

Biofuel Impacts on Midwestern Agriculture

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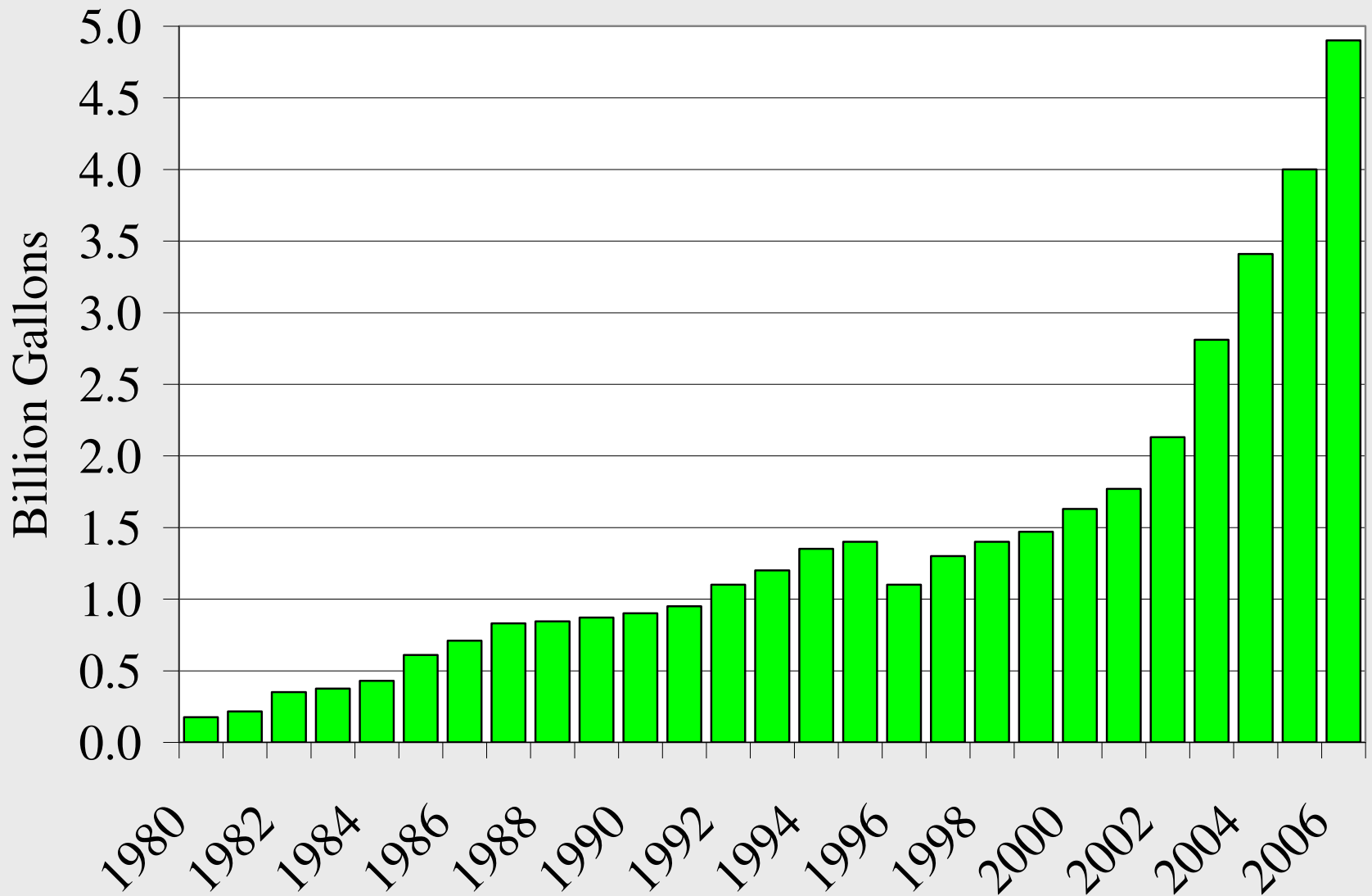
Center for Agricultural and Rural Development
Iowa State University

February 21, 2007

West Central Spring Agronomy Update
Owatonna, Minnesota

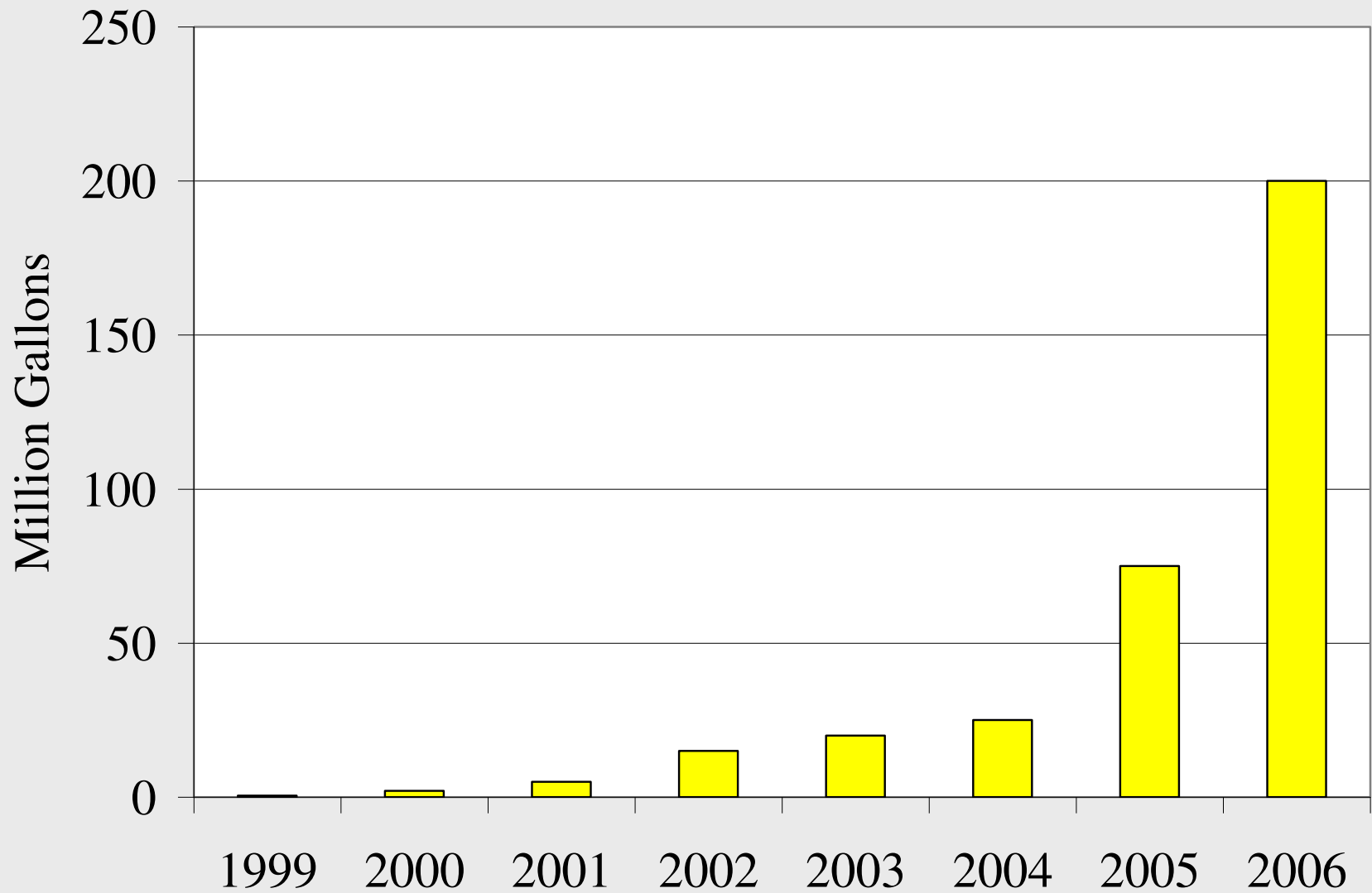
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Ethanol Explosion



