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BioEnergy

Fueling America Through Renewable Resources

Infrastructure for the Bioeconomy

Dr. Frank Dooley

Department of Agricultural Economics, Purdue University

presentation for at the Farm Foundation/USDA Transition to a Bioeconomy: Risk, Infrastructure and Industry Evolution conference

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Agenda

- Motivation for the work
- Consider modal splits for grain
- Describe a simple transportation flow model
- Consider the results for corn, ethanol, and DDGS
- End with a prognosis

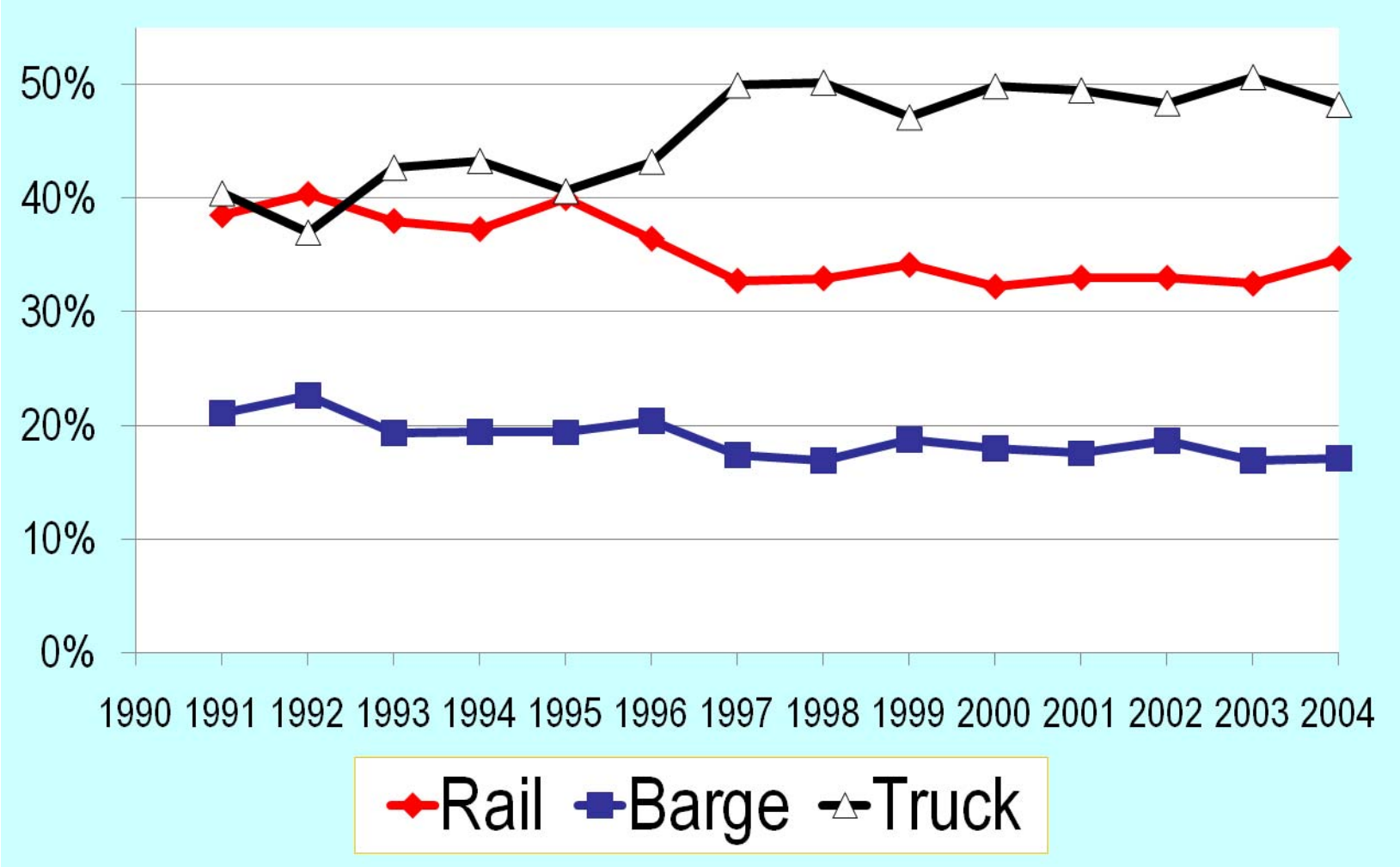
Motivation

- Growing concerns about the capacity to support grain transportation – Frittelli (2005)
- We know that grain flows depend on:
  1. Size and location of elevators,
  2. Availability of trucks, barges, rail, & power units,
  3. Rate structures, and
  4. Infrastructure (short lines, highways, locks and dams)

