Ethanol's Big-Picture Impact on Midwest Agriculture & Livestock

7/11/07

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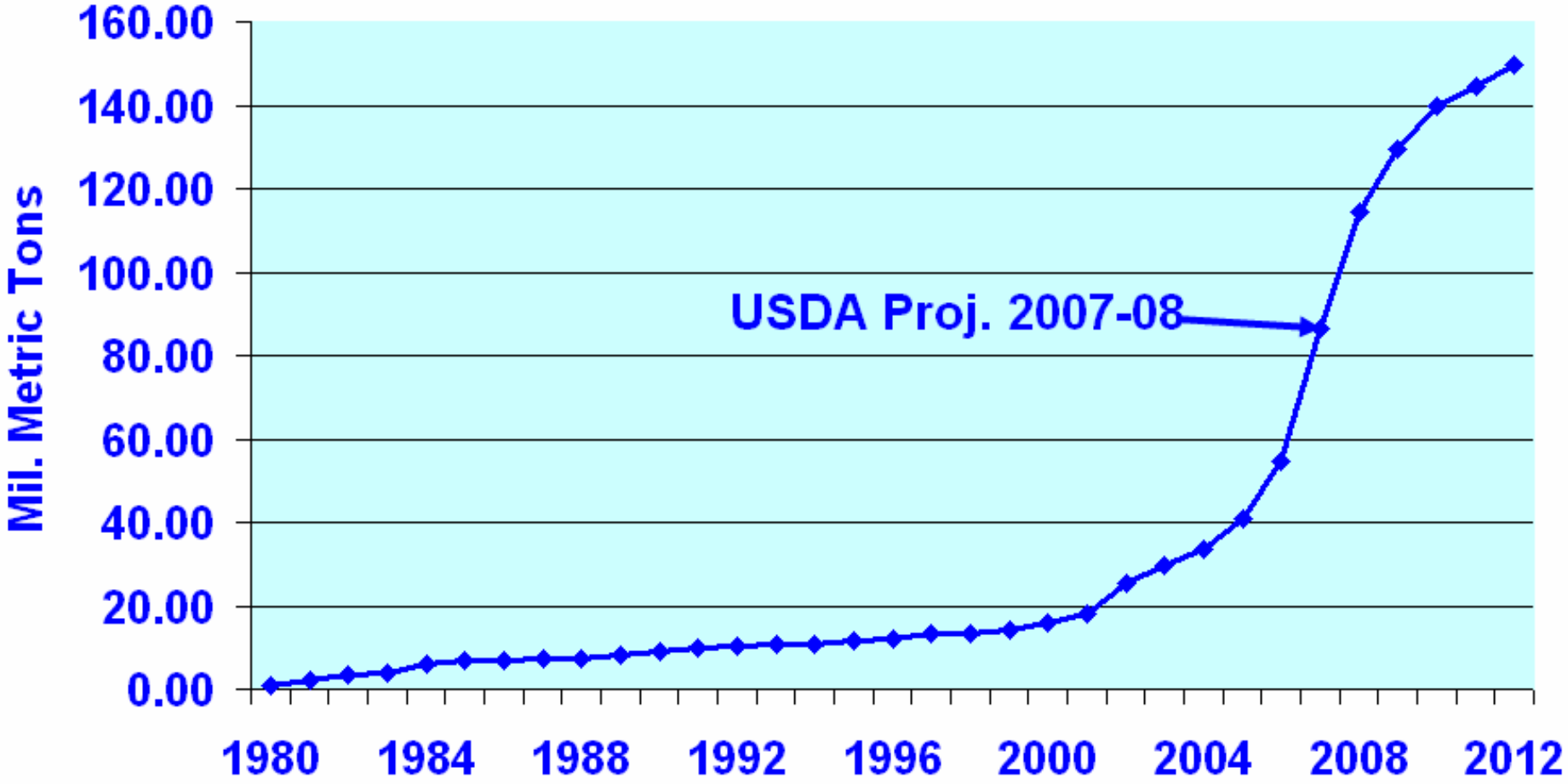
Ames, Iowa, U.S.A.

Take-home points

- Much tighter feed energy supply than in past
- Increased supply of medium-protein DGS
- Soy meal: tighter supply & higher cost
- Differential economic impacts by species of livestock & poultry
- *High risk to livestock industry in short-crop years*
- Feed price volatility affected by govt. fuel mandates
- 2nd generation ethanol plants to tighten DGS, forage supplies (8-10 years out?)

Mil. Tons U.S. Corn Use for Fuel Ethanol, Wisner Projections to 2012



41 countries encourage biofuels

Major Countries with Ethanol Fuels

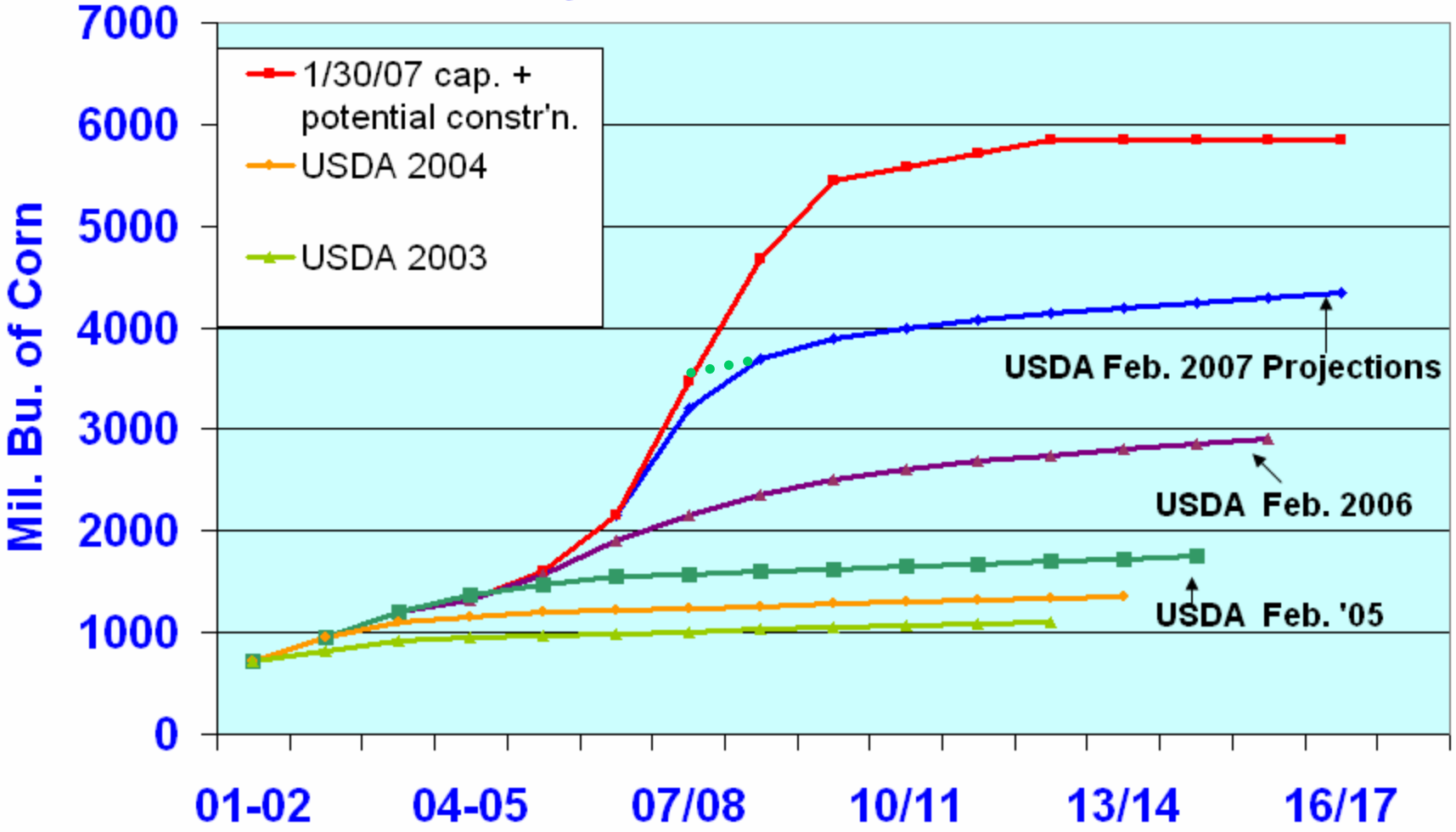
- U.S., Canada
- China, Brazil
- EU-27
- Thailand

Countries considering ethanol fuels

- South Africa
- Ukraine
- Japan

Biodiesel– Competition for crop land

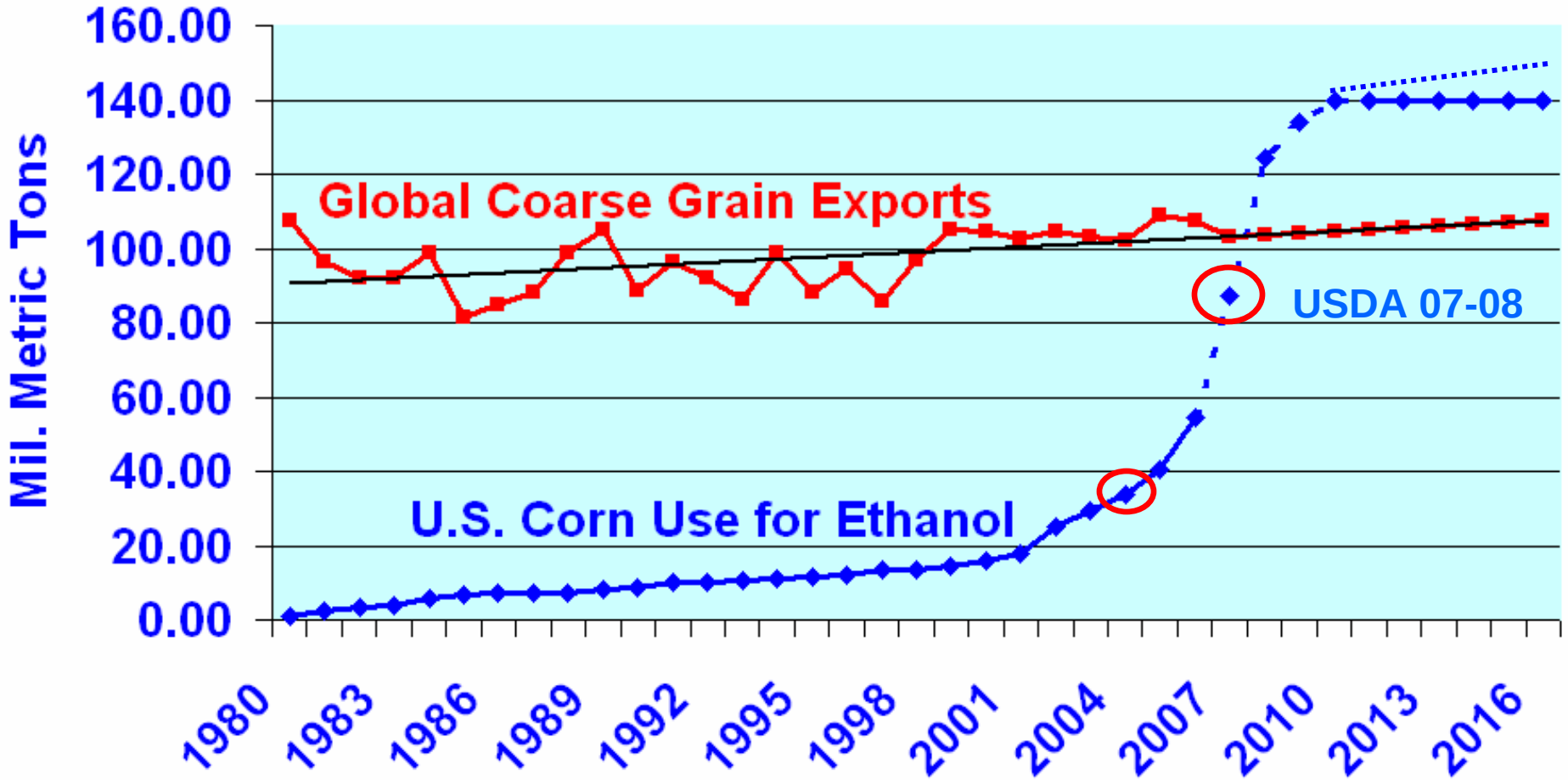
Figure 1. USDA Feb. '07 & Previous 10-Yr. Projections of Corn for Ethanol, Plus Existing & Under Construction Capacity + Likely Construction to 2010