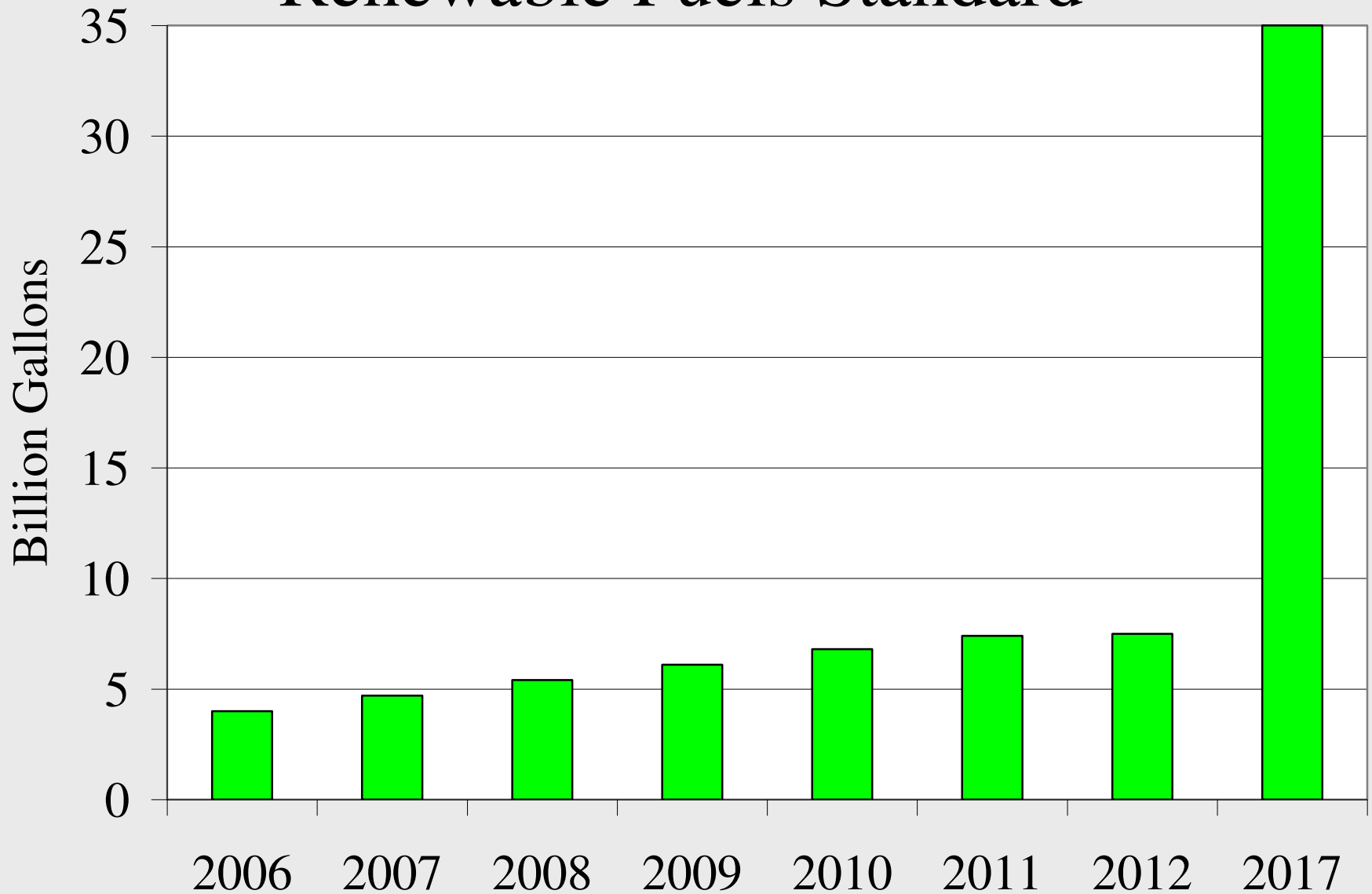
Source: Renewable Fuels Association

Biodiesel Growth



Source: National Biodiesel Board

Renewable Fuels Standard



Source: Renewable Fuels Association

Ethanol Industry Snapshots

	Ethanol Plants	Capacity (mgy)
Jan. 2000	54	1,749
Jan. 2001	56	1,921
Jan. 2002	61	2,347
Jan. 2003	68	2,707
Jan. 2004	72	3,101
Jan. 2005	81	3,644
Jan. 2006	95	4,336
Jan. 2007	110	5,386