Question for today

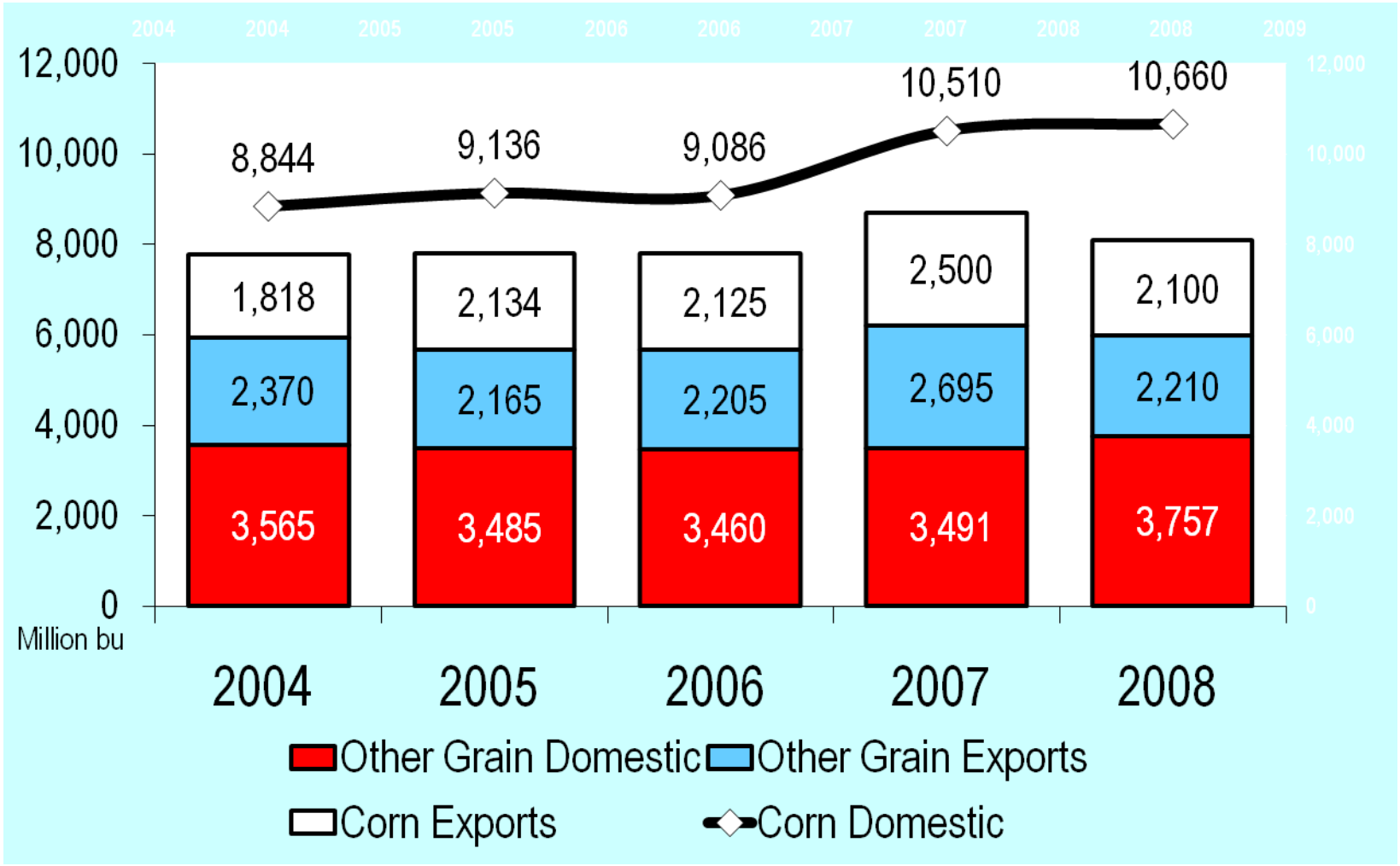
- How does the rapid expansion in ethanol production affect transportation infrastructure and the flows of corn, ethanol and DDGS?

