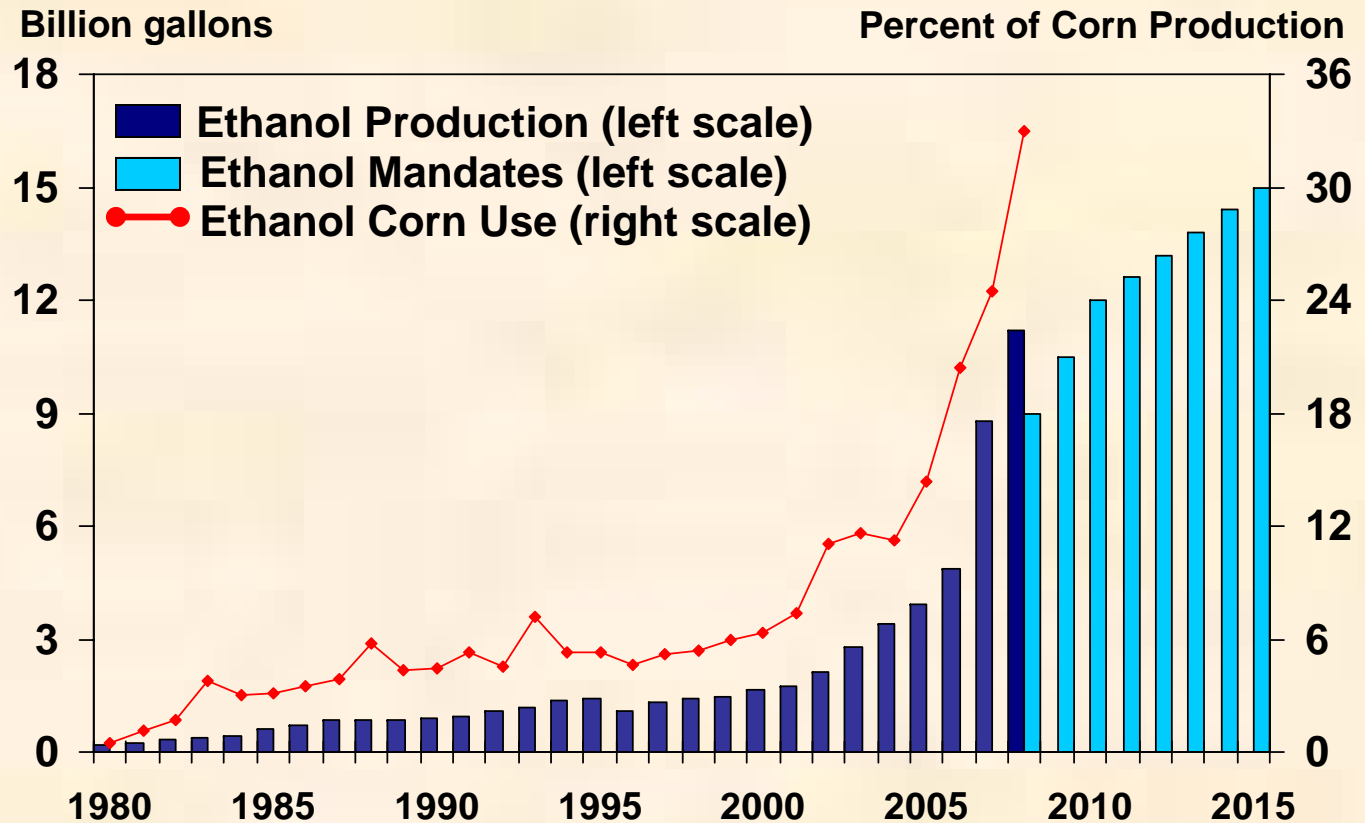
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Ethanol Supply is Greater than Demand.