Source: Renewable Fuels Association

Ethanol – State by State

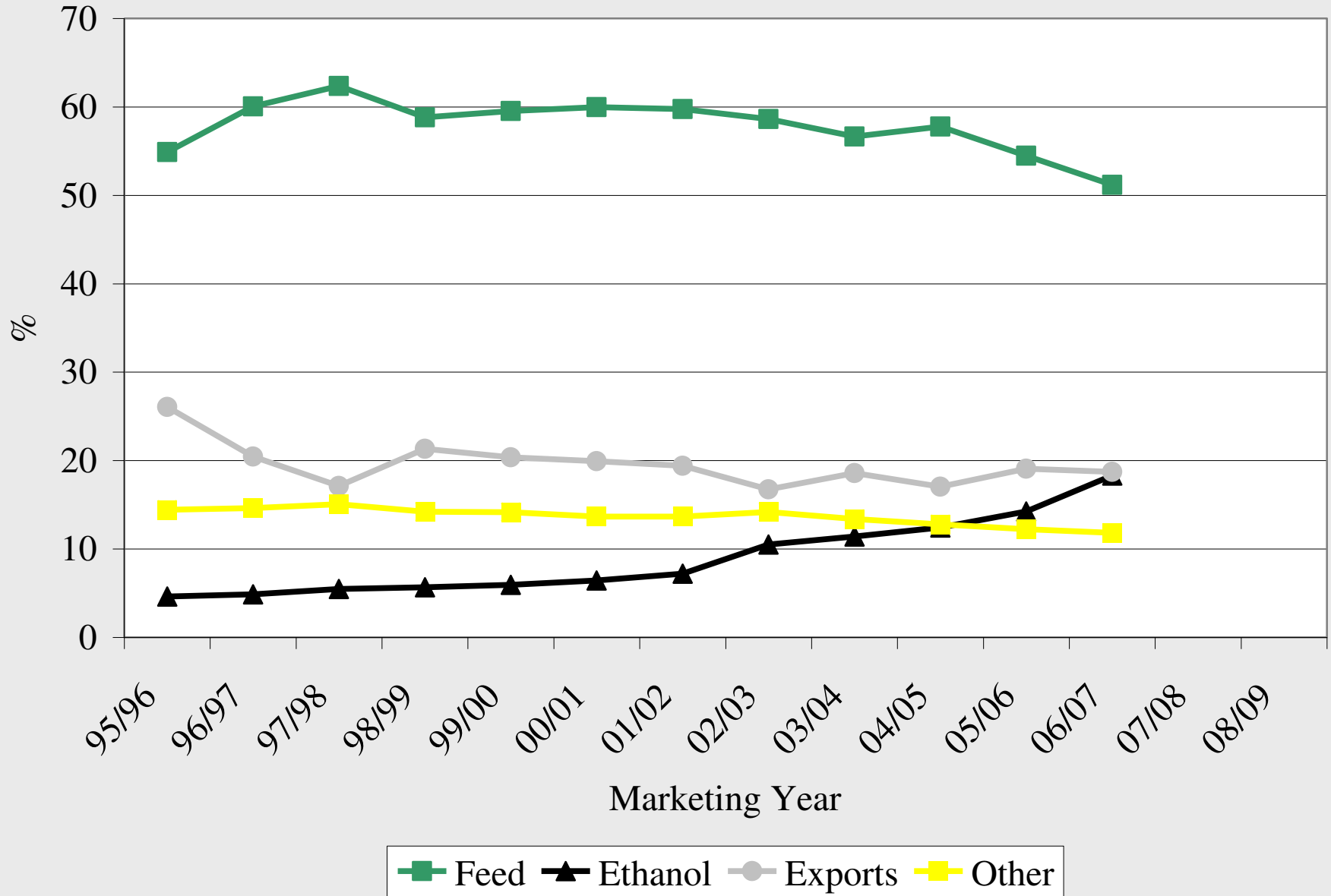
State
Current Capacity
(million gallons)

IA	1,610
IL	834
NE	597
SD	553
MN	543
WI	230
KS	211
MO	155
MI	150
IN	122
CO	88
CA	69
TN	67
KY	35
ND	34

Biodiesel – State by State

State	Current Capacity (million gallons)
IA	112
TX	104
MN	63
TN	48
OH	41
MO	36
IL	35
AR	27
CO	27
OK	23
FL	23
GA	19
IN	15
LA	15
MI	15

Historical Corn Utilization



Where Are We Headed?

- Based on construction announcements for ethanol plants, by the end of 2008, ethanol production capacity could exceed 12 billion gallons
- Announced biodiesel capacity exceeds 2 billion gallons