Modal Shares for U.S. Grains

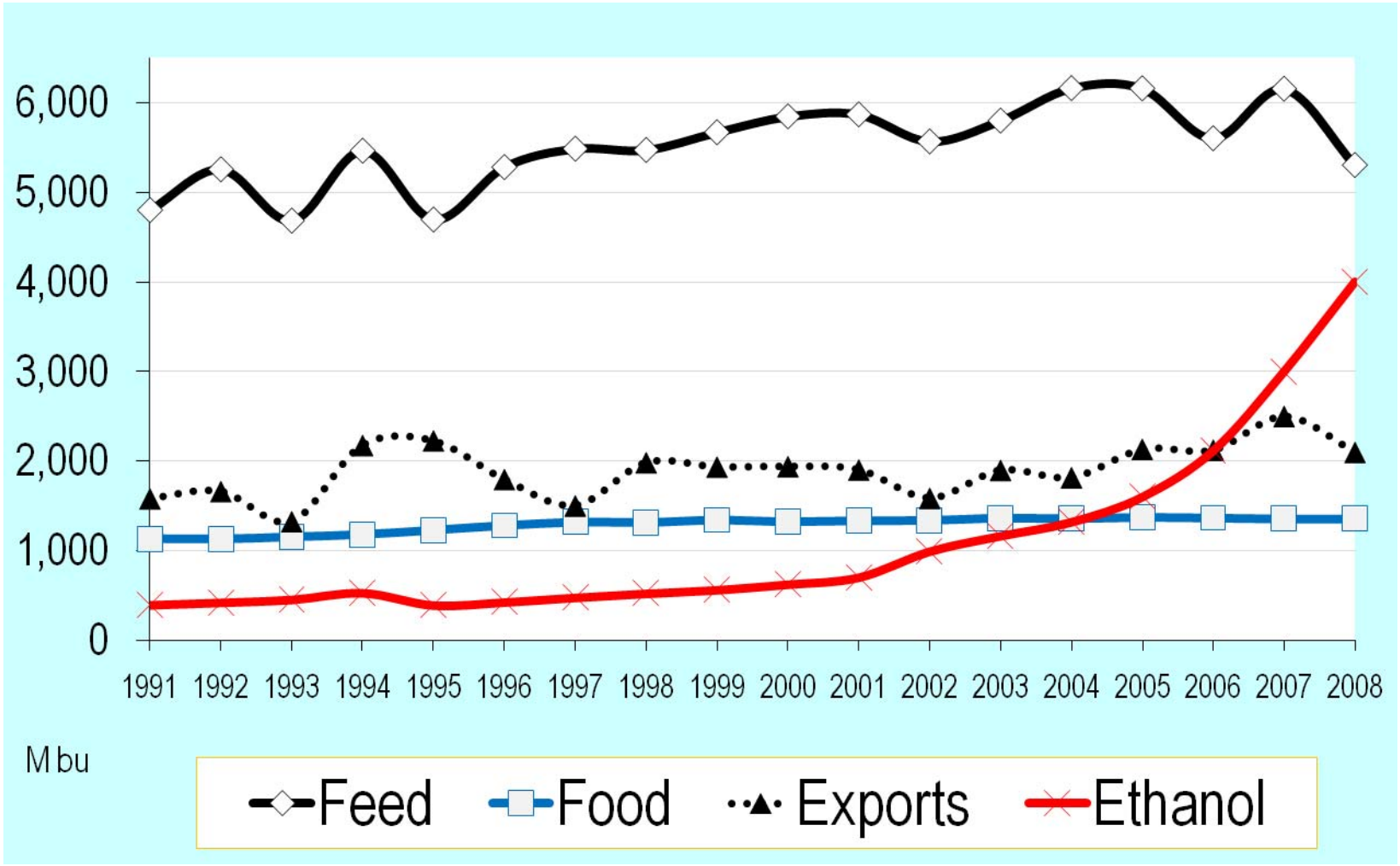


USDA, AMS

Utilization of U.S. Grain



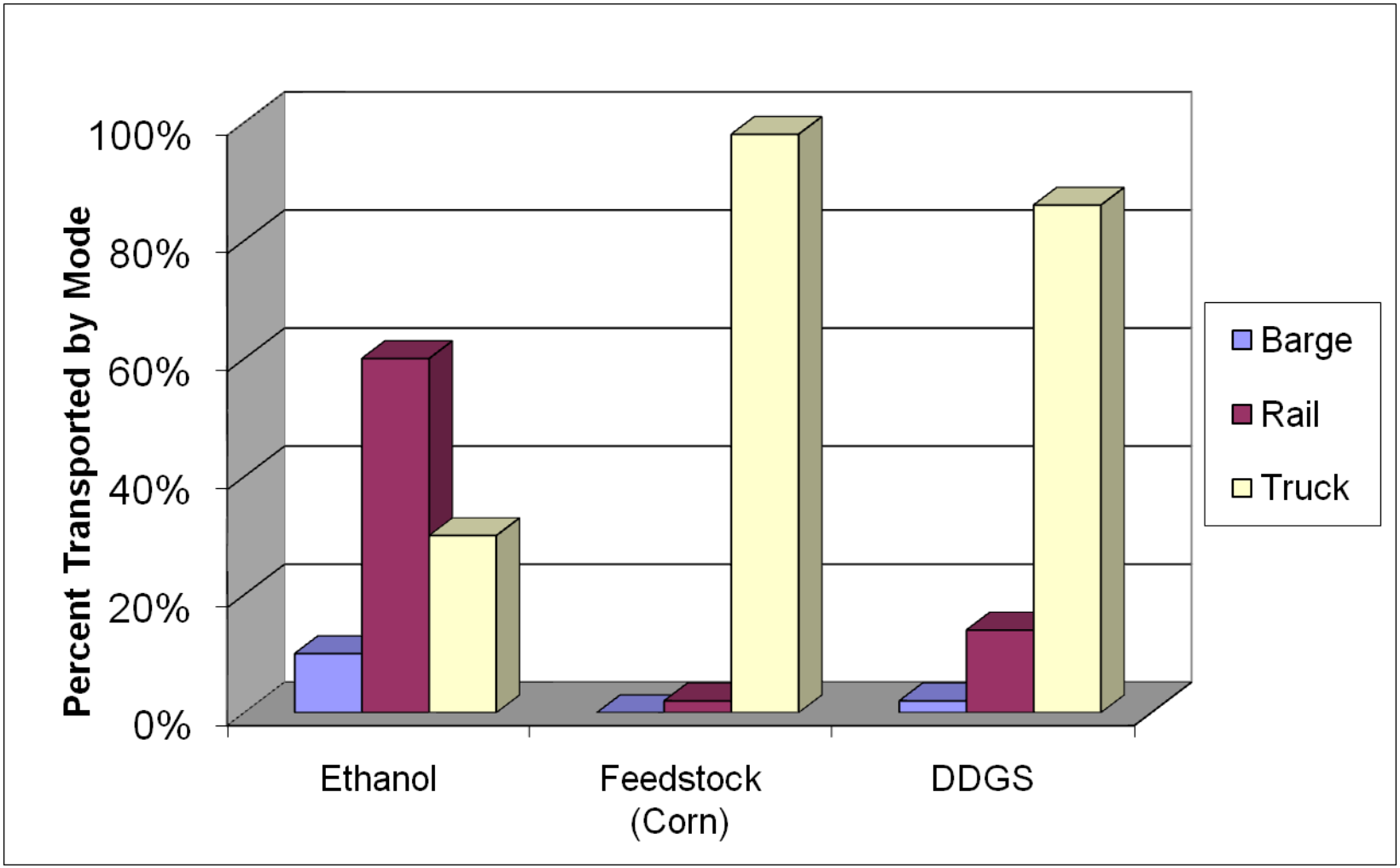
Utilization of Corn



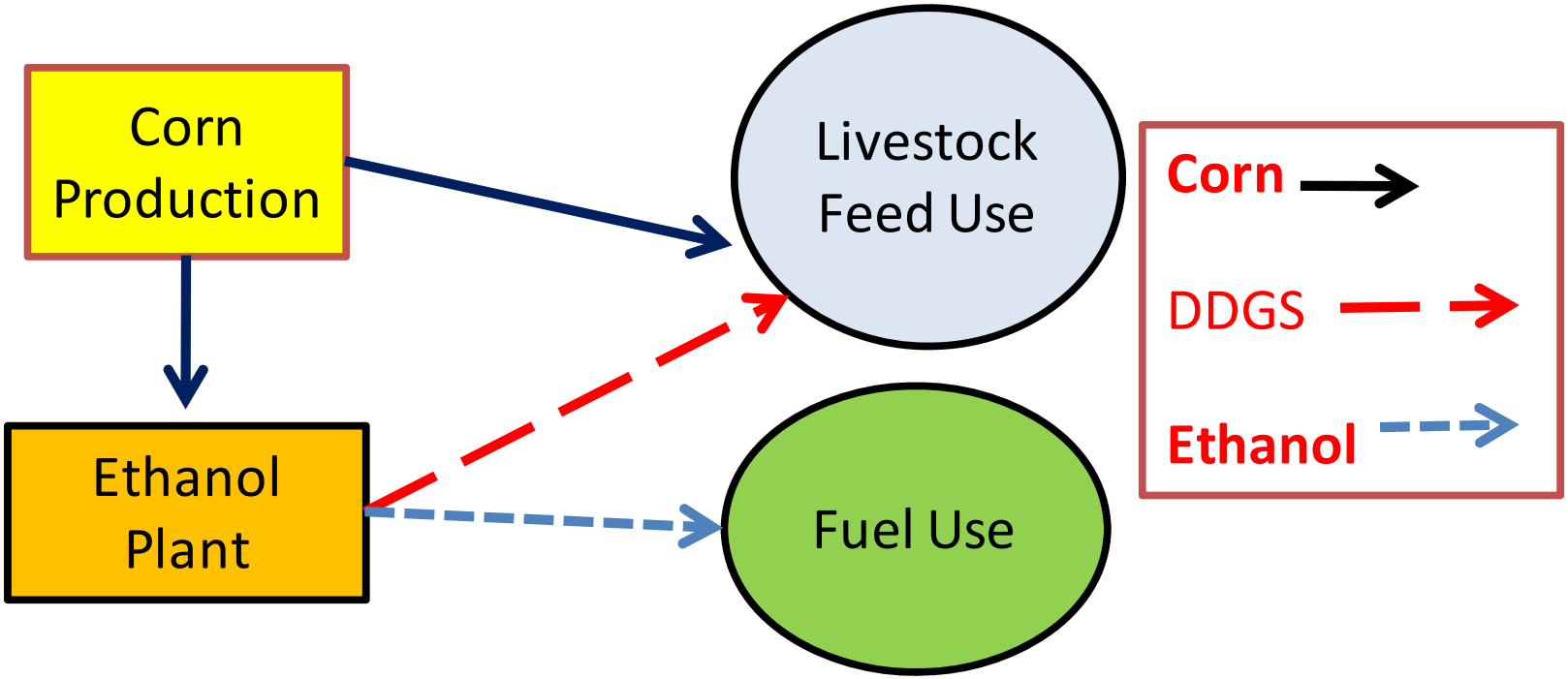
1.8 billion bu increase in corn

- 15% increase in domestic grain utilization in 4 years
- 51 million tons of corn @ historic modal splits:
  - 1.3 million truckloads (26 tons)
  - 160,000 rail cars (100 tons)
  - 588 barges (1500 tons)