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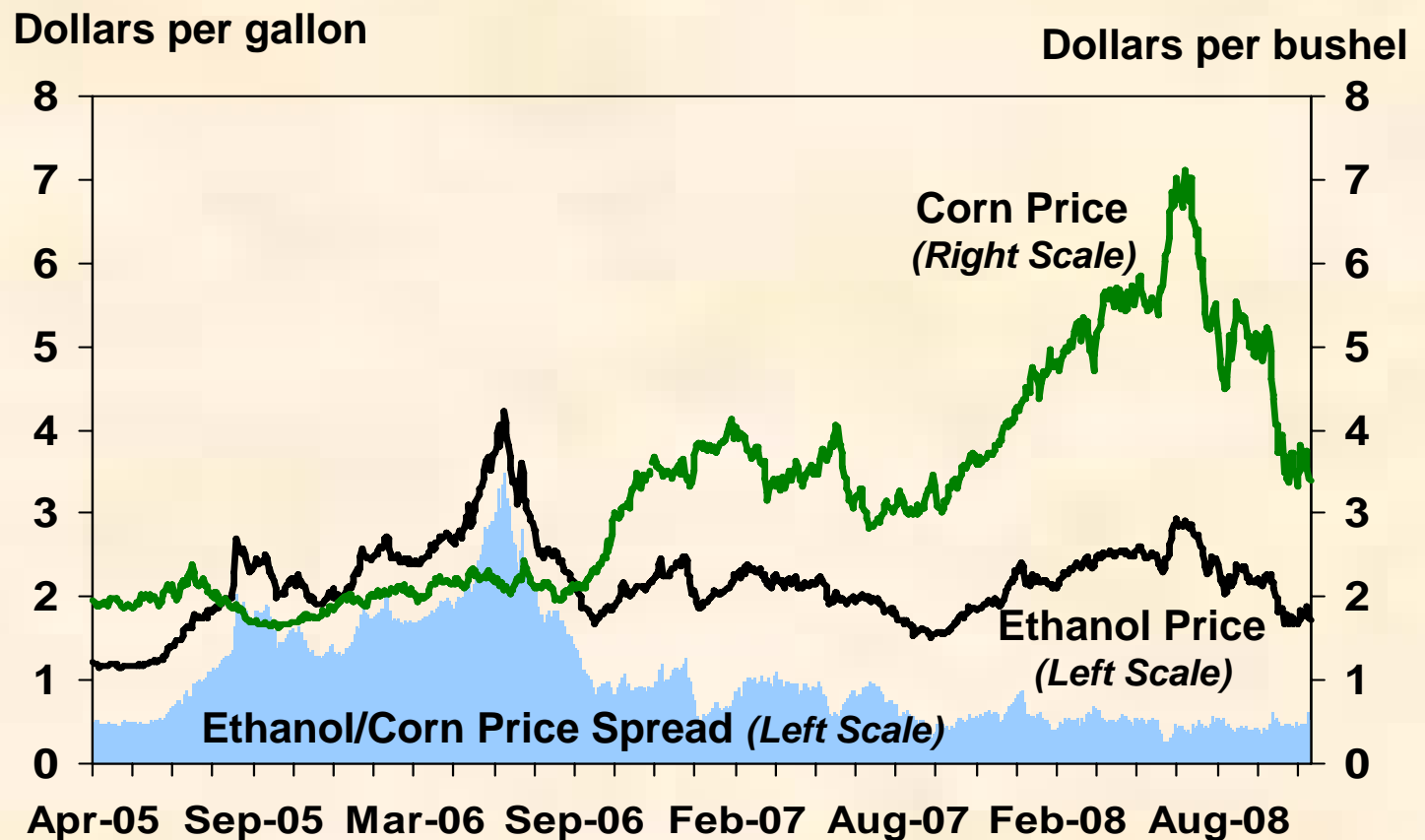


Source: USDA and Renewable Fuels Association



Profit Margins Fall.