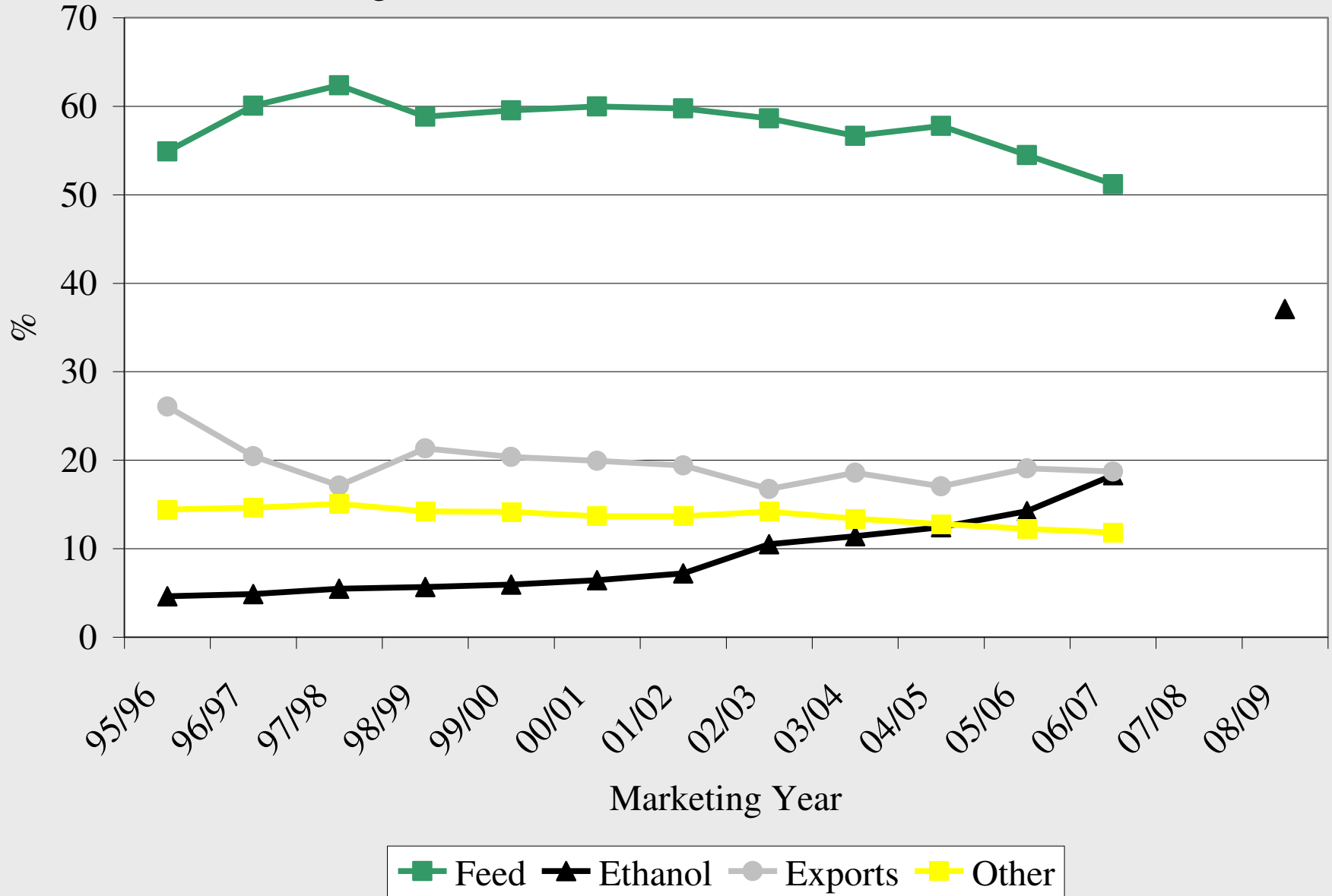
Ethanol – State by State

State	Current Capacity	Being Built (million gallons)	Total
IA	1,610	1,230	2,840
NE	597	1,163	1,760
IL	834	398	1,232
SD	553	360	913
MN	543	351	894
IN	122	699	821
WI	230	282	512
KS	211	240	451
TX	0	370	370
OH	4	345	349
MI	150	107	257
ND	34	200	234
NY	0	164	164
MO	155	0	155
OR	0	143	143

Biodiesel – State by State

State	Current Capacity	Being Built (million gallons)	Total
IA	112	235	347
TX	104	149	253
IL	35	106	141
IN	15	105	120
ND	0	120	120
MO	36	70	106
WA	5	101	106
MN	63	4	67
AL	10	55	65
PA	9	55	64
SC	6	56	62
NJ	13	45	58
NE	0	55	55
KY	4	50	54
OH	41	11	51