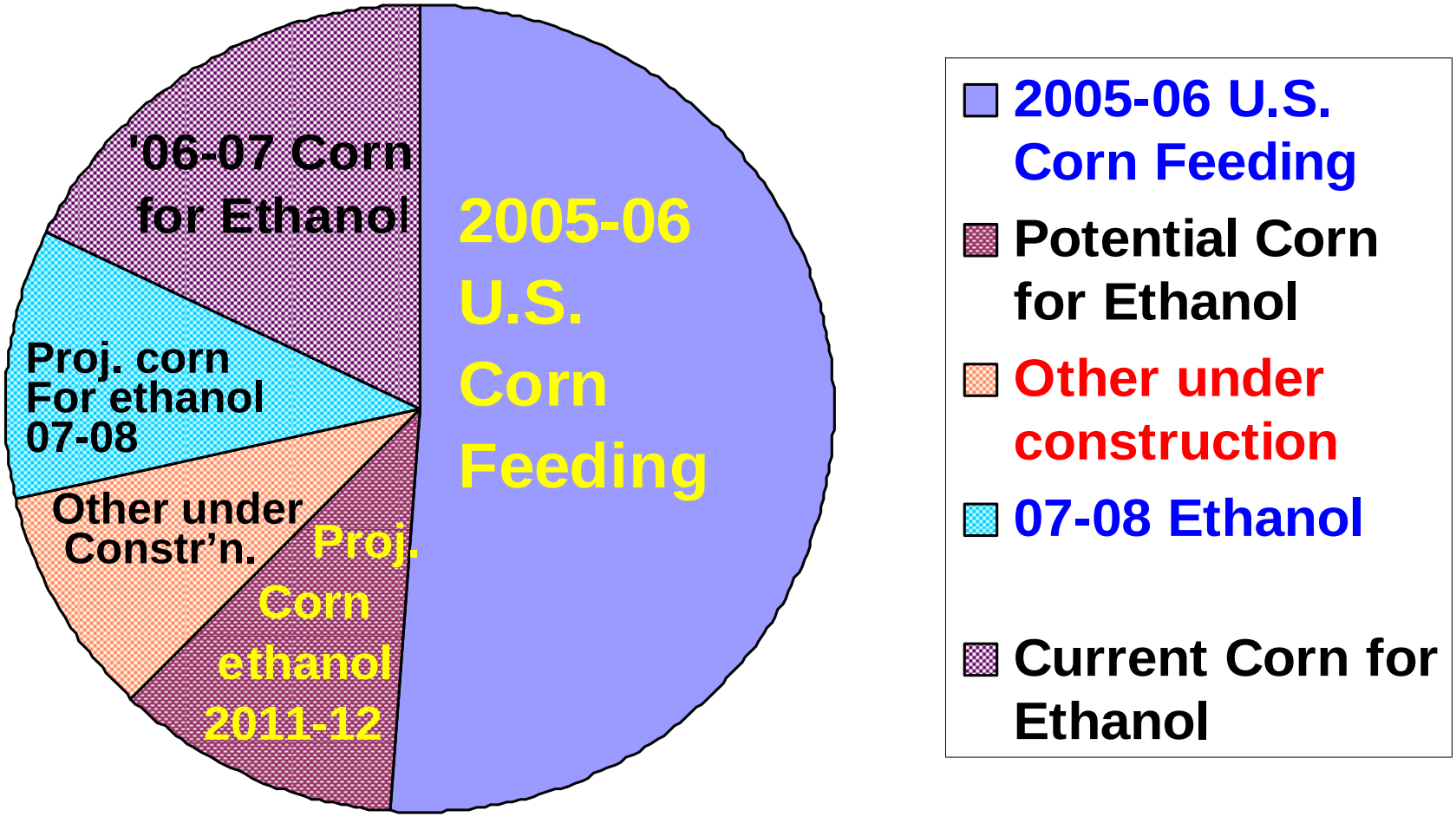
International Impacts

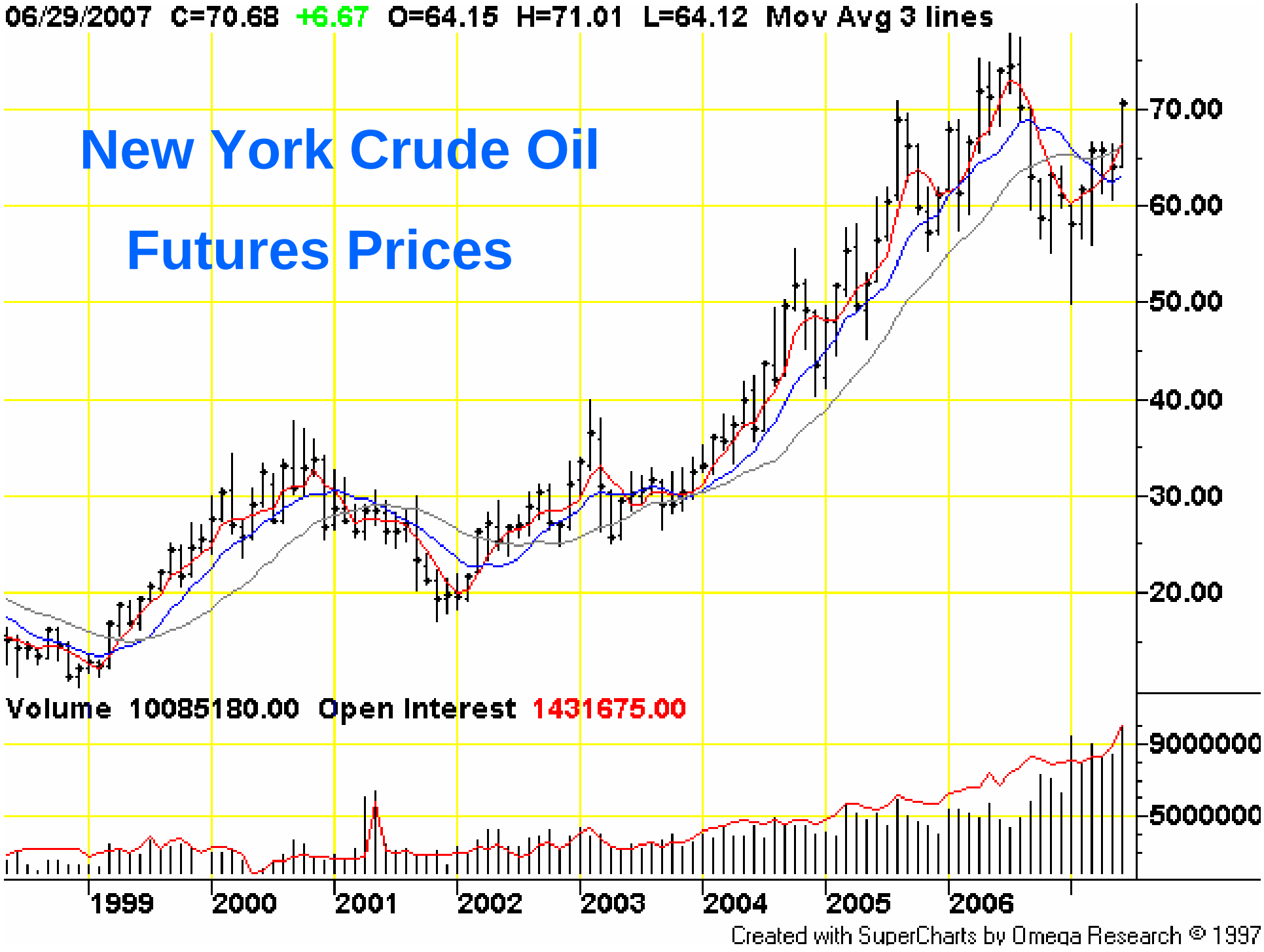
- U.S. ethanol plants under construction to use 58 mil. tons of corn (doubling use)
  - 3.5 times the volume of Japan imports of U.S. corn
  - 130% of 2006 EU corn crop
  - 70% of global corn exports
- Other countries are expanding ethanol & biodiesel
- Strong negative impacts on animal ag.
- Higher food costs ahead
- Major risk-management challenges in Ag. & bioenergy

Mil. Tons U.S. Corn Use for Fuel Ethanol & Global Coarse Grain Exports



Expanding U.S. Ethanol Industry vs. 2005-06 Corn Feeding



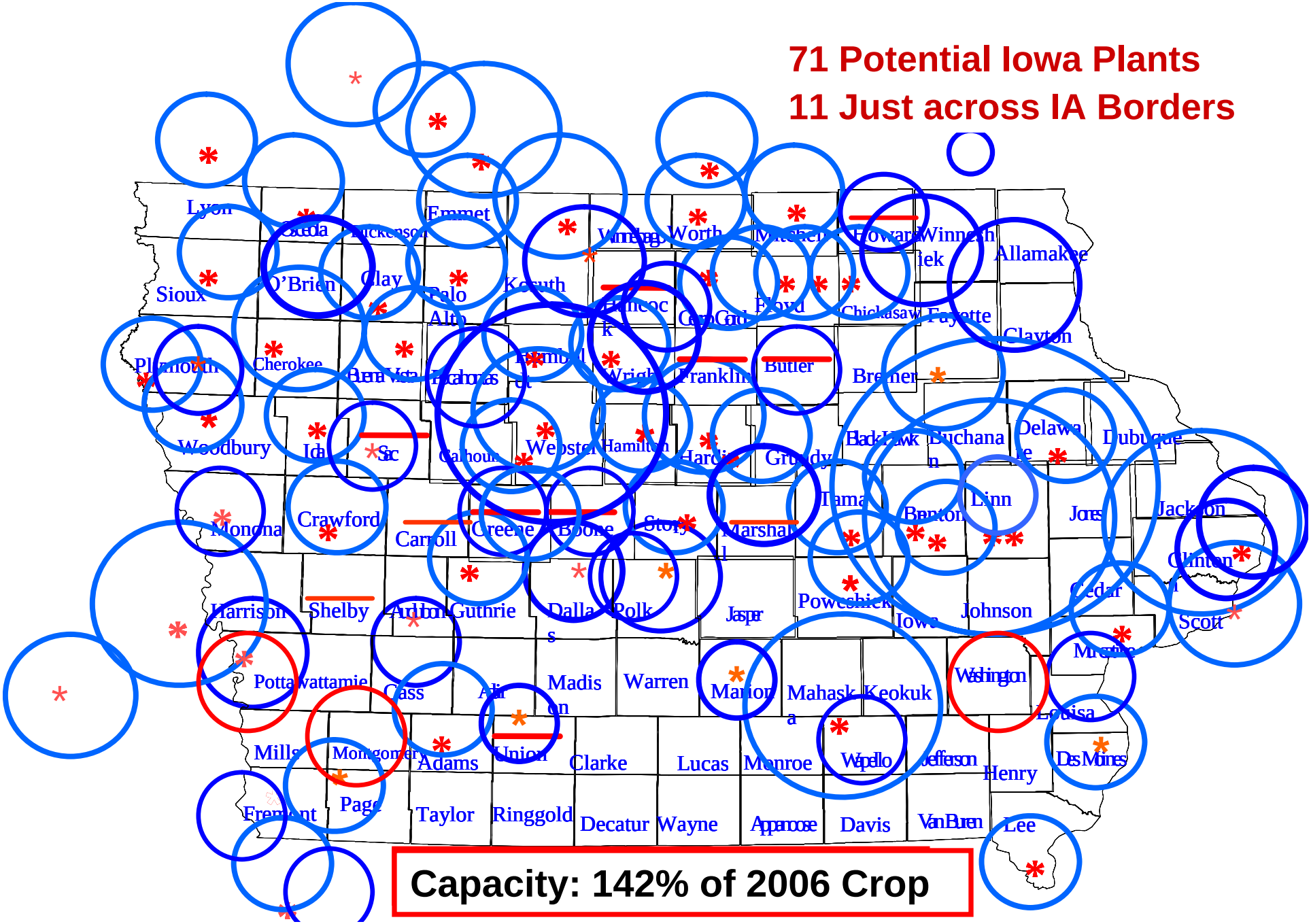

06/29/2007 C=70.68 +6.67 O=64.15 H=71.01 L=64.12 Mov Avg 3 lines
New York Crude Oil
Futures Prices
70.00
60.00
50.00
40.00
30.00
20.00
Volume 10085180.00 Open Interest 1431675.00
9000000
5000000
1999
2000
2001
2002
2003
2004
2005
2006
Created with SuperCharts by Omega Research © 1997

Corn Processing Plants in and Near Iowa, 5/31/07, Est. Mil. Bu.

Processing Capacity, Ethanol & Other Processing Excl. Feed

Operating Plants		Planned or under construction, II	
Albert Lea, MN*	15	Ashton - E	20
Albert City	36	Atlantic - P	19
Ashton	36	Belmond - P	38
Blair, NE*	32	Blair, NE* - E	38
Blairstown	3	Blenco - P	38
Cedar Rapids	203	Buffalo - P	38
Charles City	40	Butler County - P	36
Clinton	180	Burlington expansion E	36
Coon Rapids	18	Cedar Rapids -Penford - C	15
Corning (may go to 38 mil. Bu.)	23	Columbus Junction- P	27
Denison	20	Coon Rapids - E- P	20
Eddyville	76	Council Bluffs - C	42
Emmetsburg	19	Creston - P	18
Faribank	38	Des Moines P	38
Ft. Dodge	40	Dexter - C	38
Galva	10	Dyersville- P	37
Goldfield	19	Emmetsburg- E	18
Gowrie	22	Fairmont, MN (1/2 of 76 mil. Bu.)* C	38
Hanlontown	20	Ft. Dodge new plant - P	73
		Ft. Dodge Expansion - C	38
Hopkinton (Uses sugar & strach)	0	Garner-P	38
Iowa Falls	40	Green County - P	70
Jewell	24	Grinnell - C	38
Keokuck	47	Hancock co.-P	38
Lakota	36	Hartly - C	40
Luvurne, MN*	8	Hinton - P	38
Marcus	18	Manchester- P	38
Mason City	18	Marcus expansion - E	18
Muscatine	49	Marion co. - P	20
Nevada	19	Marshaltown - P	38
Sioux Center	8	Merrill - C	18
Steamboat Rock	7	New Hampton - P	18
W. Burlington	19	Odebolt - P	45
Sub-total, operating	1,088	Ogden - P	36
*Total excludes out-of-state Proccessing		Ottumwa - P	18
		Pleasantville- P	38
P = Proposed, C = Under Construction,		Pocohontos Co. - P	38
E= Expansion of existing plant		Postville - P	42
Planned, Part I		Quad Cities - Galva, IL 38- P	38
ADM Expansion (cedar rapids & clinton)	190	Red Oak - p	18
Akron - P	38	Salix - P	19
Arthur - P	36	Shenandoah - C	18
Wesley - P	37	Spencer - P	38
W. Des Moines - P	36	Staceyville - P	38
Blairstown-- P-E	13	St. Ansgar - C	38
Partial Sub-total, planned	350	Superior - C	18
		Tama - C	38
		Winnesheik county - P	38
		Total, planned	1,831
Grand total processing, all, rated capacity		2,919	Mil. Bu.