USDA Expectation, 2005

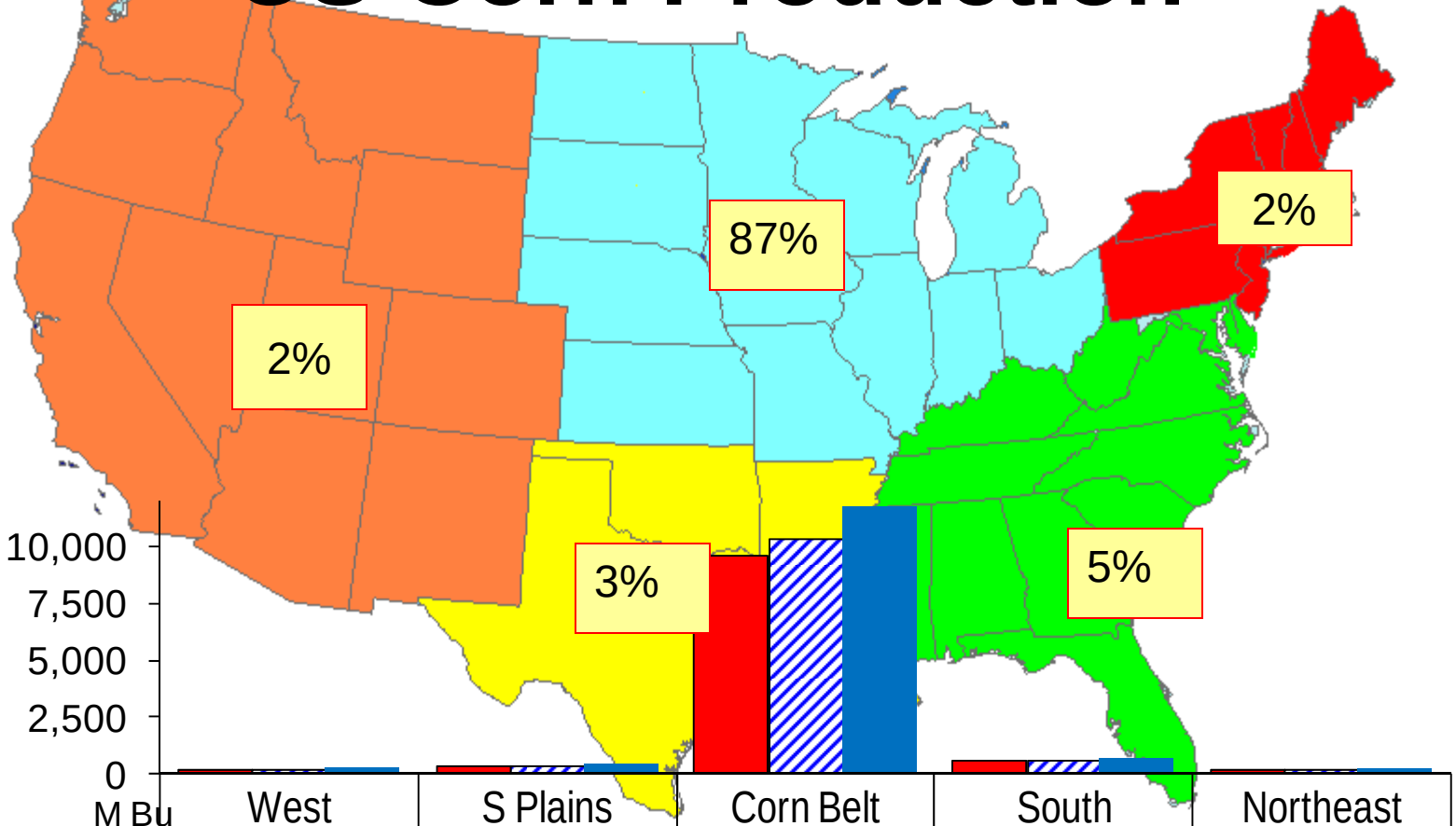


Transport Flow Model



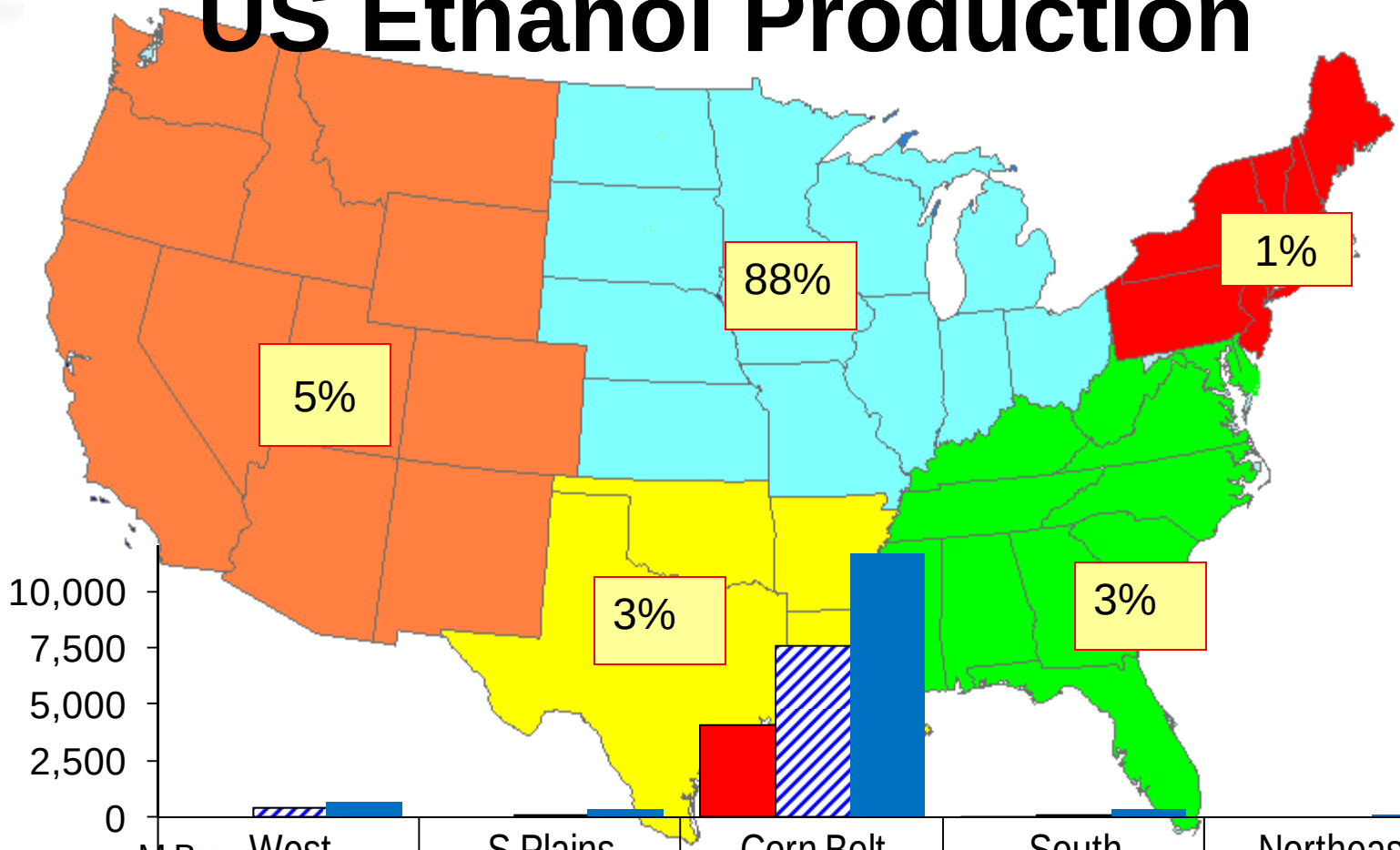
- Models are built for 2004, 2007, and 2010
- Data are at the state level