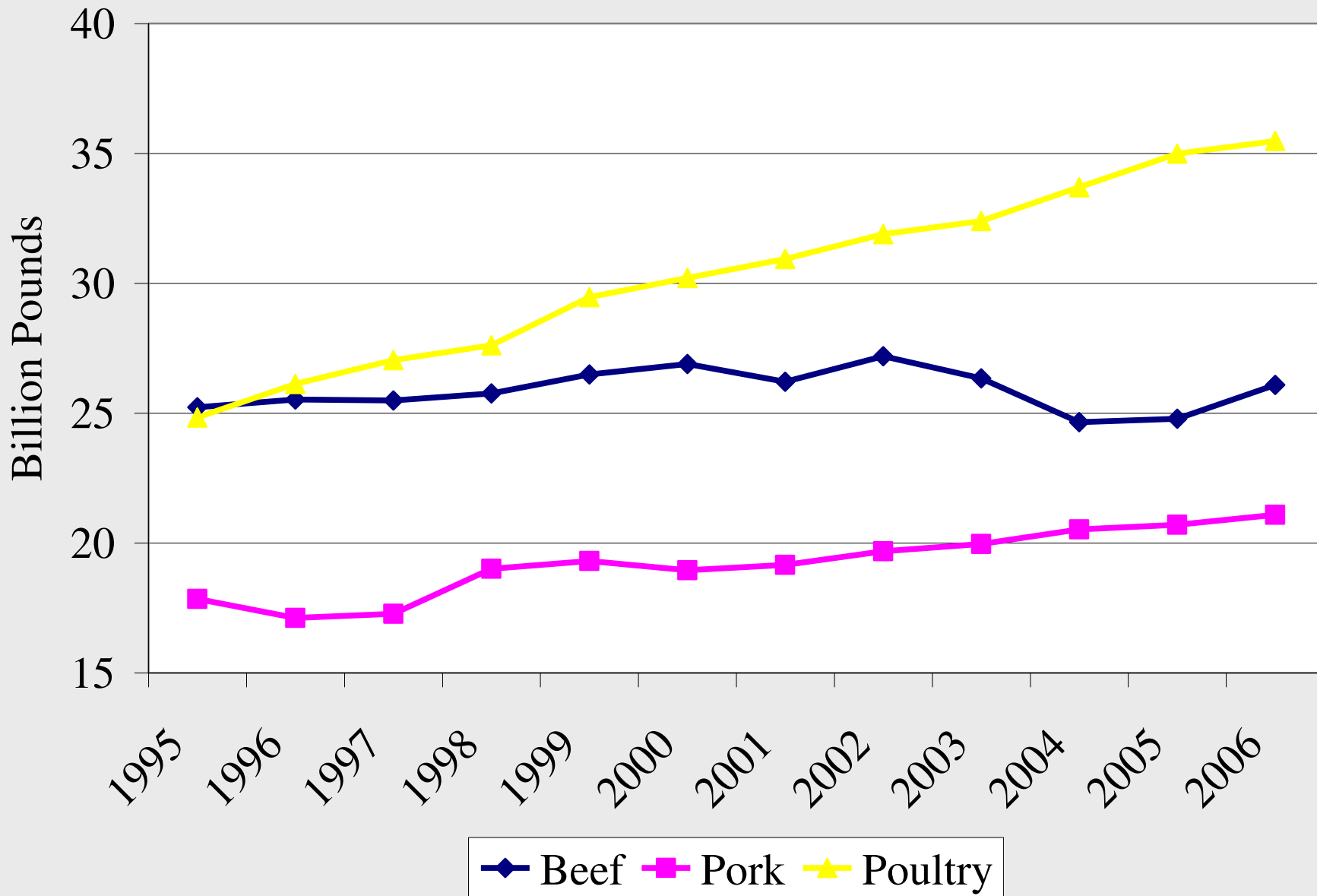
Projected Corn Utilization



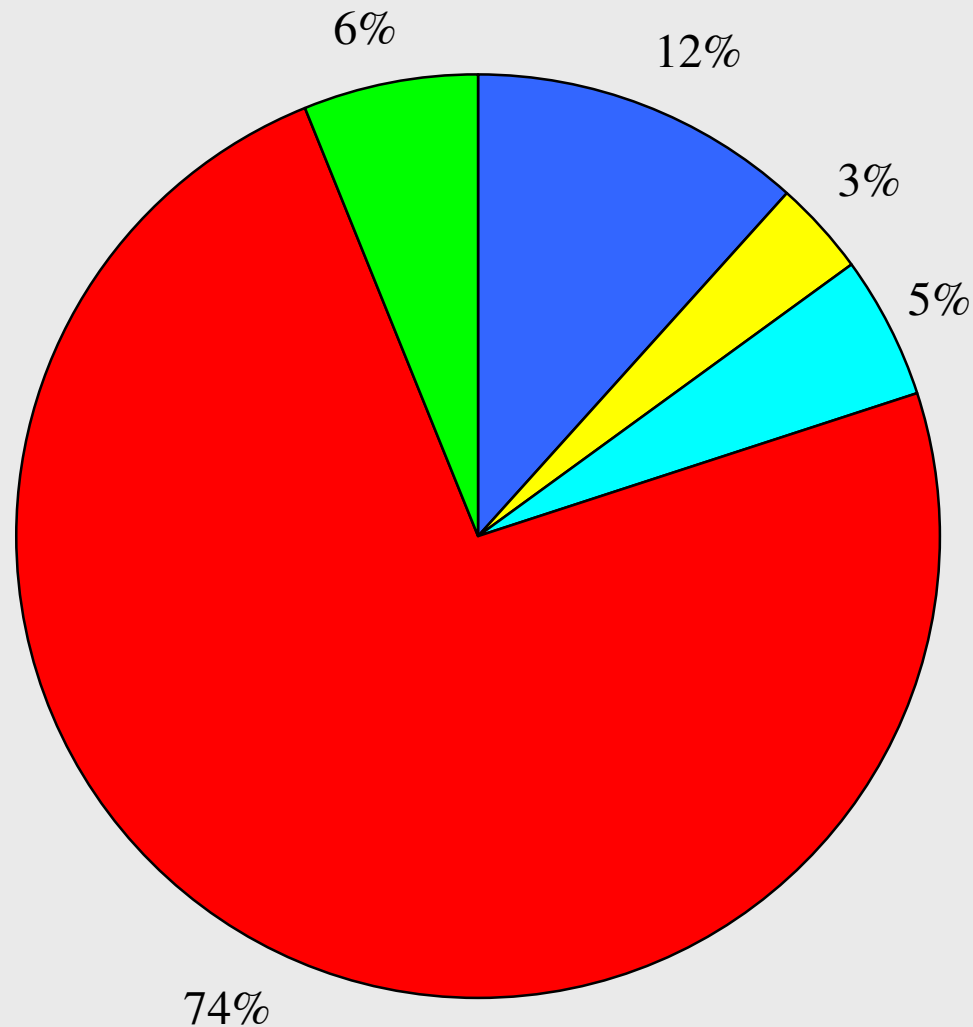
That's A Lot of Corn

- 12 billion gallons of ethanol translates into 4.36 billion bushels of corn
 - That's more than the combined corn output of Iowa, Illinois, and Wisconsin in 2006.
- Ethanol demand for corn is putting tremendous pressure on the corn market
- It will likely take both supply and demand shifts to balance out the corn market.