Iowa Corn Processing, 5/31/07	No. plants	Mil. Bu.	of '06 Crop
Total operating	30	1,088	53.1%
Total Under Construction or expansion	10	447	21.8%
Total Planned, not yet under construction	34	1,384	67.5%
Grand Total (adjusting for plant expansions)	71	2,919	142.4%

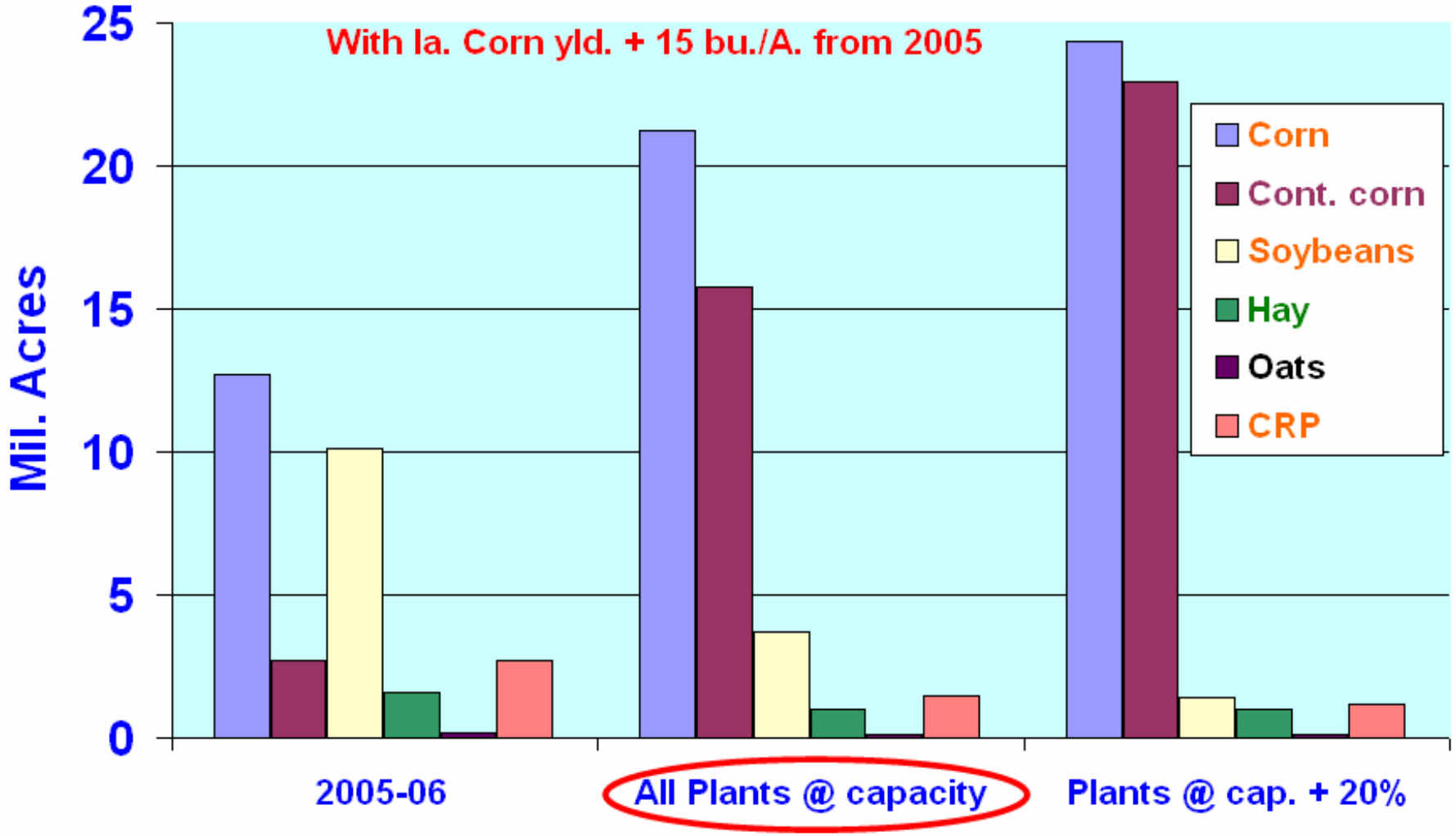


Iowa Corn Processing Plants, Current & Planned, 5/30/07

Iowa Corn Production, Use & Excess for Export out of State, Mil. Bu.			
	2005-06	Current &	Current &
6/11/07	06/06 processing	Planned plants	Planned plants
	Capacity	@ rated capacity	@ 120% capacity
2005 corn crop	2,163	2,163	2,163
Less feed use	700	700	700
Less processing	1,088	2,919	3,503
Plus corn replaced by DGS	45	45	45
Avail. For Export	420	-1,411	-1,995
Est.2007 Mil. Harv. Acres	13.5		
Yield, 2005, Bu./A.	173		
2005 Trend Yield, Bu/A.	159		
2009 Trend Yld., Bu./A.	167		
Yield needed to maintain exports (@ '05 A.)		295.9	339.1
Acreage needed @ 2005 yield		23.1	26.5
Acreage needed @ 2009 trend yield		23.9	27.4
Acreage needed @ 2005 yield+15 bu./A.		21.2	24.4

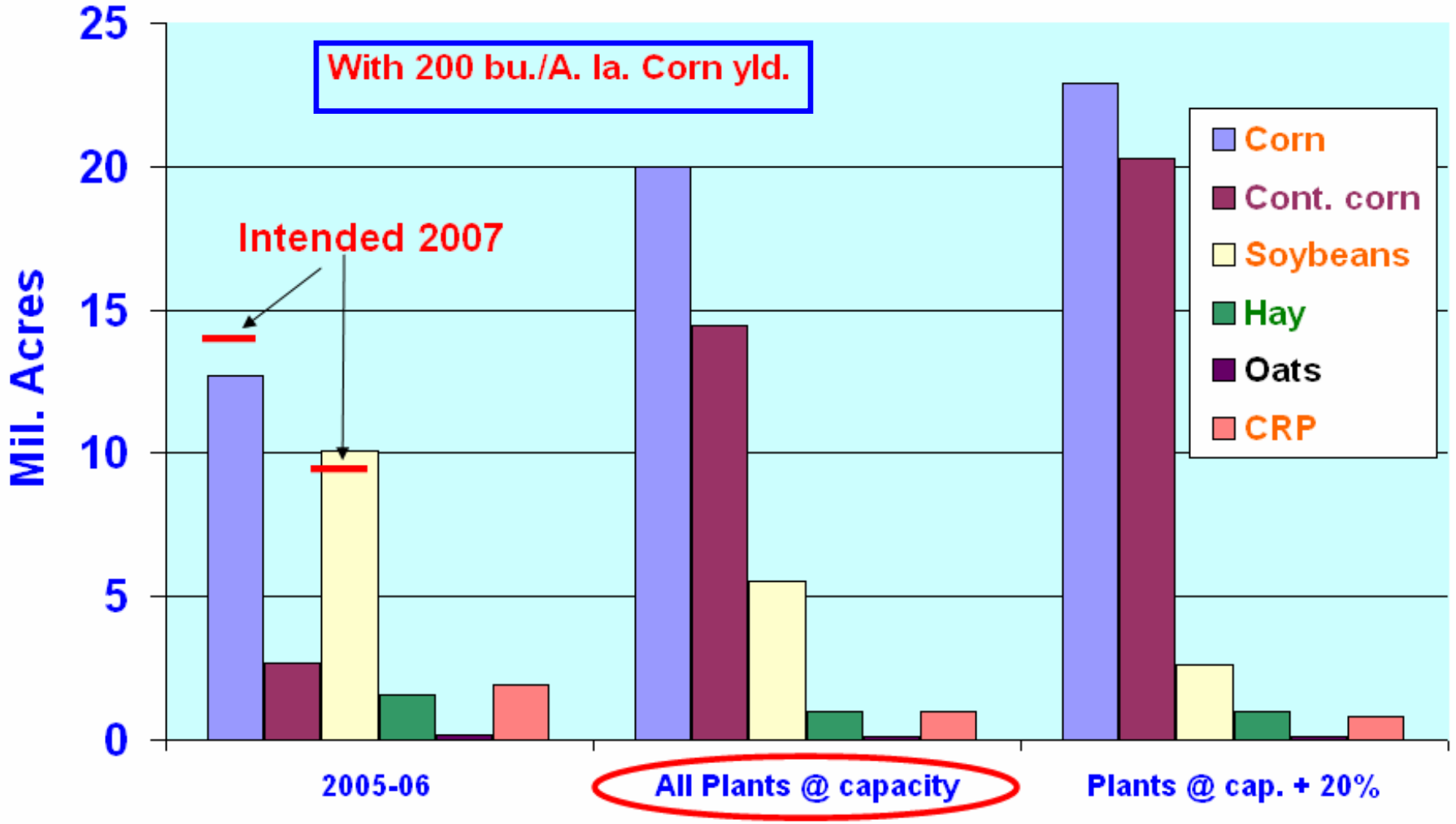
6/12/07

Iowa Current & Potential 2010 Crop Acreages



6/12/07

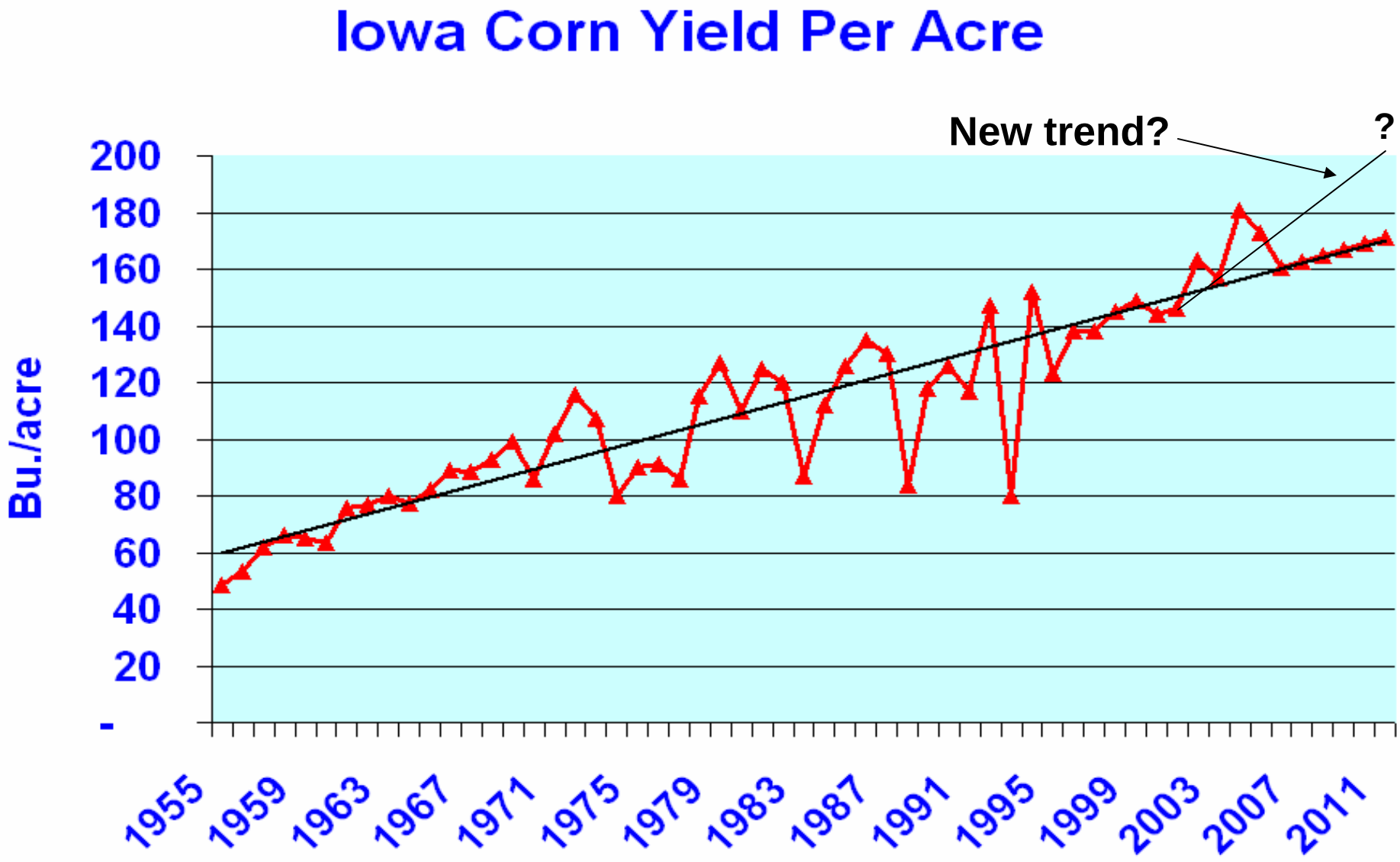
Iowa Current & Potential 2010 Crop Acreages



June 2007

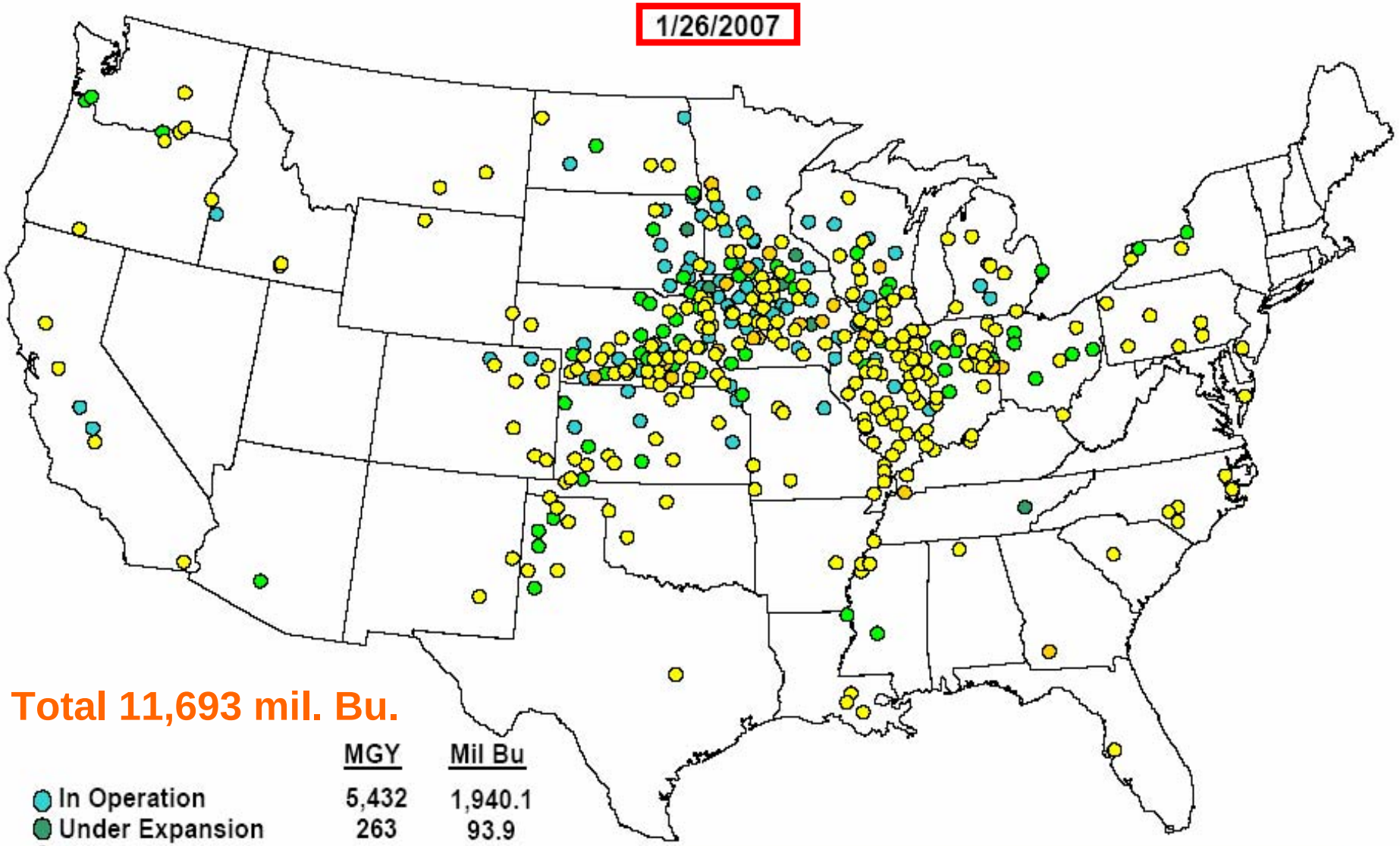
Needed Yld. @ current Acres

296 bu./A.