Ethanol and Corn Prices



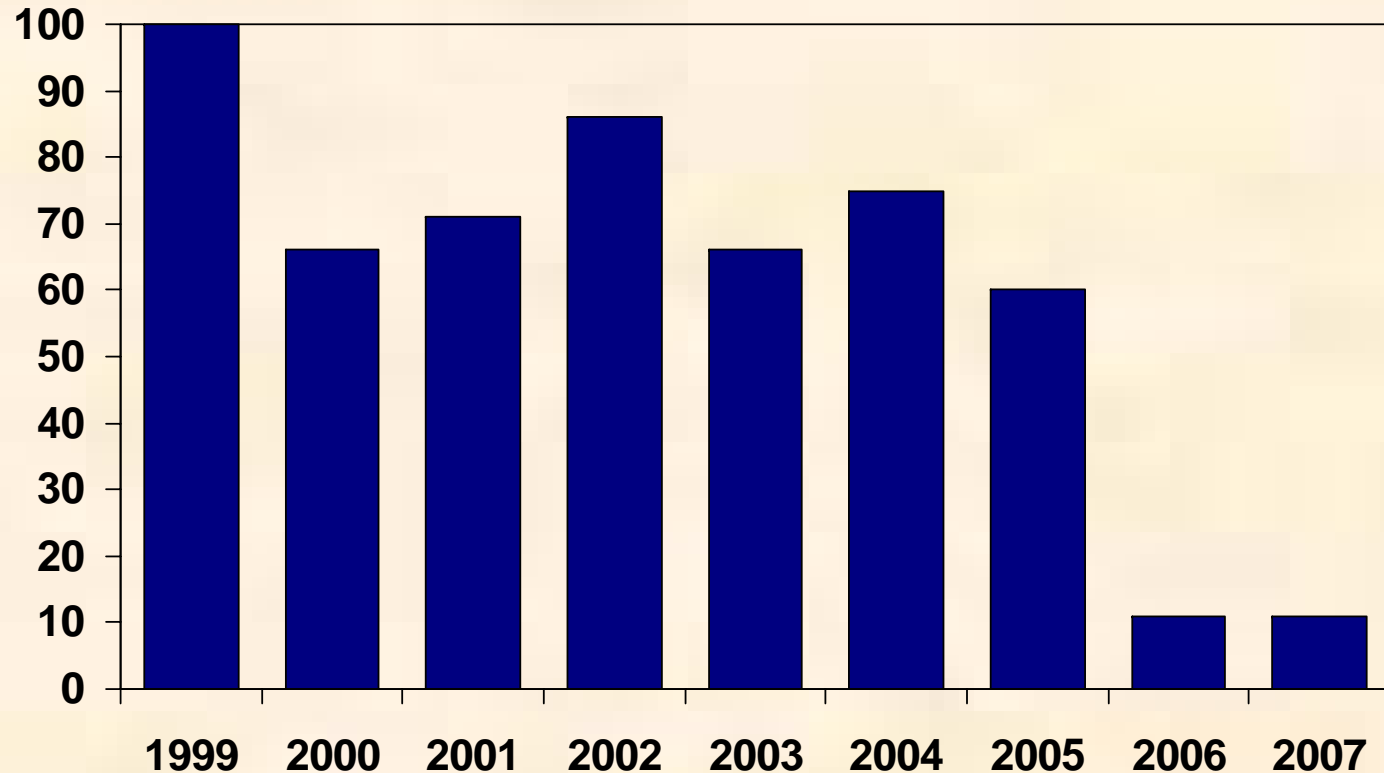
Spread is equal to ethanol price – (corn price/2.8 gallons per bushel)



Who Will Operate Ethanol Plants in the Future?

Farmer-Owned Ethanol Investment

Percent of Capacity



Source: Renewable Fuels Association



Photos courtesy of USDA

Ethanol is a Policy Driven Industry

- **MTBE bans fueled 2006 boom**
- **Blenders credit drops from 51 to 45 cents.**
- **Tariff on Brazilian ethanol.**
- **Renewable Fuels Standard is driving future growth for corn-based and cellulosic ethanol.**

Where is Market-Driven Demand?



Ethanol Market Truths

- **Ethanol is a commodity.**
 - **The low-cost producer will survive.**
1. *Is the U.S. the low-cost producer of ethanol?*
 2. *Who has lower fixed costs?*
 - *Fixed costs depreciated in older plants, but plants are smaller.*
 - *Larger plants can spread fixed costs, but fixed costs are not depreciated.*
 3. *Will new technologies make ethanol efficient?*
 - *Enzymes to boost yields*
 - *Transportation and distribution networks*
 - *Disposal of distilled grains*

Conclusions

- Ethanol has provided mixed farm impacts.
- The farm and non-farm benefits are not as large as some people tout.
- A short-term shake-out in the industry.
- Ethanol is a policy-driven industry.
- New technological innovations are needed.

***A viable ethanol industry
is one that can stand the market test.***



Photos courtesy of USDA