U.S. Livestock Production

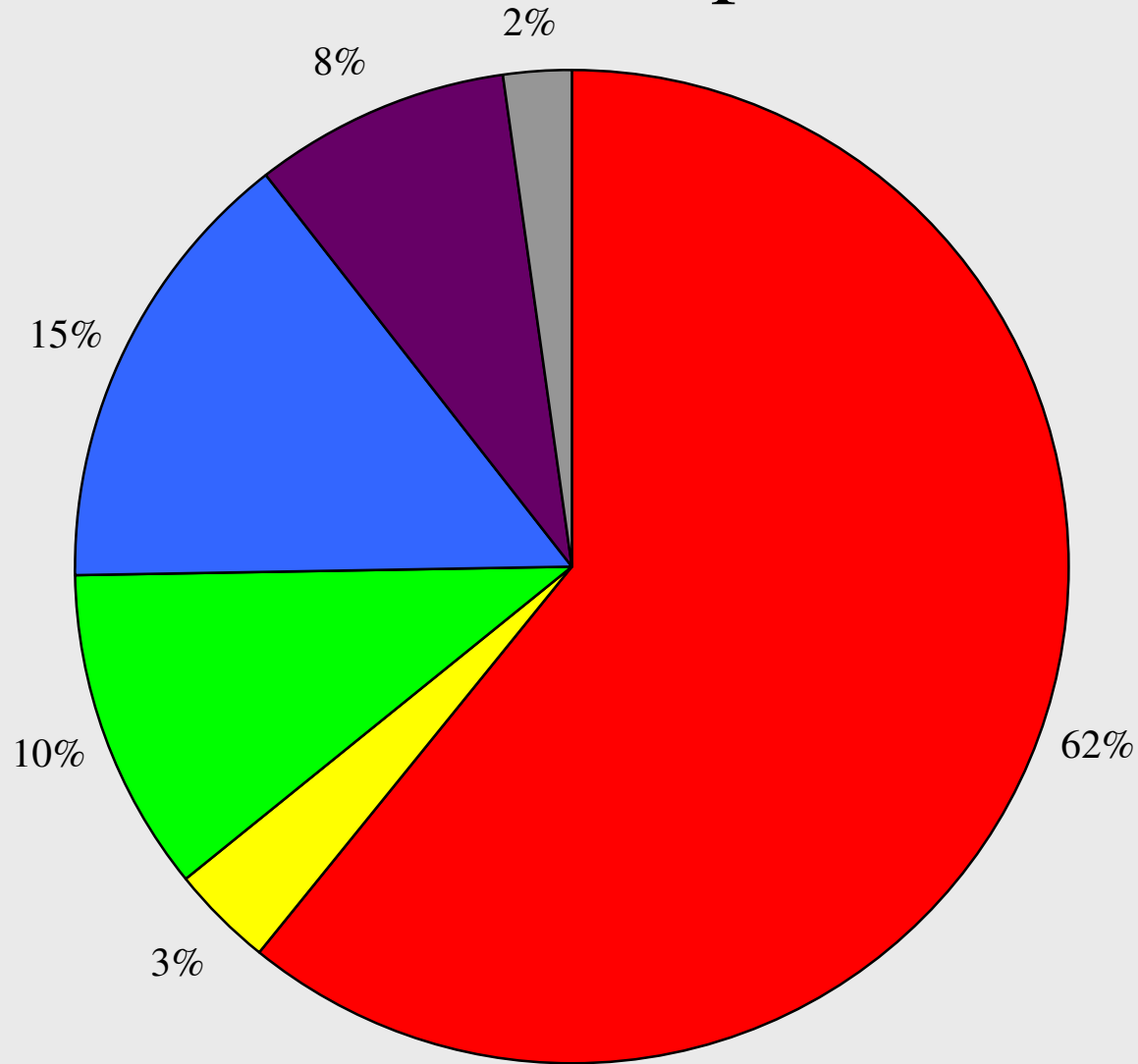


World Corn Exports in 2005/2006



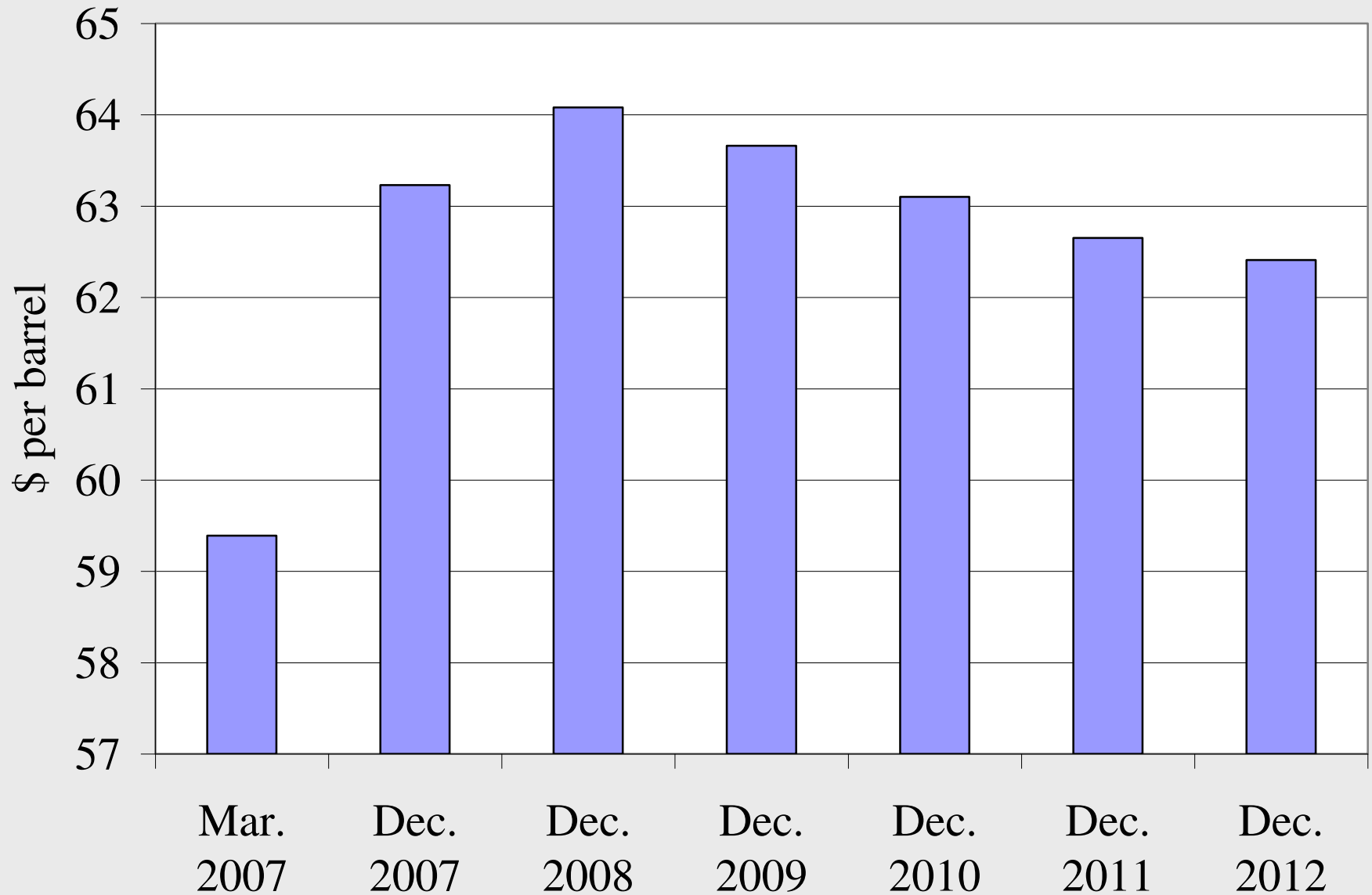
■ Argentina ■ Brazil ■ China ■ United States ■ Rest of World