US Corn Production



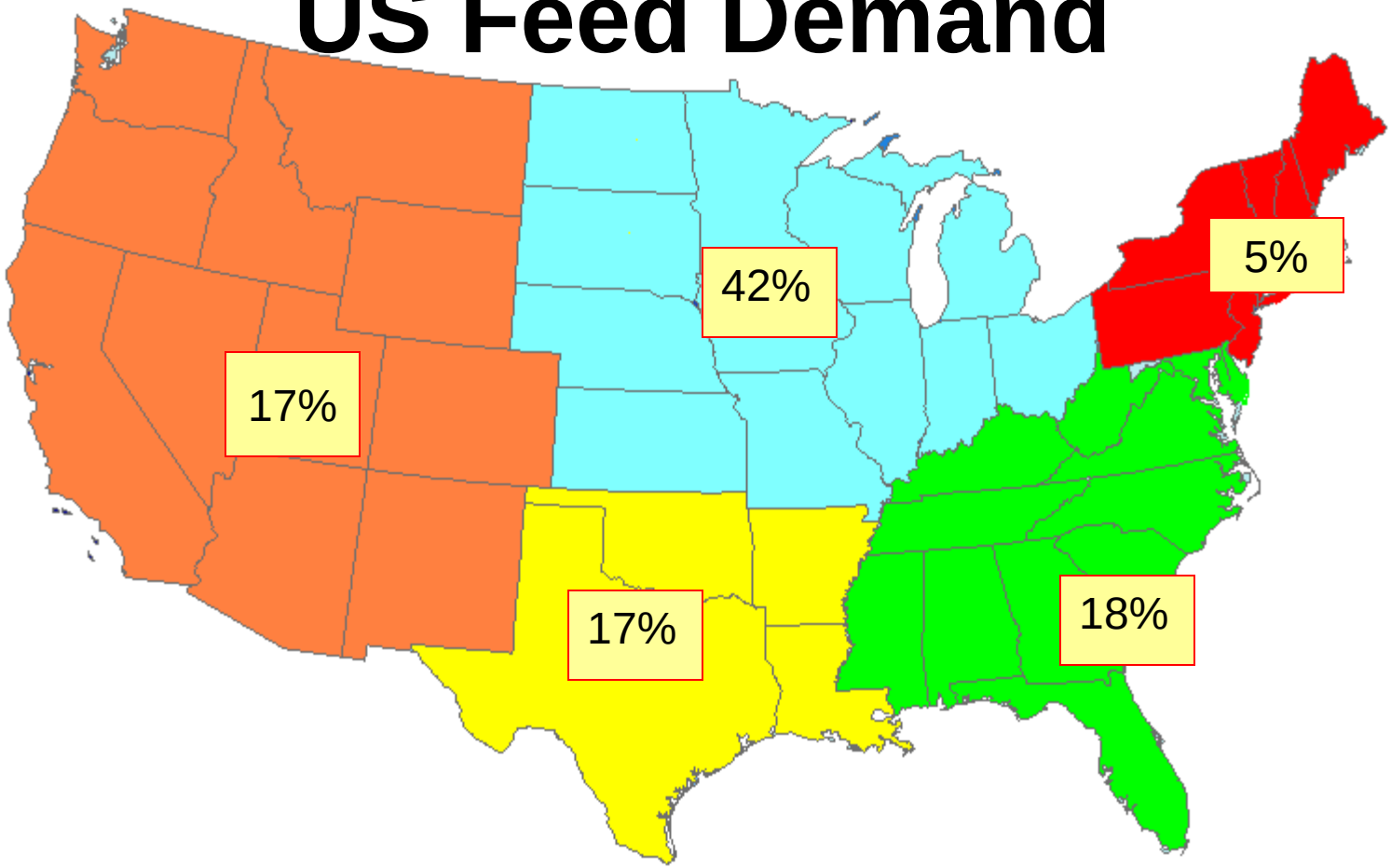
M Bu	West	S Plains	Corn Belt	South	Northeast
04	211	348	9,596	607	185
07	237	410	10,325	636	196
10	268	465	11,714	722	223