US Ethanol Plants

1/26/2007



Total 11,693 mil. Bu.

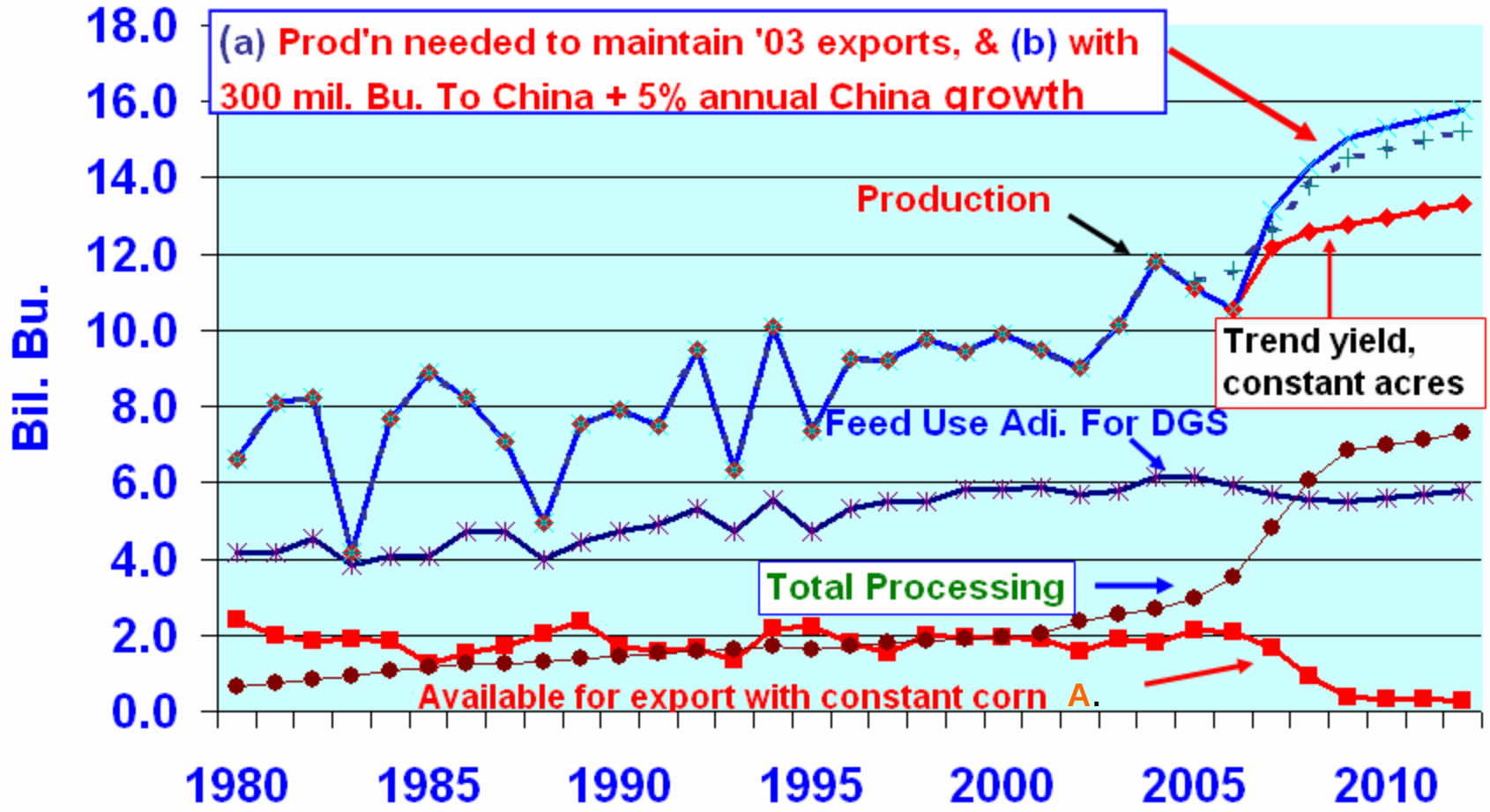
	MGY	Mil Bu
In Operation	5,432	1,940.1
Under Expansion	263	93.9
Under Construction	4,872	1,740.0
Ground Broken	2,463	879.6
Planned	19,710	7,039.3

Plants "Under Construction" have broken ground and have poured concrete. Plants that have "broken ground" have begun site work but no actual construction. Plants that are "planned" have been talked about or announced in the news.

5.9 Bil. Bu. Corn for Ethanol

Figure 1. U.S. Corn Production, Domestic Use, & Availability for Exports--Proj. to 2012

5-29-07



How Much More U.S. Construction to Reach 5.5 Bil. Bu. Corn for Ethanol?

- **Operating plants:**
  -- 2.15 Bil. Bu.
- **Plants under construction:**
  -- 2.0 Bil. Bu.
- **Plants soon to build:**

-- 0.2 Bil. Bu.

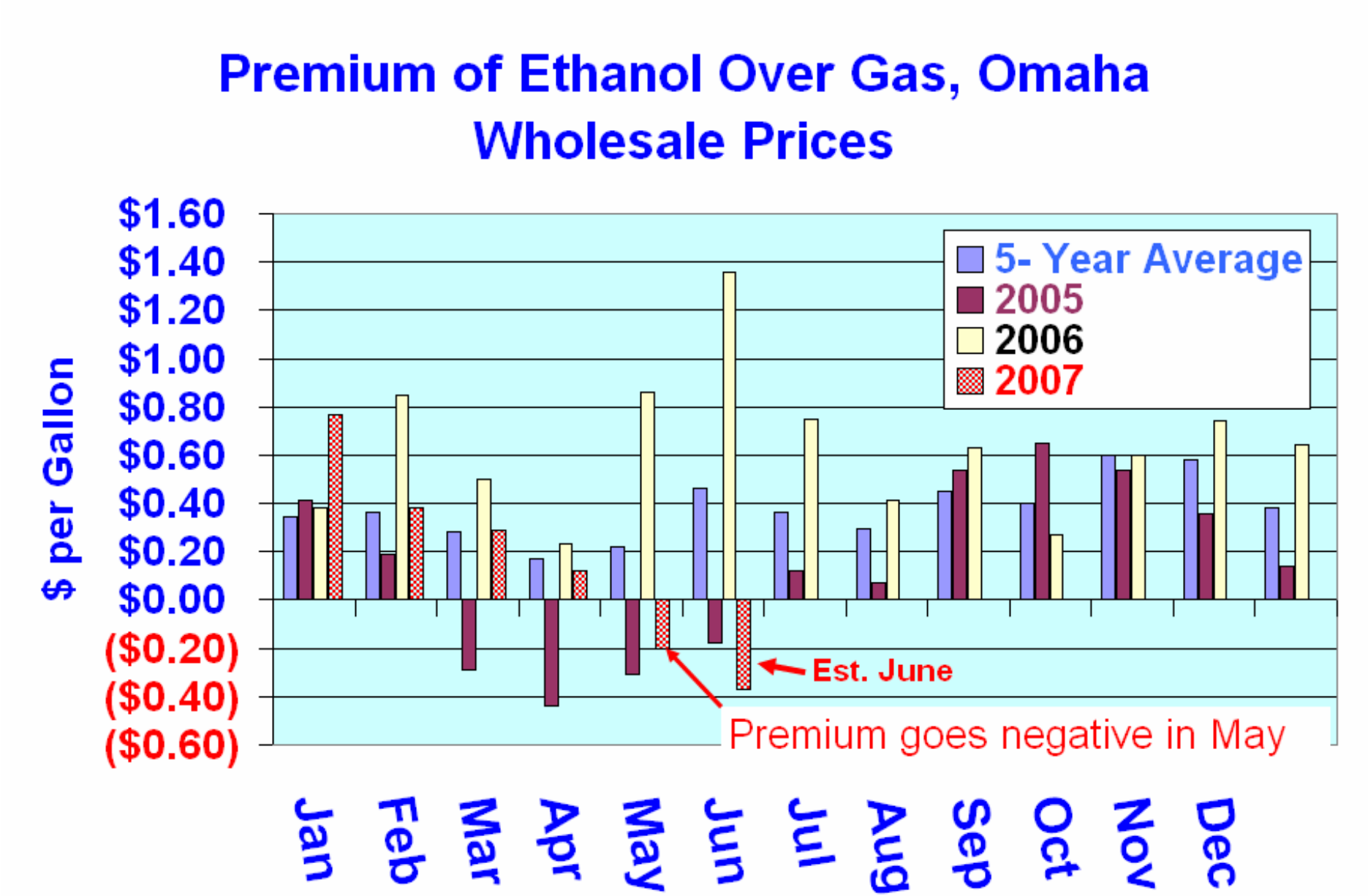
Total: 4.35 Bil. Bu.

Capacity needed:

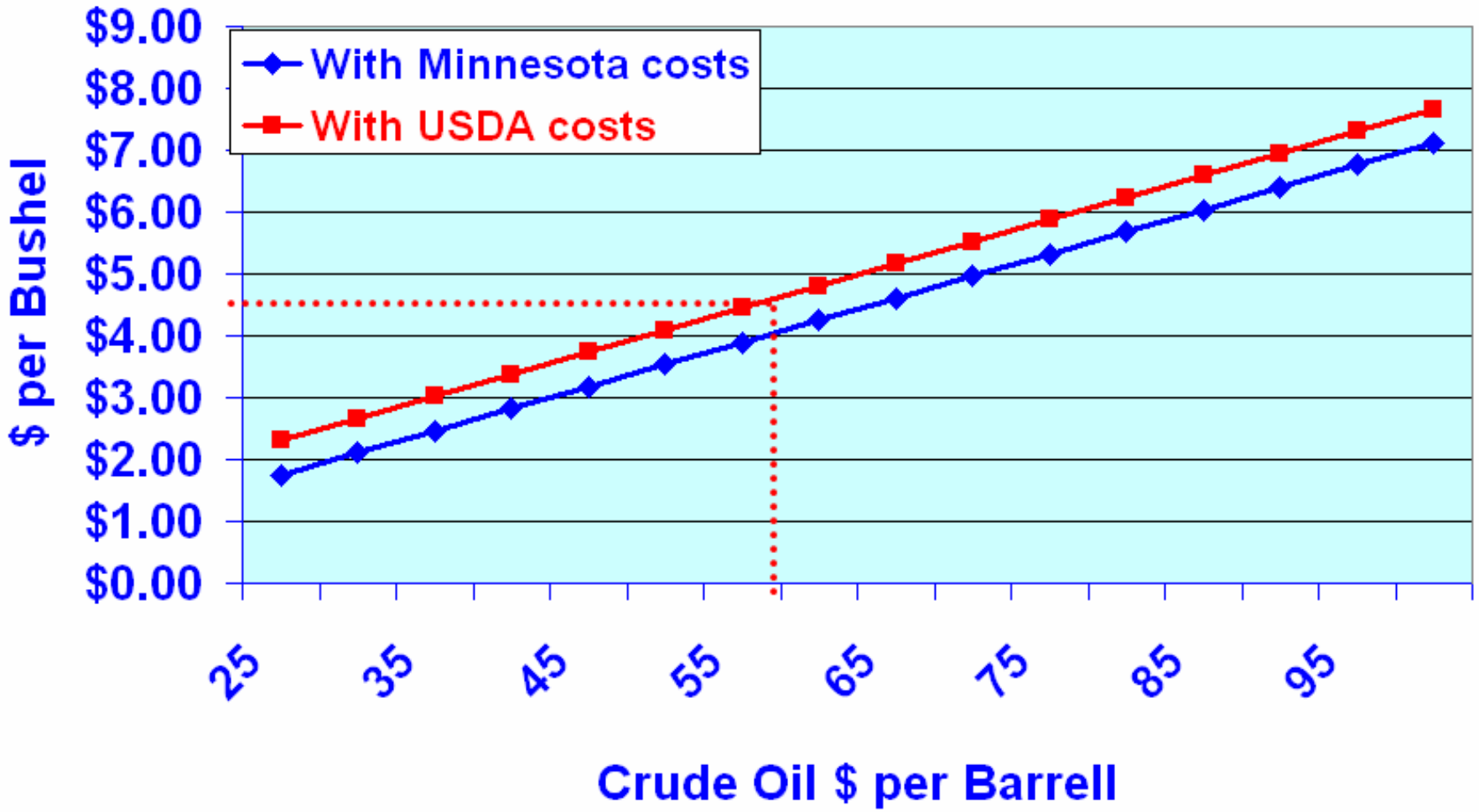
1.15 Bil. Bu.

(About 32 plants @ 100 mil. gal./yr.)

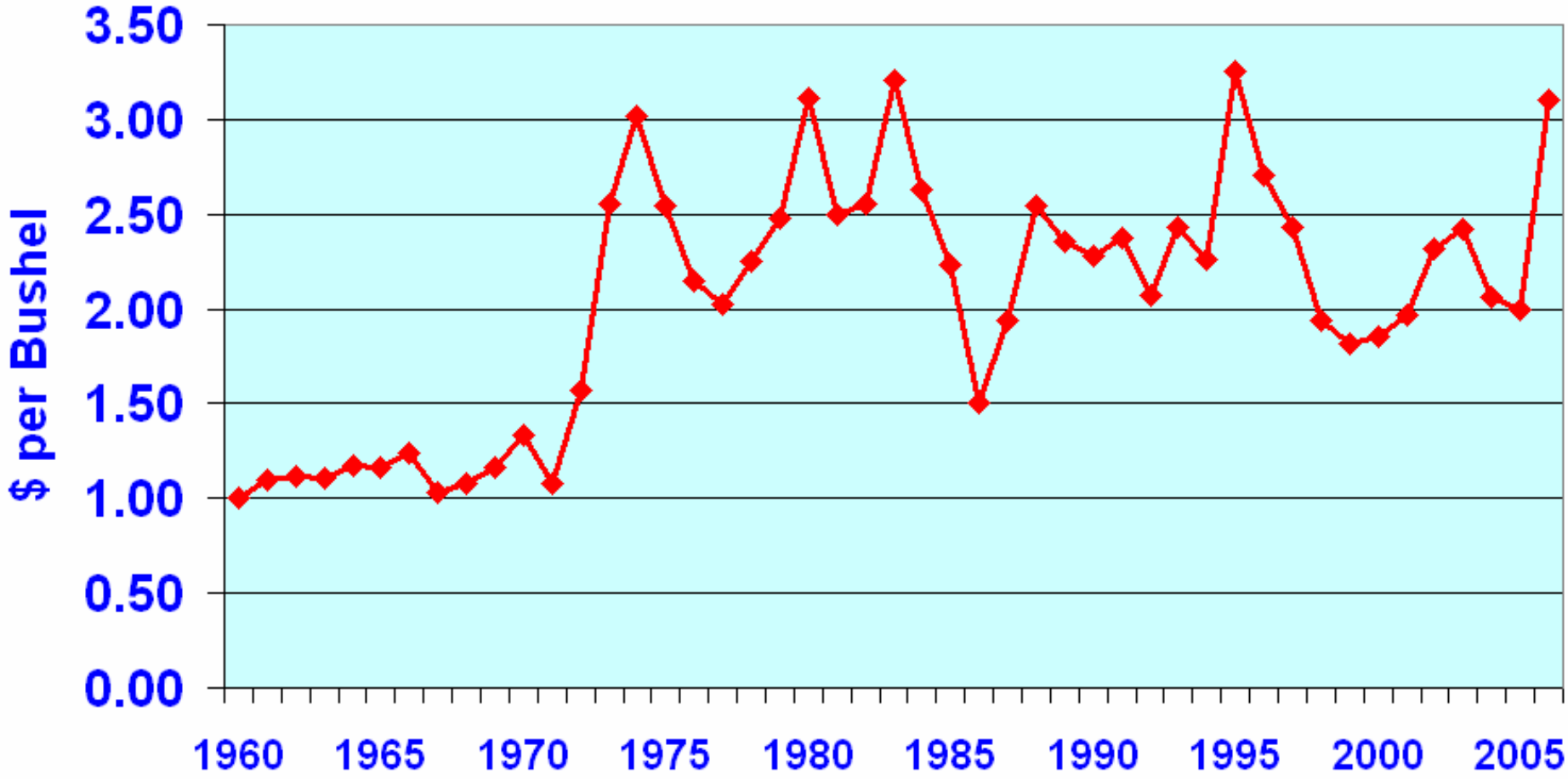
Blending Wall?