World Ethanol Imports, 2006

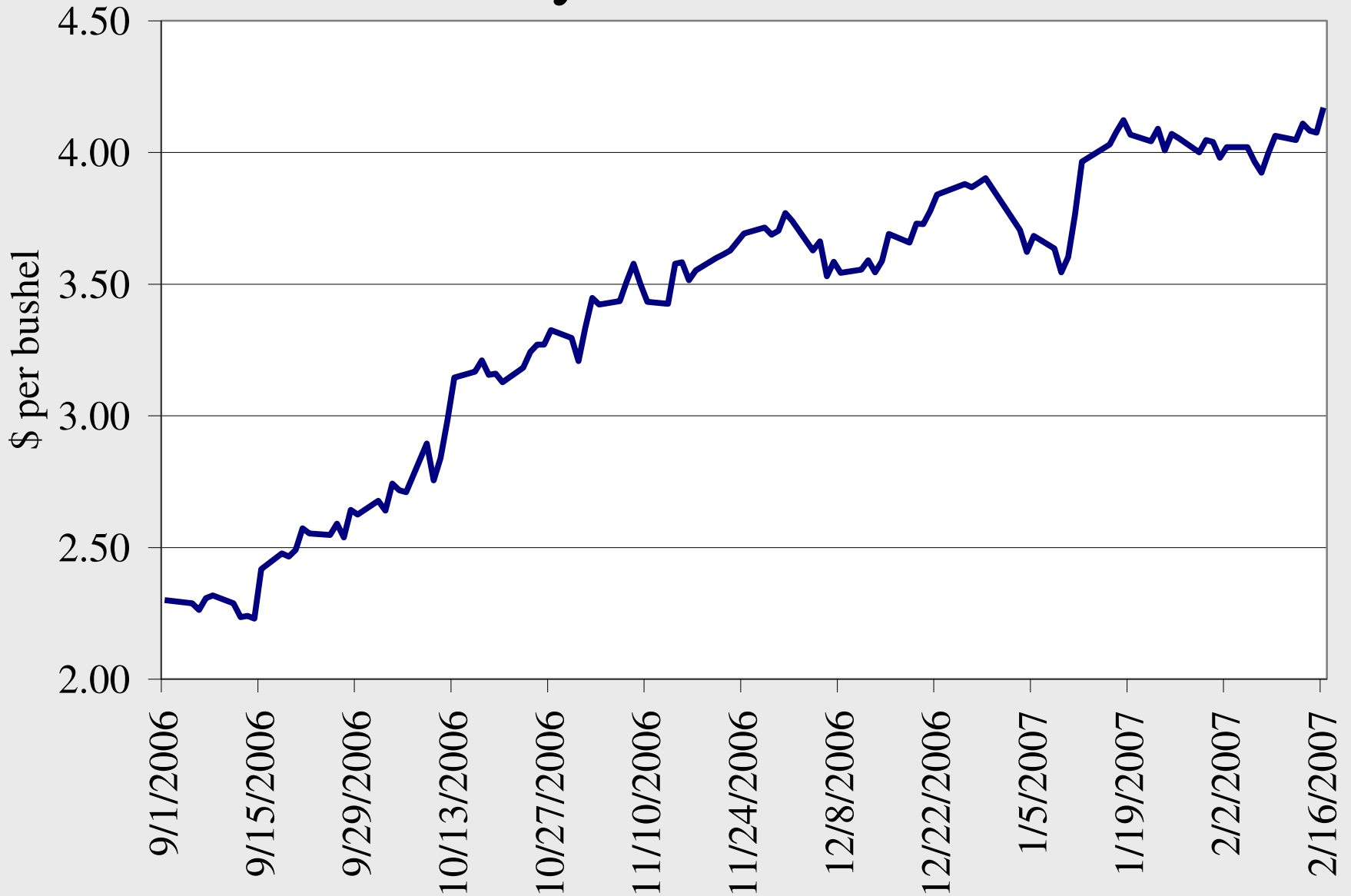


■ U.S. ■ EU ■ India ■ Japan ■ South Korea ■ Rest of World

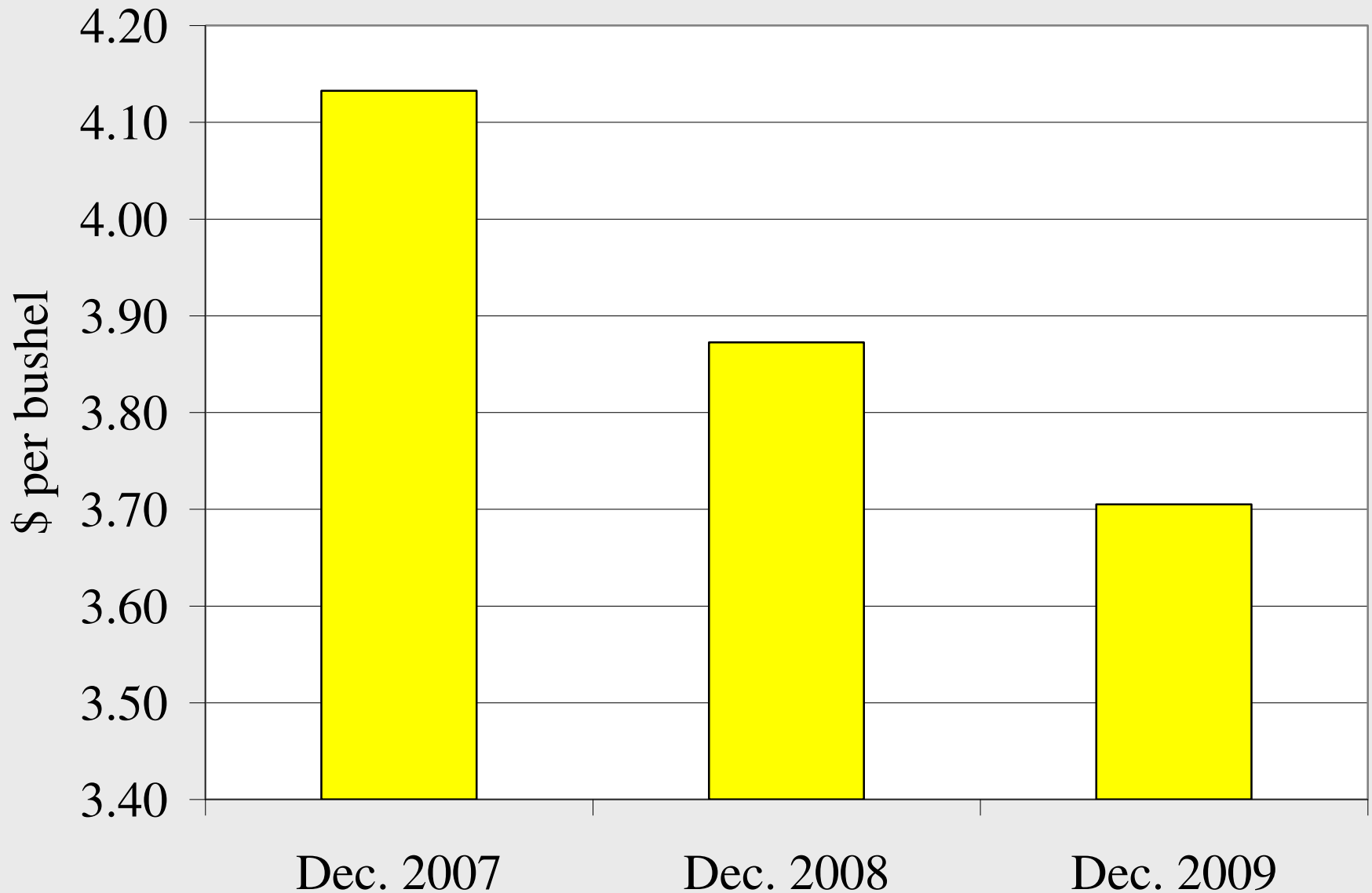
Oil Futures As Of 2/19/2007



Nearby Corn Futures



Corn Futures As Of 2/19/2007



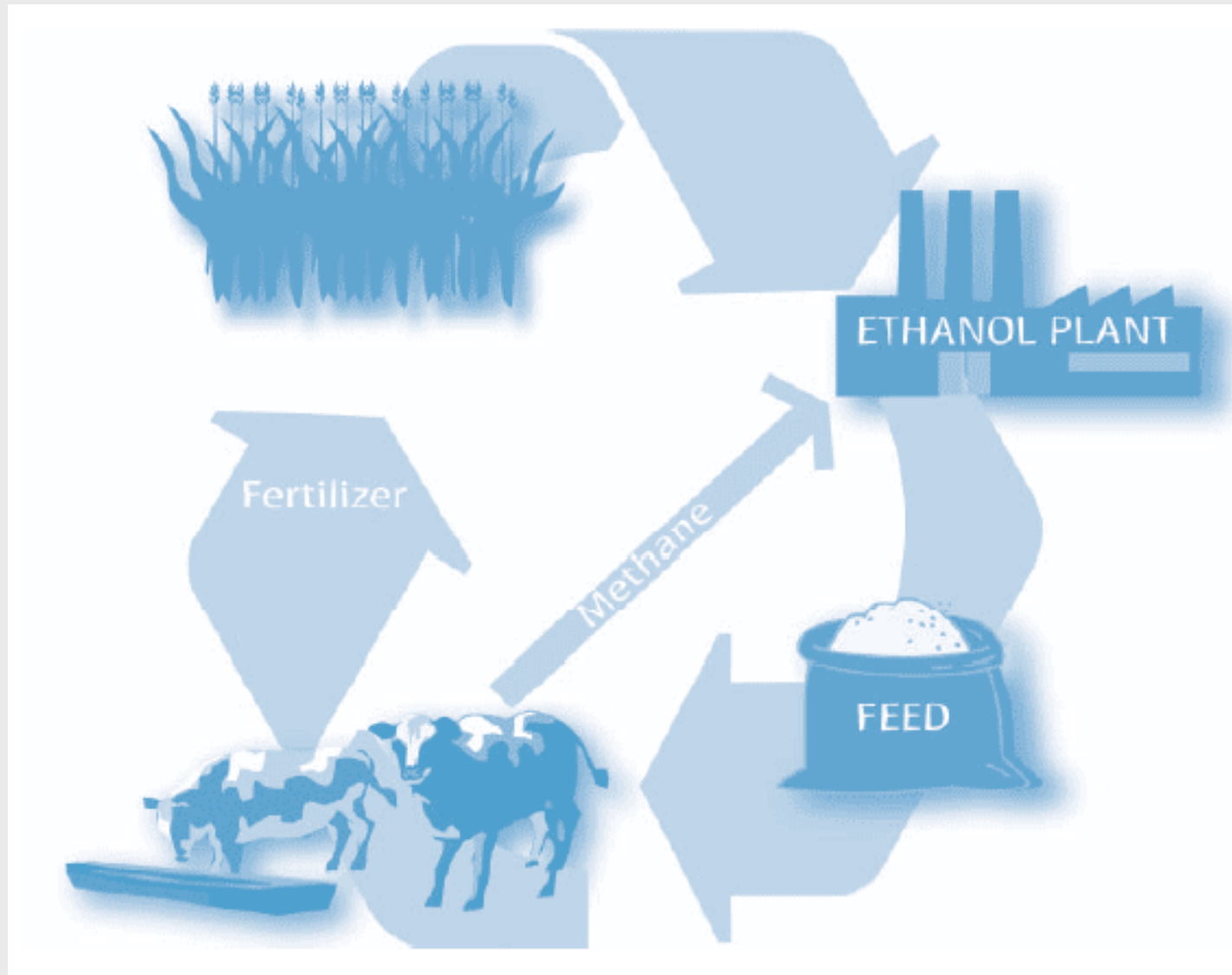
Support for More Corn Acres

- Futures prices are providing a definite signal for more corn acres
- Early projections for the 2007 crop year indicate acreage in the mid-to-upper 80 million acre range
- Up substantially from 2006, but will it be enough?

Where Will the Acreage Come From?

State	2000-2006 Average		Percentage of Acreage in Corn	If the States Followed a 2/1 Rotation	
	Corn	Soybeans		Corn	Soybeans
	(acres)			(acres)	
Illinois	11,421	10,236	53%	14,438	7,219
Indiana	5,657	5,571	50%	7,486	3,743
Iowa	12,386	10,450	54%	15,224	7,612
Kansas	3,314	2,850	54%	4,110	2,055
Kentucky	1,217	1,279	49%	1,664	832
Michigan	2,221	2,036	52%	2,838	1,419
Minnesota	7,214	7,257	50%	9,648	4,824
Missouri	2,864	5,050	36%	5,276	2,638
Nebraska	8,307	4,743	64%	8,700	4,350
Ohio	3,371	4,493	43%	5,243	2,621
South Dakota	4,350	4,179	51%	5,686	2,843
Wisconsin	3,636	1,610	69%	3,497	1,749

Ethanol-Livestock Synergies



A 50-Million Gallon Ethanol Plant ...

- Uses roughly 18.5 million bushels of corn
 - In Iowa, corn from 116,000 acres
- Produces 315 million pounds of distillers grains
 - This could feed approx. 60,000 dairy cattle or 17.26 million layers
- Utilizes natural gas/coal in plant operations
 - Manure from 60,000 dairy cattle could produce methane to meet part of the ethanol plant's energy needs

The Next Generation of Ethanol Plants

- Plants being constructed in Mead, Nebraska and Hereford, Texas are modeled on the ethanol-livestock synergies
- The Mead plant is scheduled to come online in Feb. 2007
- The Hereford plant is scheduled to be running by the second half of 2007