US Ethanol Production

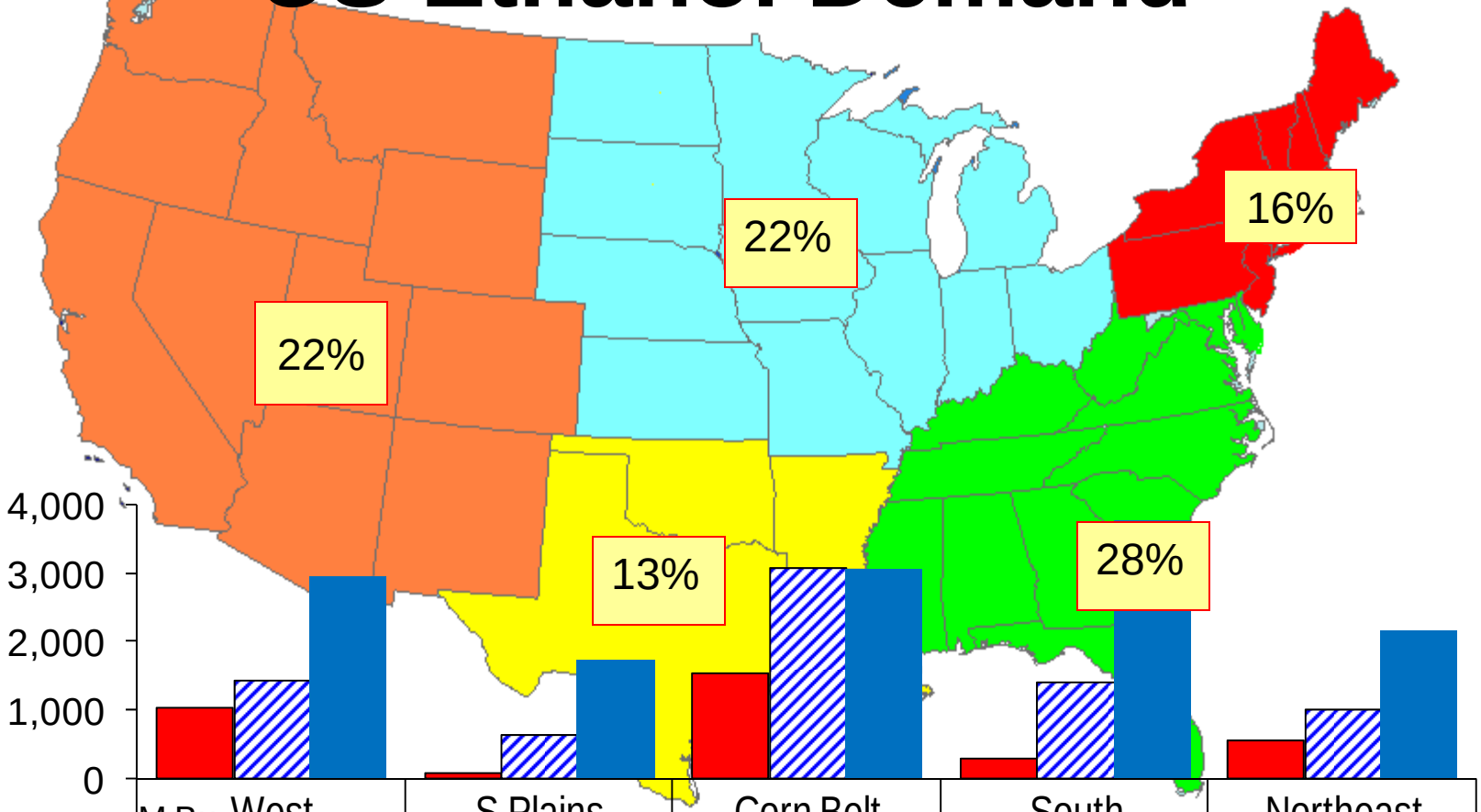


M Bu	West	S Plains	Corn Belt	South	Northeast
04	0	0	4,061	33	0
07	405	100	7,608	93	0
10	677	340	11,647	353	150