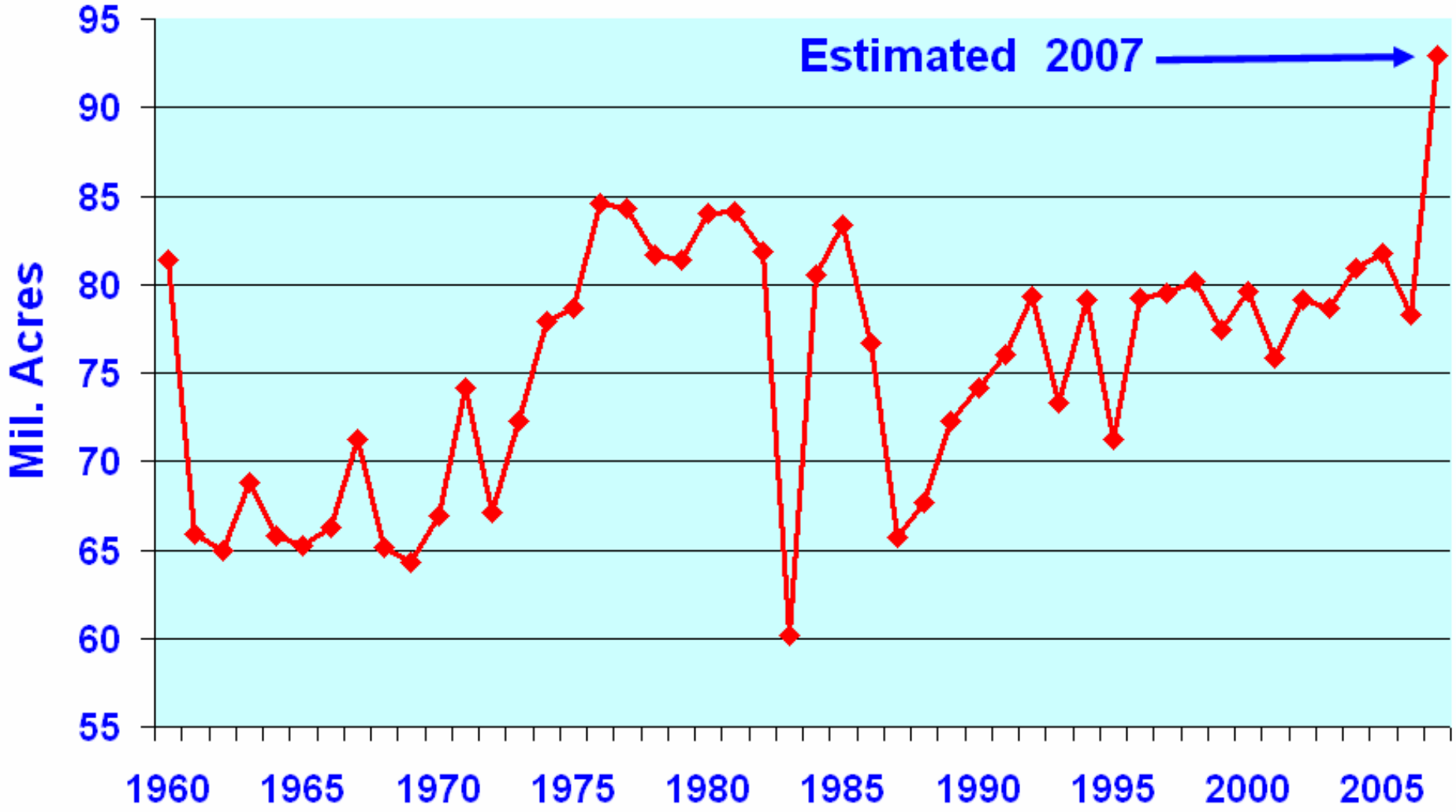
Approximate Maximum Price Ethanol Plants to Pay for Corn with Varying Crude Oil Prices



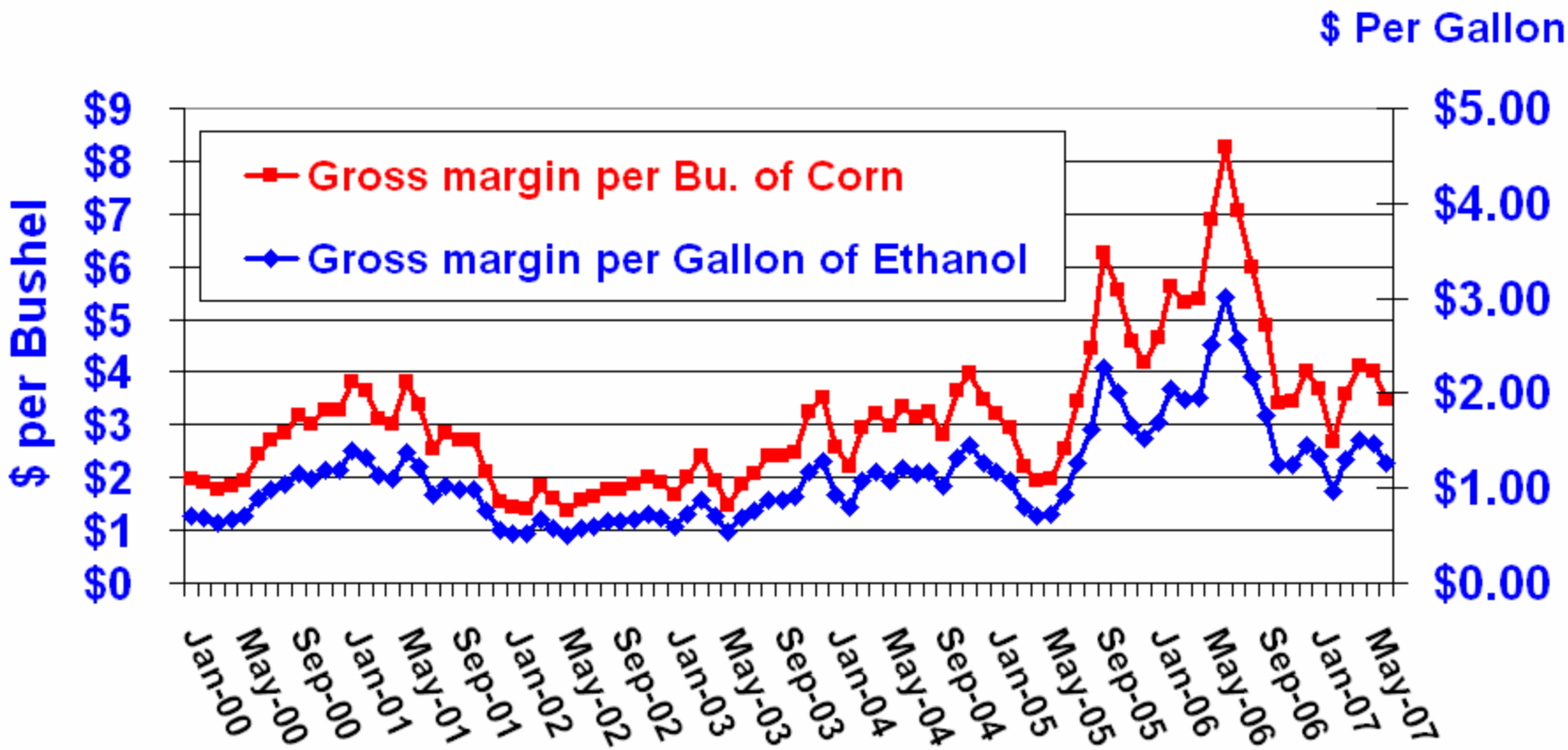
U.S. Average Farm Price for Corm, 5th Time above $3 in 46 years



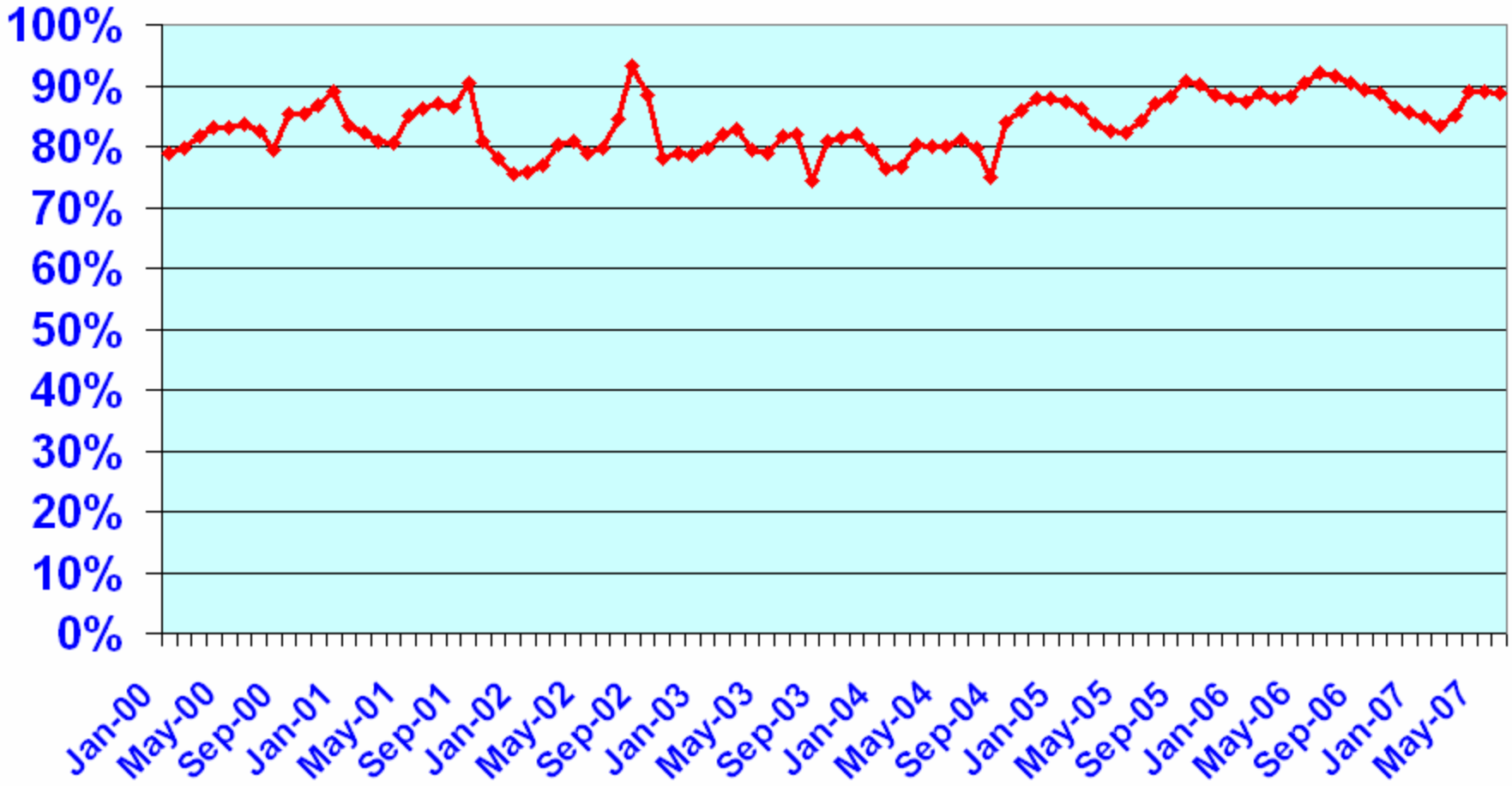
U.S. Corn Planted Acreage



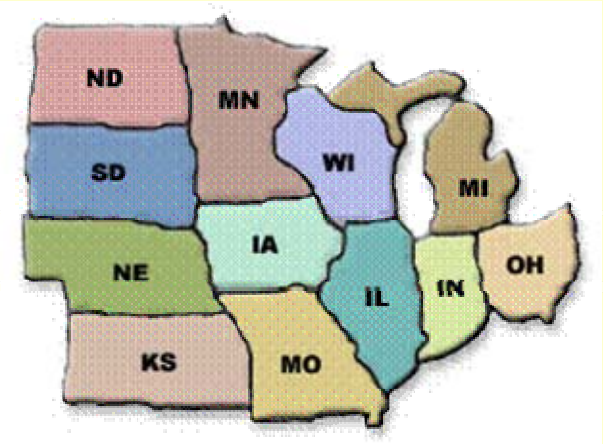
Iowa Gross Processing Margins for Ethanol, January 2000 - Prelim. June 2007



Iowa Ethanol Plants: Percent of Total Revenue Originating From Ethanol Sales



State Avg. Ethanol Rack Prices



Date: Wed., May 30, 2007

Iowa: 2.393

Illinois: 2.398

Kansas: 2.602

Michigan: 2.610

Minnesota: 2.387

Missouri: 2.412

North Dakota: 2.454

Nebraska: 2.479

South Dakota: 2.463

Wisconsin: 2.564

Averages provided by:

AXXIS SOFTWARE AN OPIS COMPANY

ispetro.com

american coalition for ethanol

www.ethanol.org

Date: Tuesday, July 10, 2007

Iowa: 2.21

Illinois: 2.33

Kansas: 2.42

Minnesota: 2.22

Missouri: 2.43

North Dakota: 2.29

Nebraska: 2.36

South Dakota: 2.31

Wisconsin: 2.32

Averages provided by:

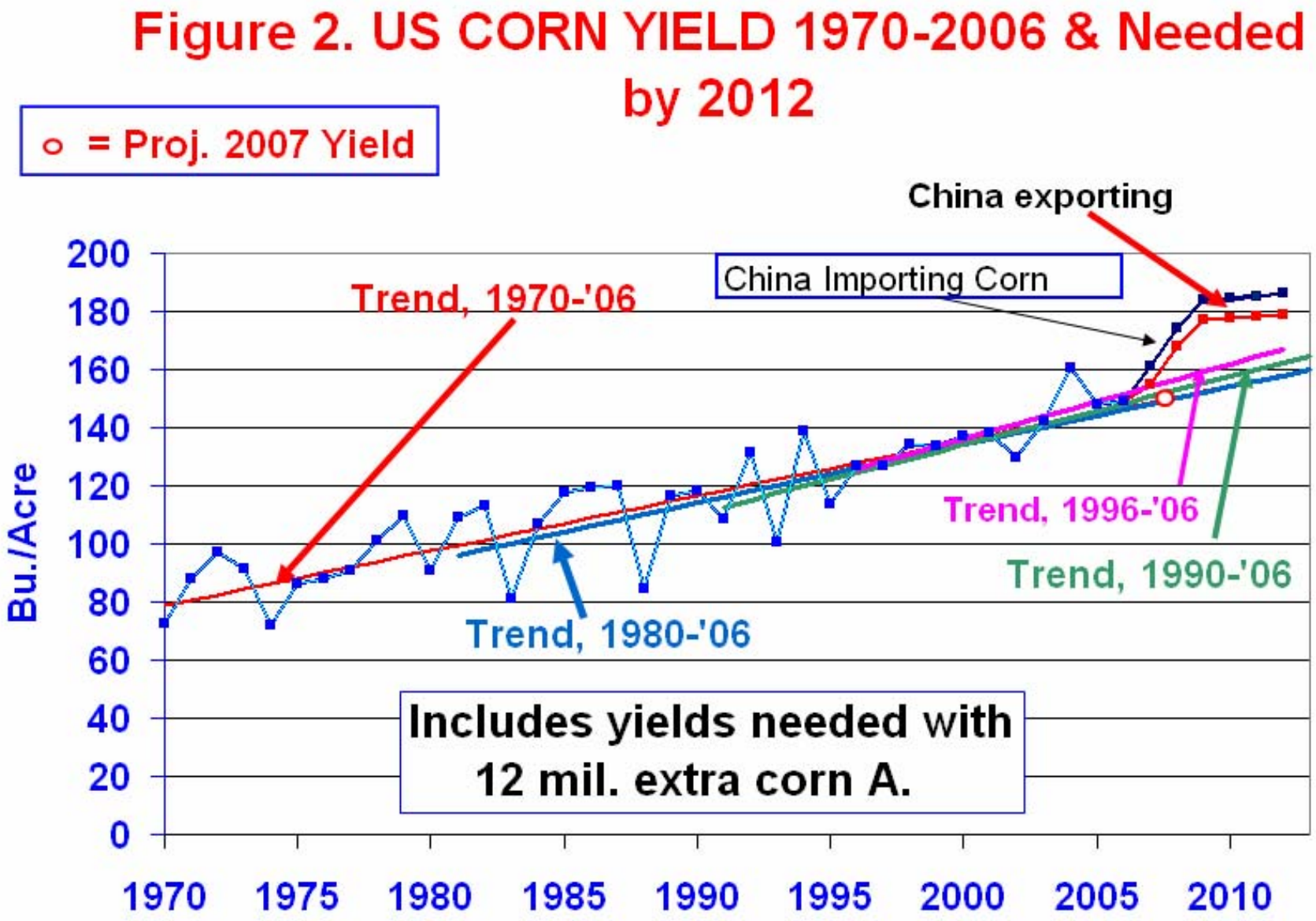
AXXIS SOFTWARE AN OPIS COMPANY

www.axxispetro.com

american coalition for ethanol

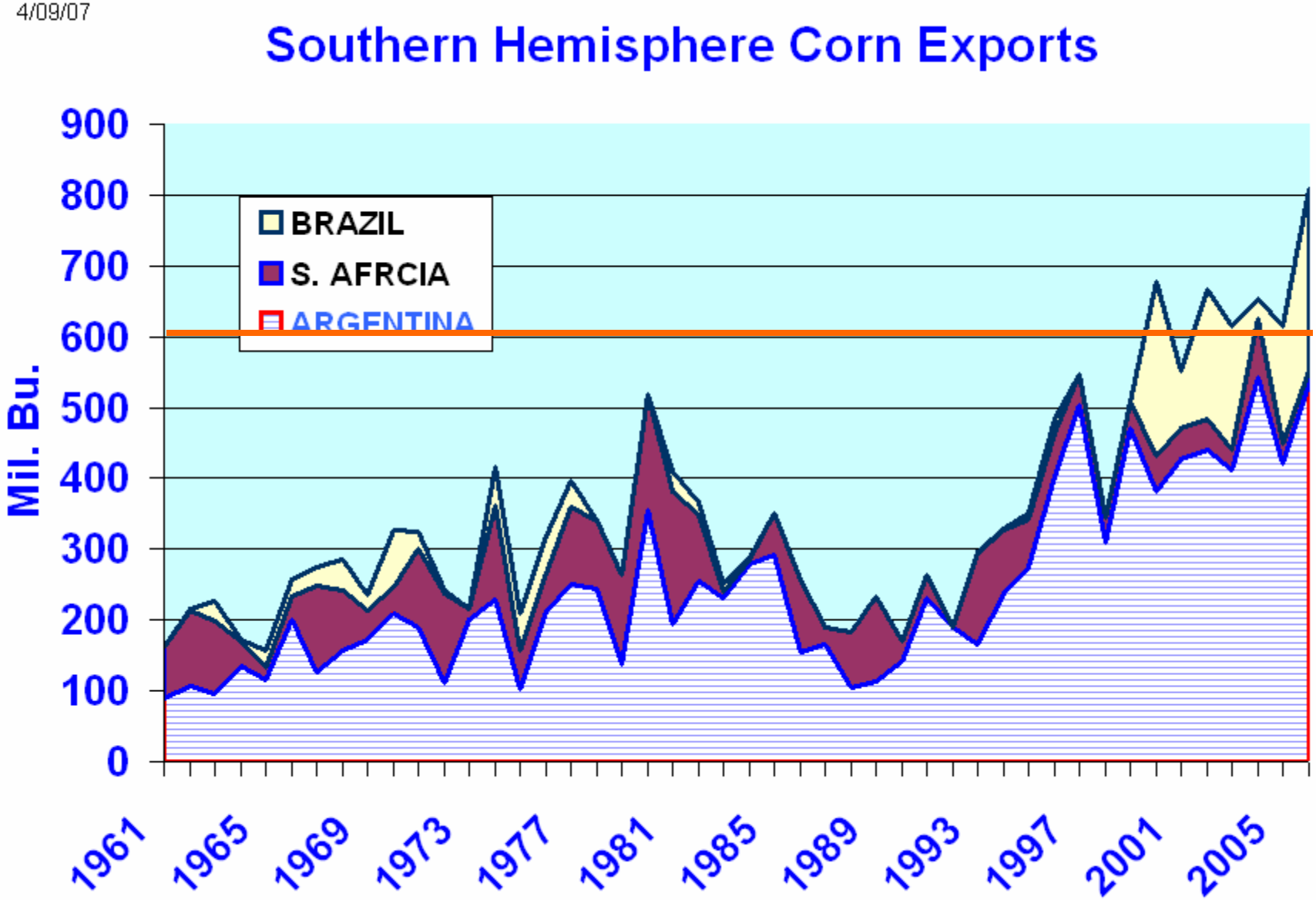
www.ethanol.org

5.9 Bil. Bu. Corn for ethanol by 2012

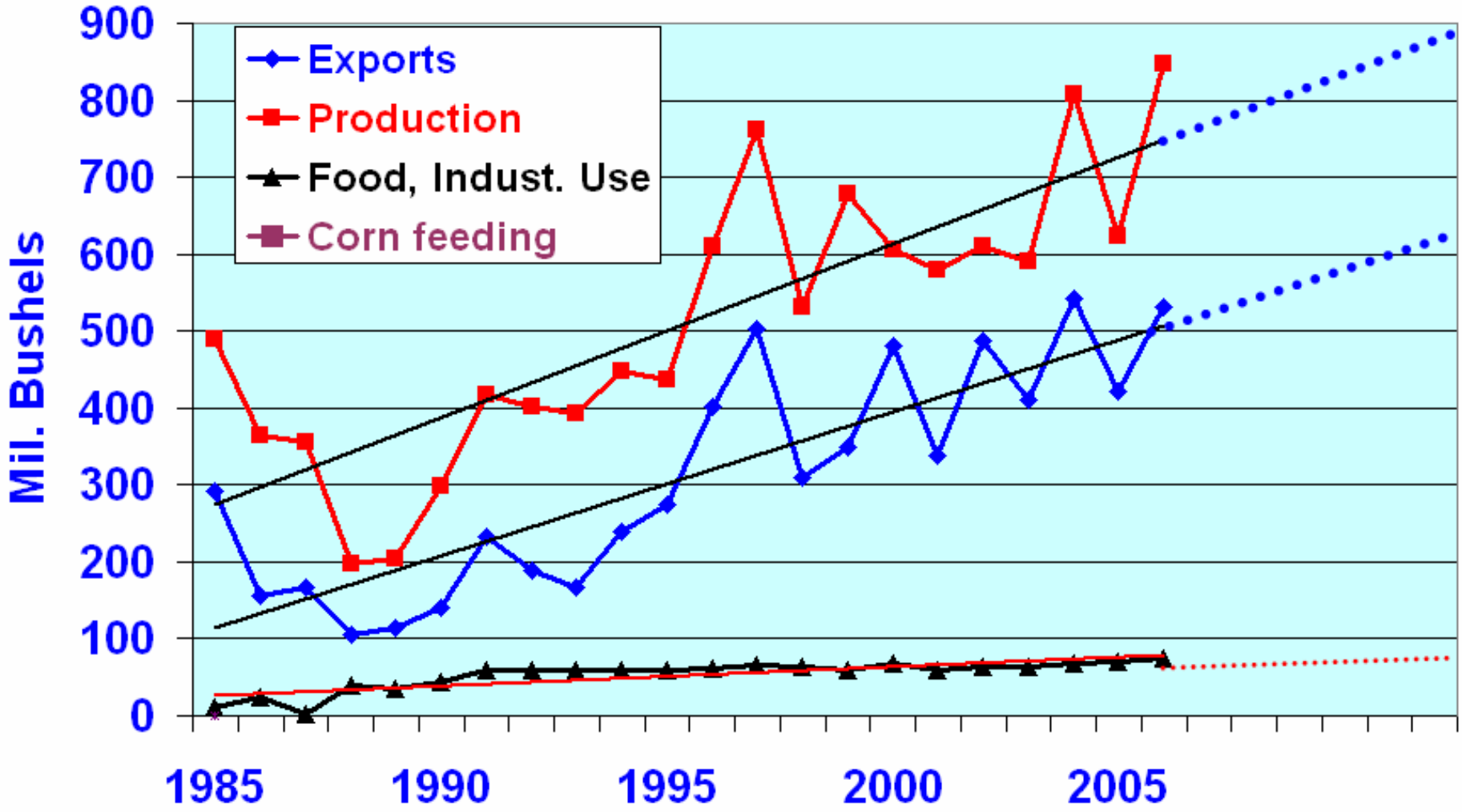


Will increased South American exports more than offset U.S. decline?