E3 Biofuels – Mead, Nebraska

- 24 million gallon ethanol plant paired with a 30,000 head feedlot
- Will process 8 million bushels of corn and 228,000 tons of manure
- The biogas from the manure is projected to meet the energy needs of the ethanol plant

E3 Biofuels – Mead, Nebraska

- 100,000 tons of wet distillers grains are also produced and fed to the cattle in the feedlot
 - Energy savings of not drying the distillers grains

Panda Ethanol – Hereford, Texas

- 100 million gallon ethanol plant surrounded by 3.5 million head of cattle (within 100 miles)
 - “Saudi Arabia of cattle manure”
- Utilizes 40 million bushels of corn and 900,000 tons of wet distillers grains
- Methane derived from manure will be burned to generate steam to power the plant

10 Observations about Ethanol

1. Ethanol production growth has exceeded expectations
 - Growth has exceeded forecasts and has put the U.S. on pace to far exceed the RFS
 - But the industry is approaching another barrier point (10% of gasoline usage)
2. Gasoline prices are likely to remain high enough to support ethanol

10 Observations about Ethanol

3. Ethanol margins can remain positive over a wide corn price range
4. Corn prices are likely to remain higher than usual
5. Given positive margins, ethanol plants will be competitive for corn at higher prices

10 Observations about Ethanol

6. To maintain all corn usage demands, the U.S. will need to dramatically expand corn acreage
7. Other countries will response to higher corn prices as well
8. With heightened demand and thin stocks, the corn market will be more volatile

10 Observations about Ethanol

9. Cellulosic ethanol has tremendous promise, but it will be several years before cellulosic ethanol truly impacts the energy markets

10. The merging of the energy and agricultural sectors will force substantial changes in both sectors