US Feed Demand



US Ethanol Demand

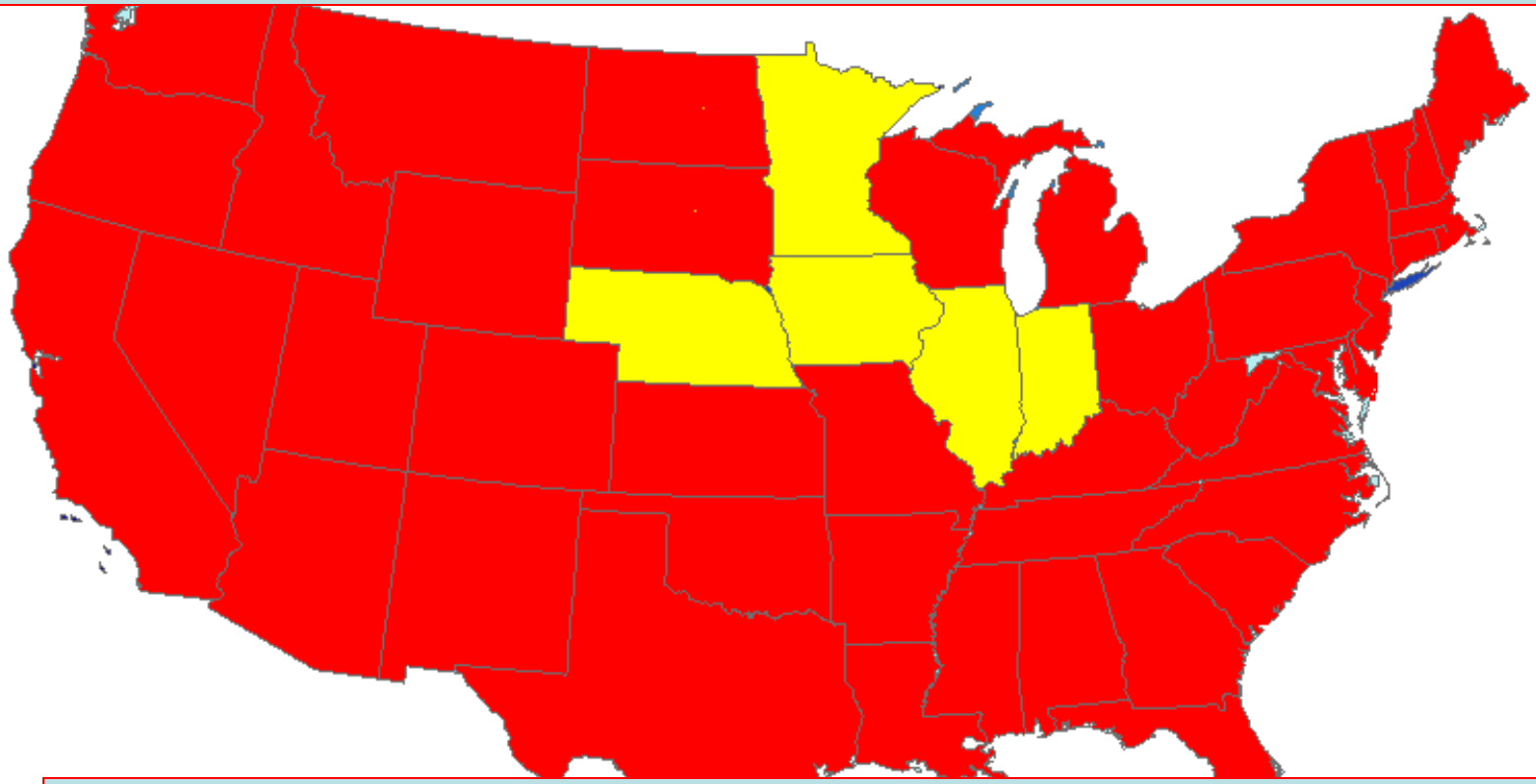


M Bu	West	S Plains	Corn Belt	South	Northeast
04	1,023	77	1,552	282	567
07	1,460	659	3,096	1,433	1,031
10	2,962	1,748	3,080	3,797	2,168

Calculate Net Corn Flow

	2004	2007	2010
	Billion bushels		
Corn Production	10.9	11.8	13.4
Livestock Use	6.0	5.6	5.2
Ethanol Use	1.5	2.9	4.7
Surplus/Deficit	3.5	3.2	3.5
Surplus States	16	15	18
Deficit States	32	33	30

80% of surplus in 5 states



- Still need 1 billion bushels for food
- 2 billion bushels for exports

Calculate Net DDGS Flow

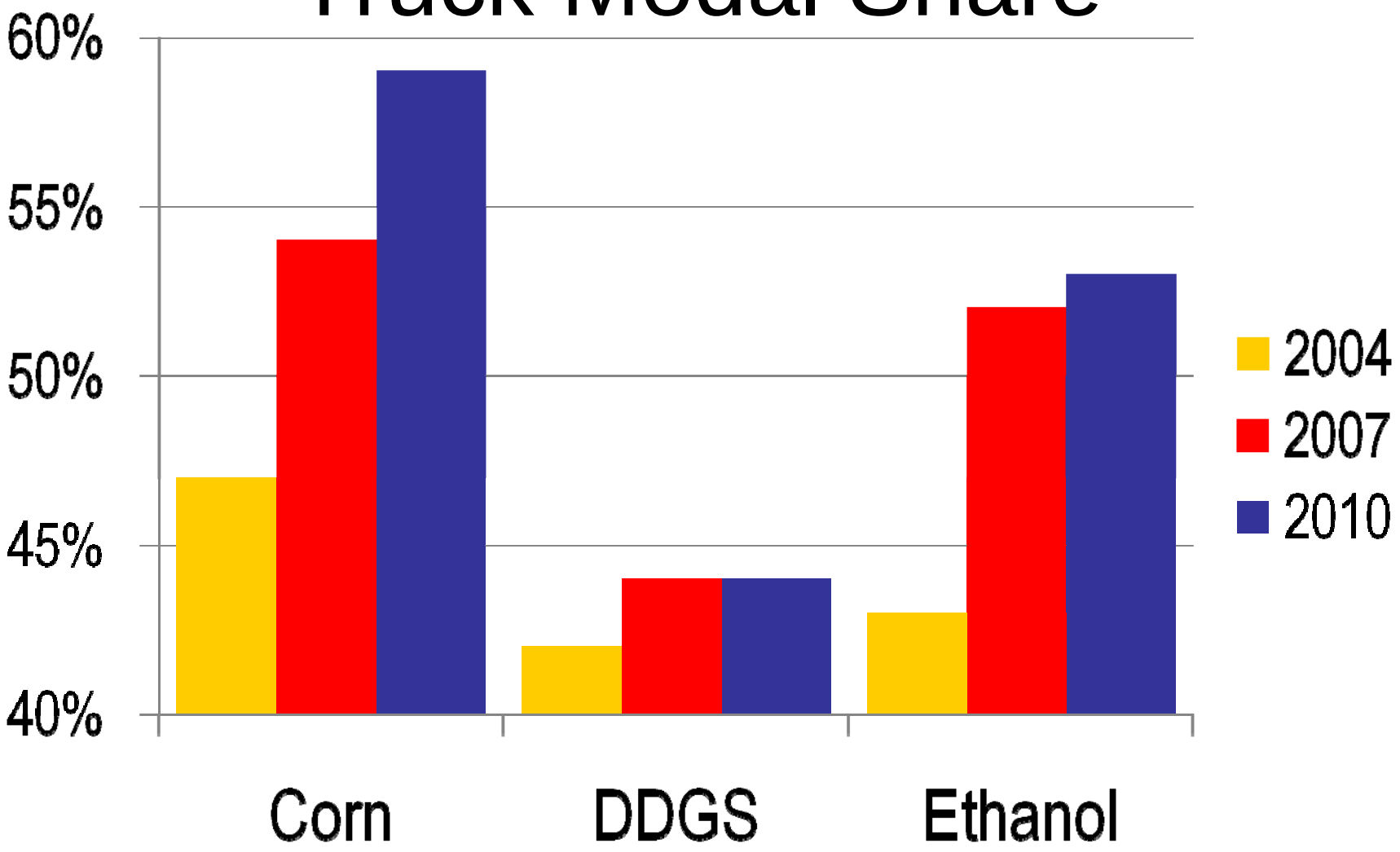
	2004	2007	2010
	Million Tons		
DDGS Production	12.8	25.7	41.3
Livestock Use	12.0	23.1	34.9
Surplus/Deficit	0.8	2.6	6.4
Surplus States	7	9	13
Deficit States	41	39	35