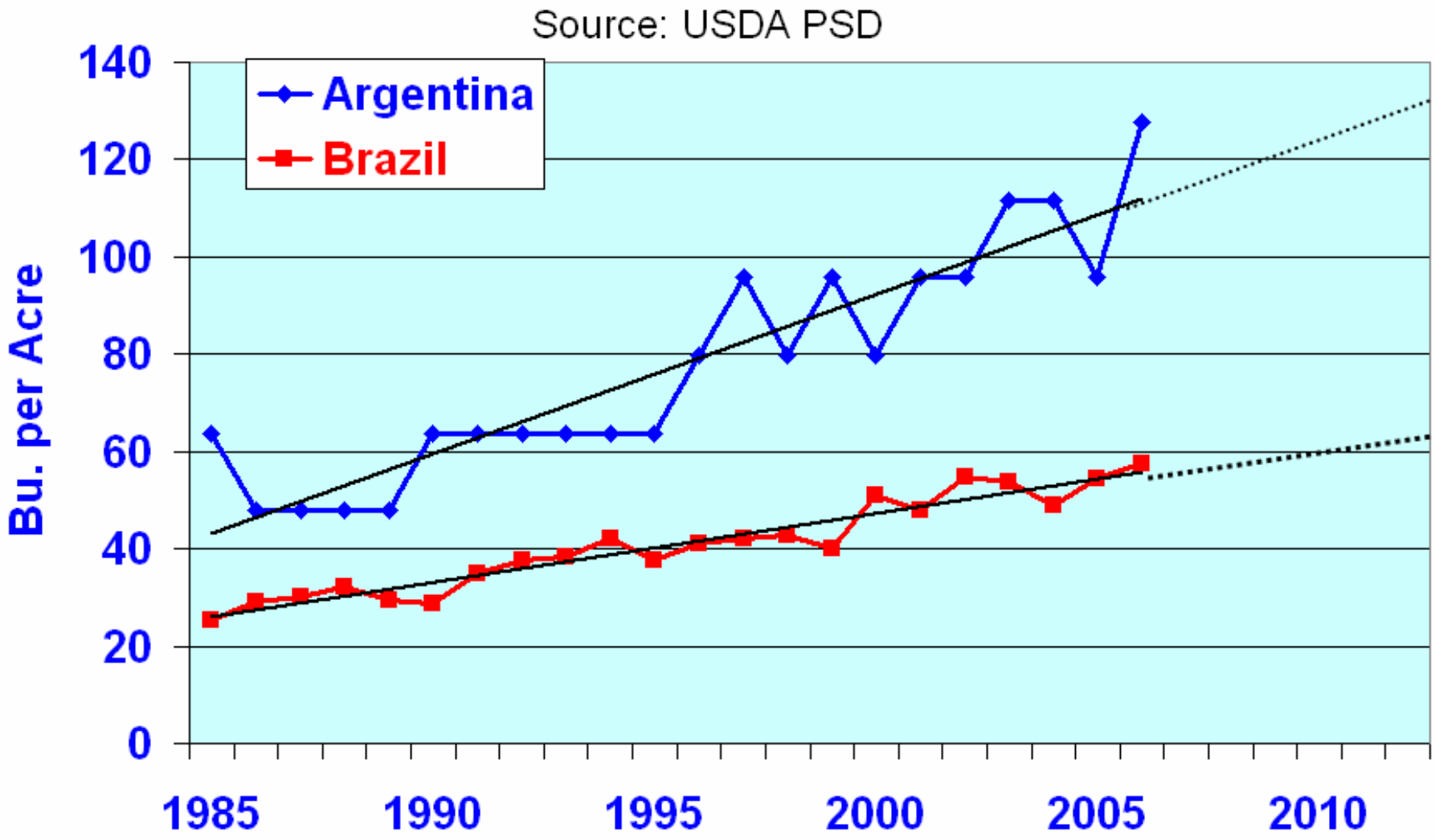
4/09/07



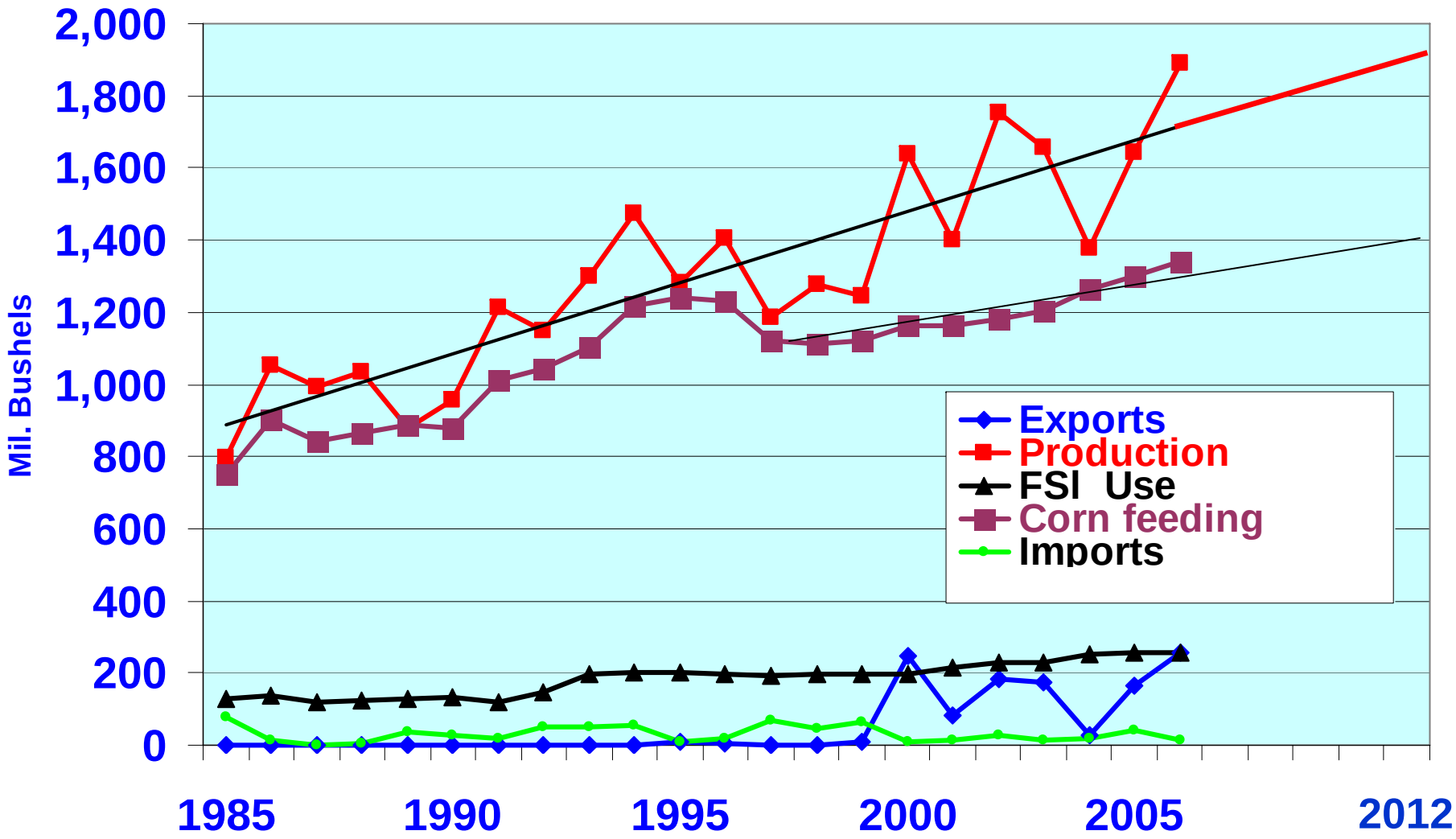
Argentine Corn Production & Use



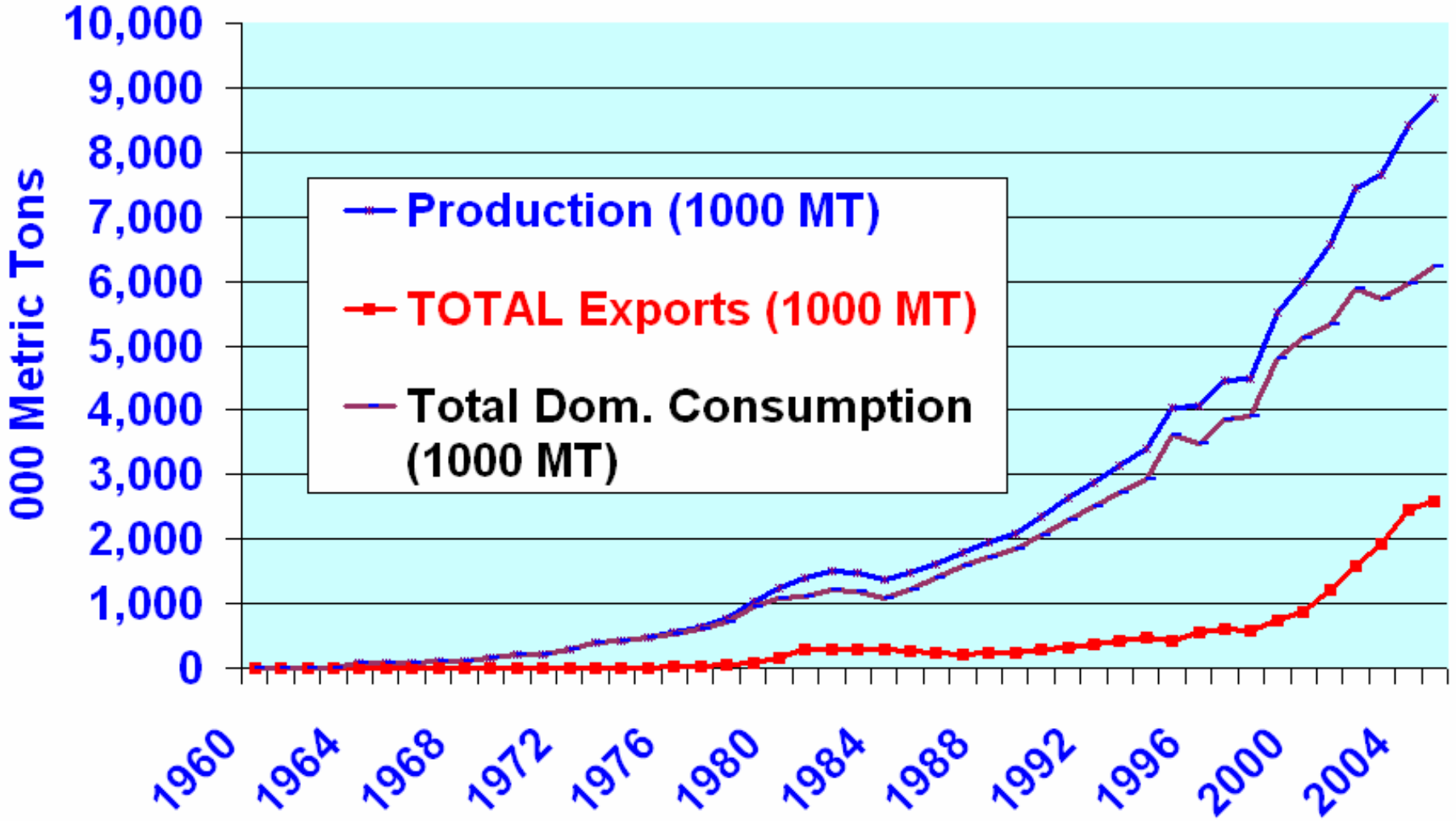
Brazil & Argentina Corn Yields



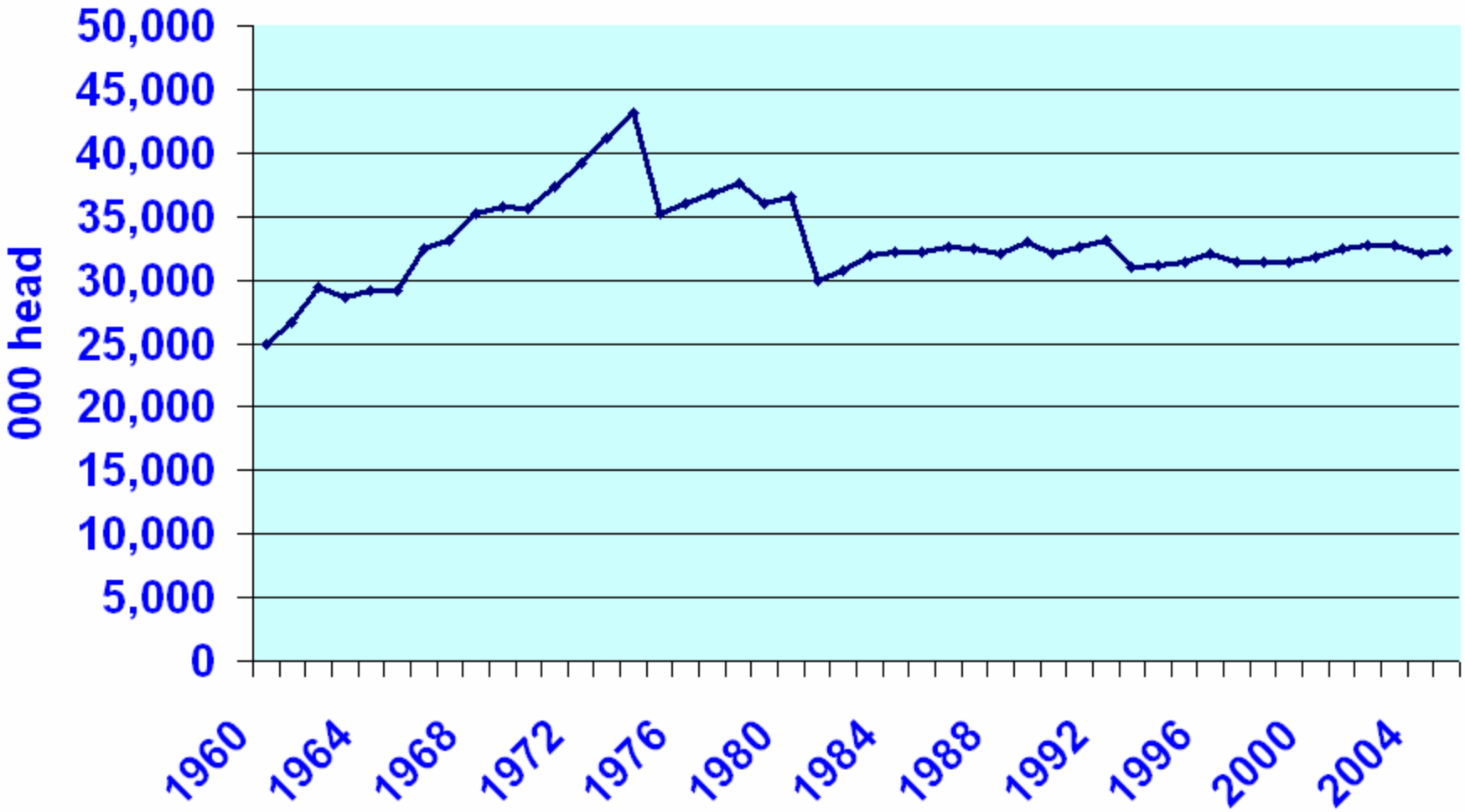
Brazil Corn Production & Use



Brazil Broiler Meat



Brazilian Hog Numbers



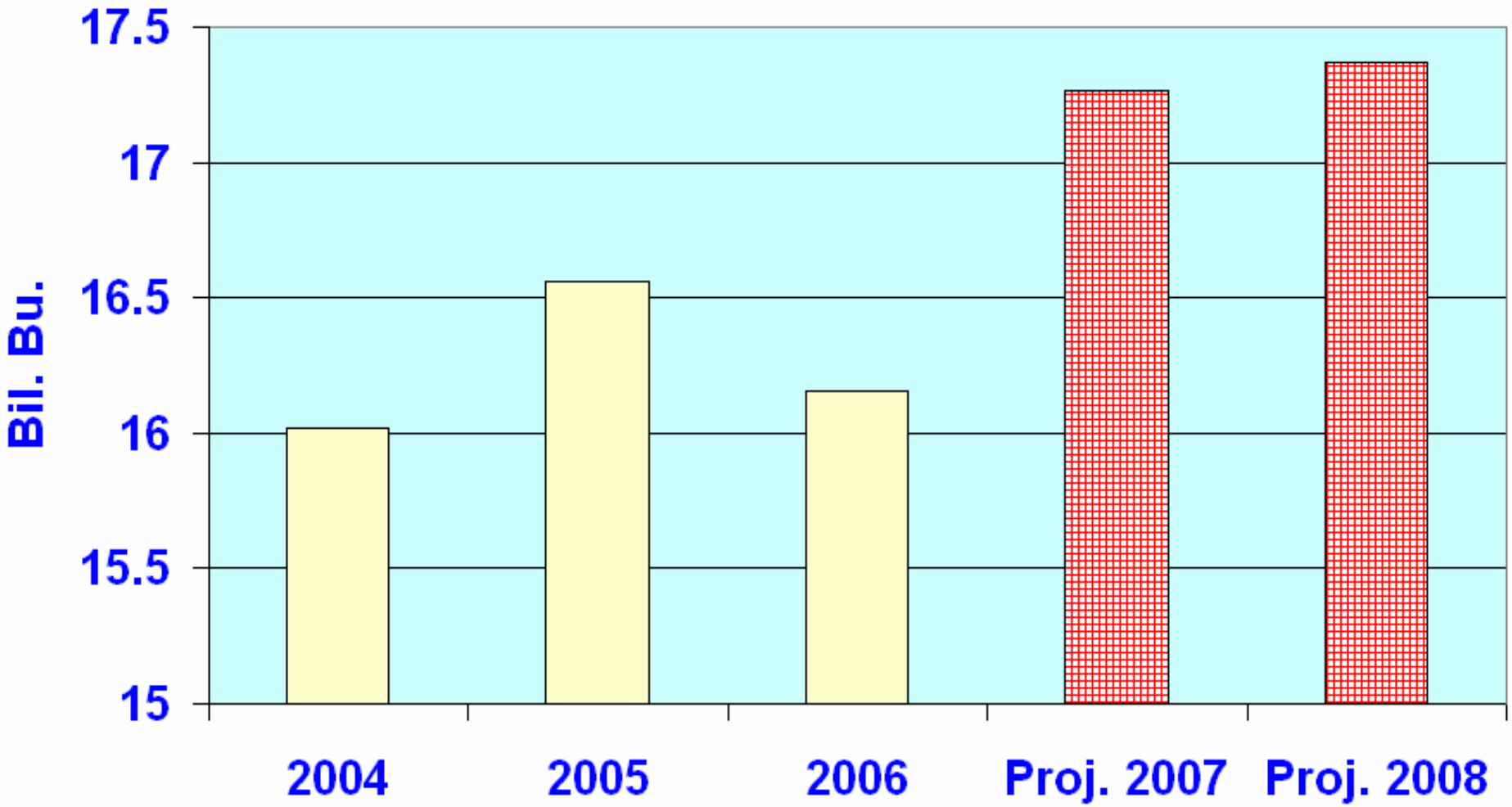
Potential area to be cleared for crops

Newly Cleared Land In Brazil

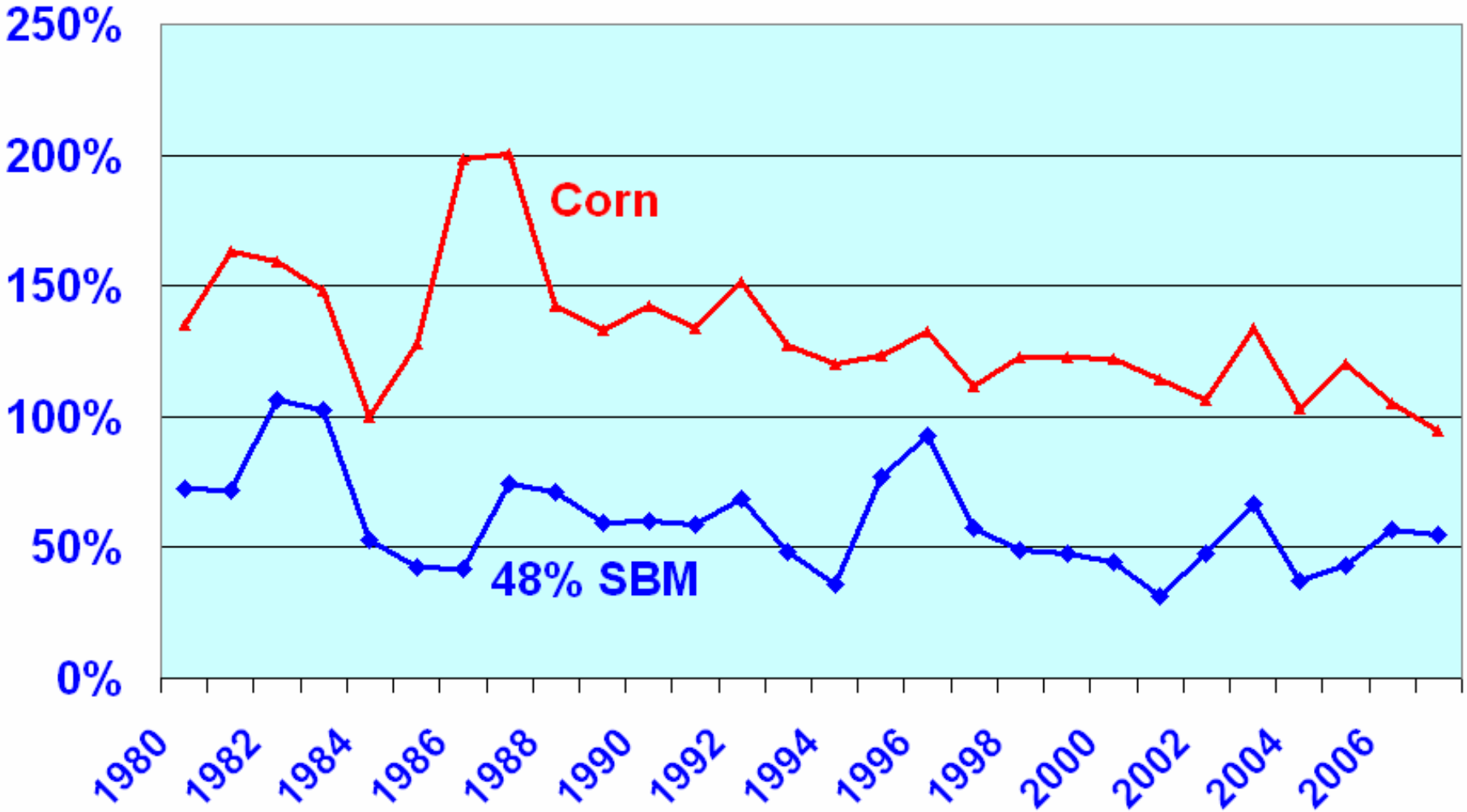
Planted to Upland Rice

					June 29 acreage	
USDA Corn Bal. Sheet, 6/11/2007					Alternative	Alternative
		2005-06	2006-07	2007-08	2007-08	2008-09
Planted Mil. Acres		81.8	78.3	90.5	92.9	91.9
Harvested Mil. Acres		75.1	70.6	82.9	85.4	84.4
Bu./A.		148	149.1	150.3	150.3	153
Mil. Bu.						
Beginning Stocks		2,114	1,967	987	1,087	1,473
Production		11,114	10,535	12,460	12,836	12,913
Imports		9	10	15	15	15
Total Supply		13,237	12,512	13,412	13,938	14,401
Feed & Residual		6,141	5,850	5,700	5,700	5,600