Will rely on export markets

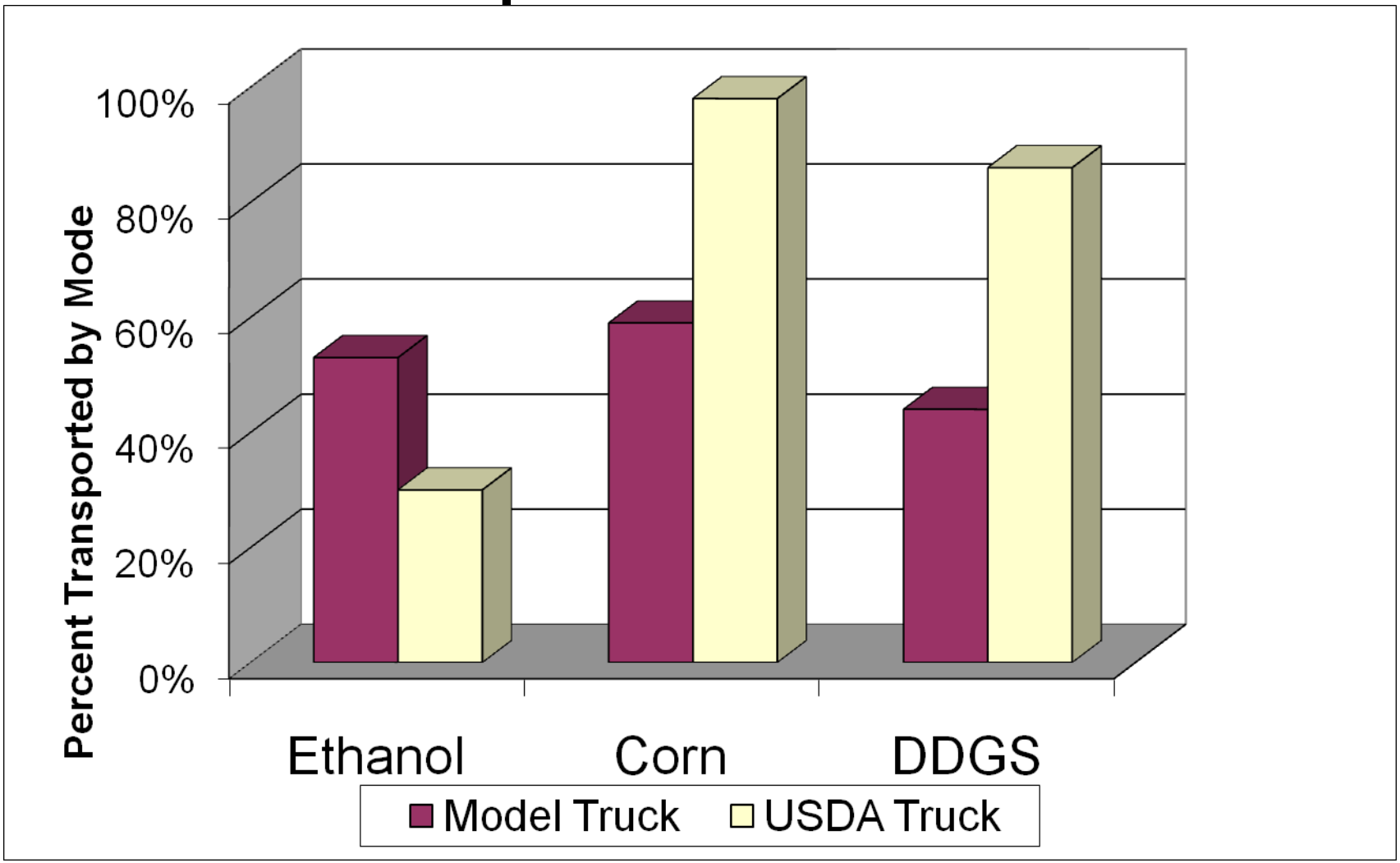
Calculate Net Ethanol Flow

	2004	2007	2010
	Billion Gallons		
Ethanol Production	4.1	8.2	13.2
Fuel Use	3.5	7.7	13.8
Surplus/Deficit	0.6	0.5	-0.6
Surplus States	8	12	10
Deficit States	40	36	38

Truck Modal Share



Compare w/ USDA



Truckloads of traffic

Truckloads	2004	2007	2010
	(000 loads)		
Corn	5,608	6,991	8,687
DDGS	208	438	700
Ethanol	221	547	889
Total	6,037	7,976	10,276

From 2004 to 2010, 77.7% increase in truckload traffic. Mainly will be felt in local communities.

Rail carloads of traffic

Carloads	2004	2007	2010
	(000 loads)		
Corn	1,670	1,555	1,568
DDGS	74	144	231
Ethanol	78	129	204
Total	1,822	1,828	2,003
From 2004 to 2010, 9.9% increase in rail traffic.			
But less seasonality with DDGS and corn			

Observations

- The effects on transportation are large
- Equipment shortages in the short run
- JIT approach for ethanol industry
- Will hit blending wall by 2010. What is the pathway to go beyond 13.4 billion gallons?
- Examples of entrepreneurship
  - Manly and Gateway terminals, DDGS in containers, Kinder Morgan Florida pipeline

Prognosis

- Transportation may be at capacity, but ethanol will not have major effects on rail.
- Road infrastructure issues could be major concern at the local level.
- E85 pathway?
- Is it time to have a comprehensive analysis like we did in the 1970s

Thanks very much!

Questions and Comments

For more information:

http://www.ces.purdue.edu/bioenergy