Exports		2,147	2,150	1,975	1,975	1,950
Ethanol		1,603	2,150	3,400	3,400	4,500
Other processing & seed		1,387	1,375	1,390	1,390	1,385
Total Use		11,278	11,525	12,465	12,465	13,435
Ending Stocks		1,967	987	997	1,473	966
Weeks supply		9.1	4.5	4.2	6.1	3.7
U.S. Avg. Farm Price		$2.00	$3.05	$3.40	?	?

Figure 1. Harvest Time Total Corn & Soybean Supplies



Distillers Grain Prices, Percent of Corn & SBM, Lawrenceburg, IN



5.5 Bil. Bu for ethanol

Example U.S. DGS demand by 2011-12

(other potential: sheep, cow-calf)

- **COF @ 30% of corn 13.2 mil. T.**
- **Dairy @ 25% of corn 8.3 mil. T.**
- **Hogs @ 10% of corn 3.0 mil. T.**
- **Poultry @ 7% of corn 1.4 mil. T.**

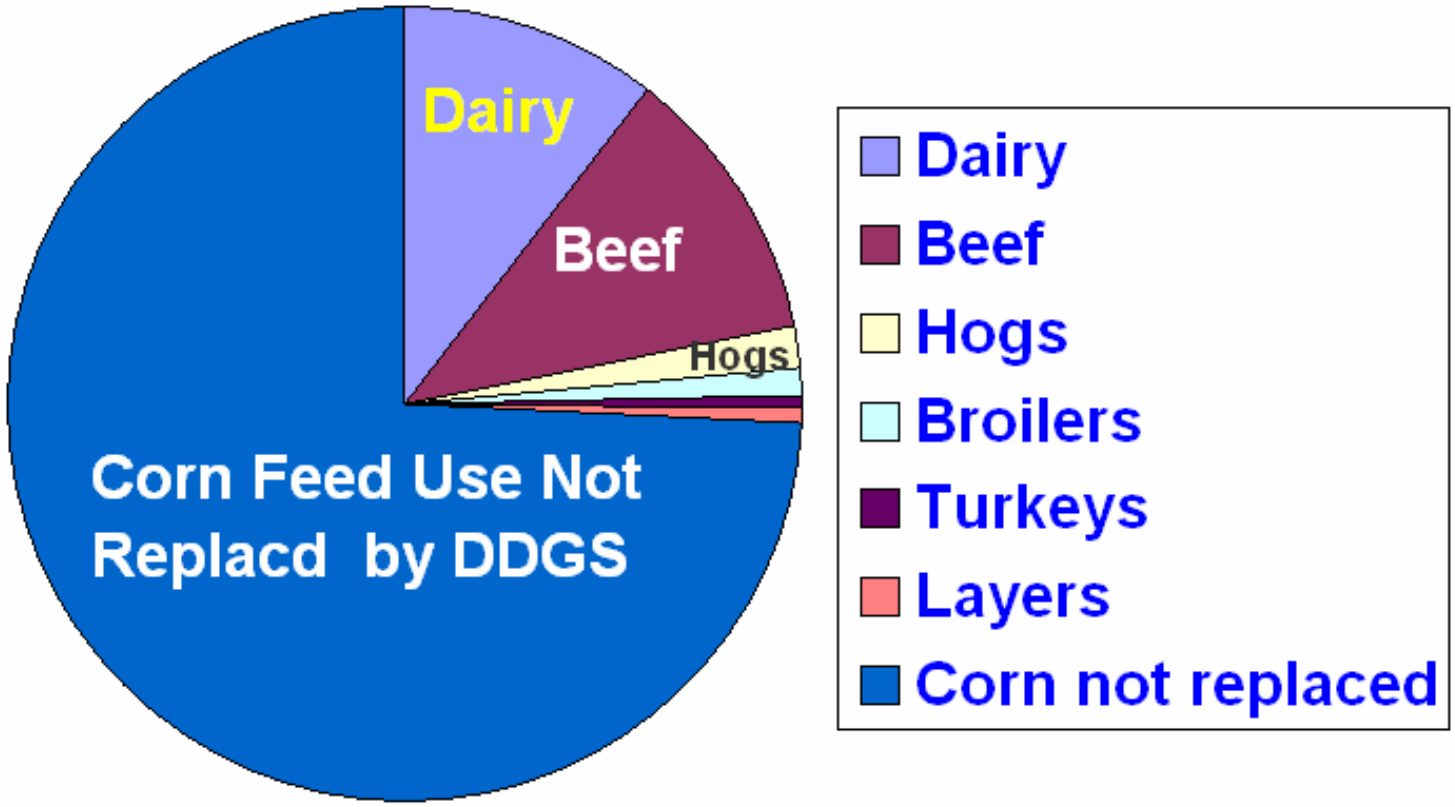
Total 25.9 mil. T.

Potential production 46.8 Mil. T.

With 6.5 bil. Bu.: 55.3 Mil. T

Approximate Future Potential DDGS Corn Replacement by Species

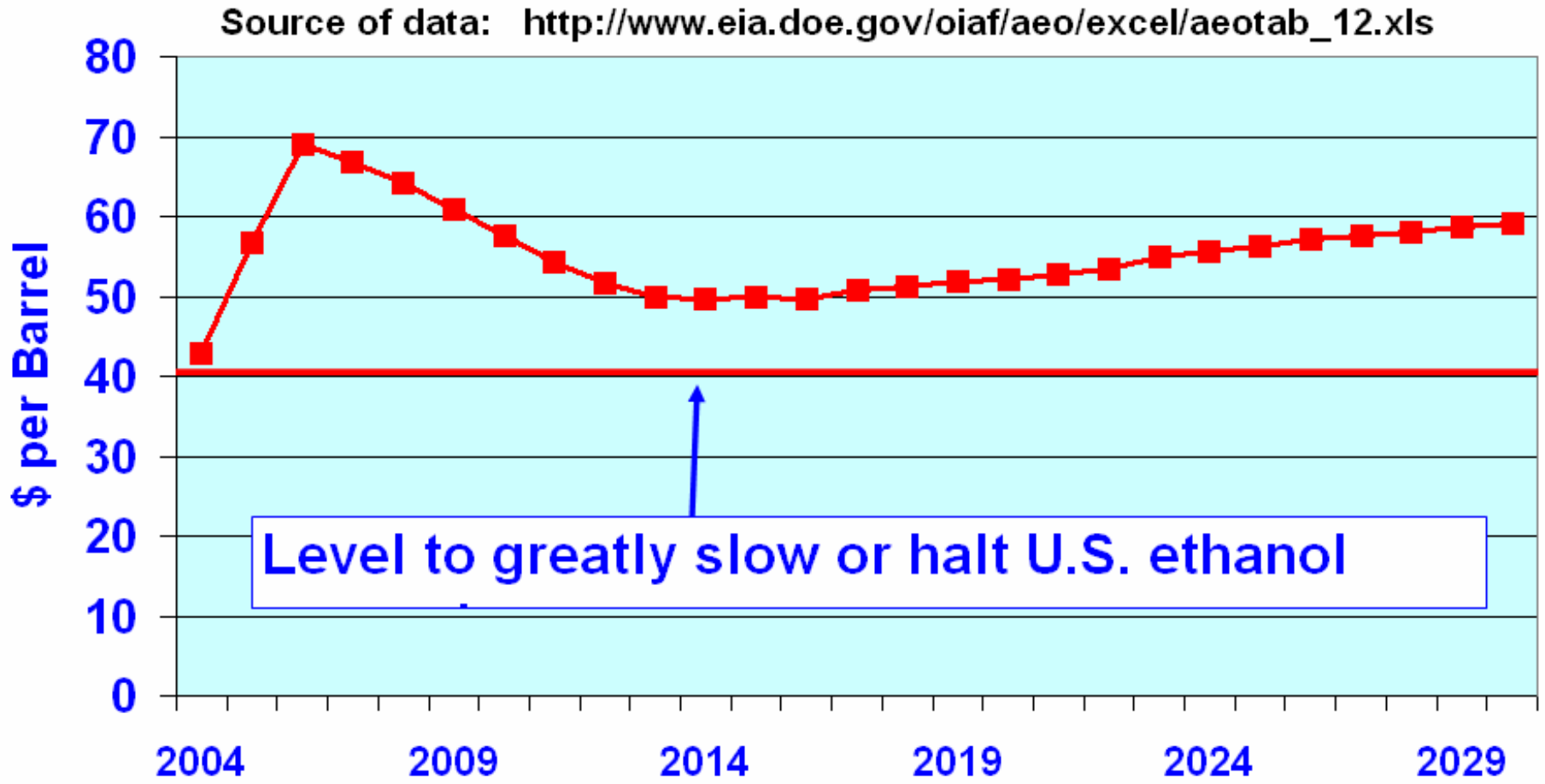
(Based on 2005-06 U.S. Corn Feeding, Current Animal Numbers, & 5.5 Bil. Bu. Corn for Ethanol)



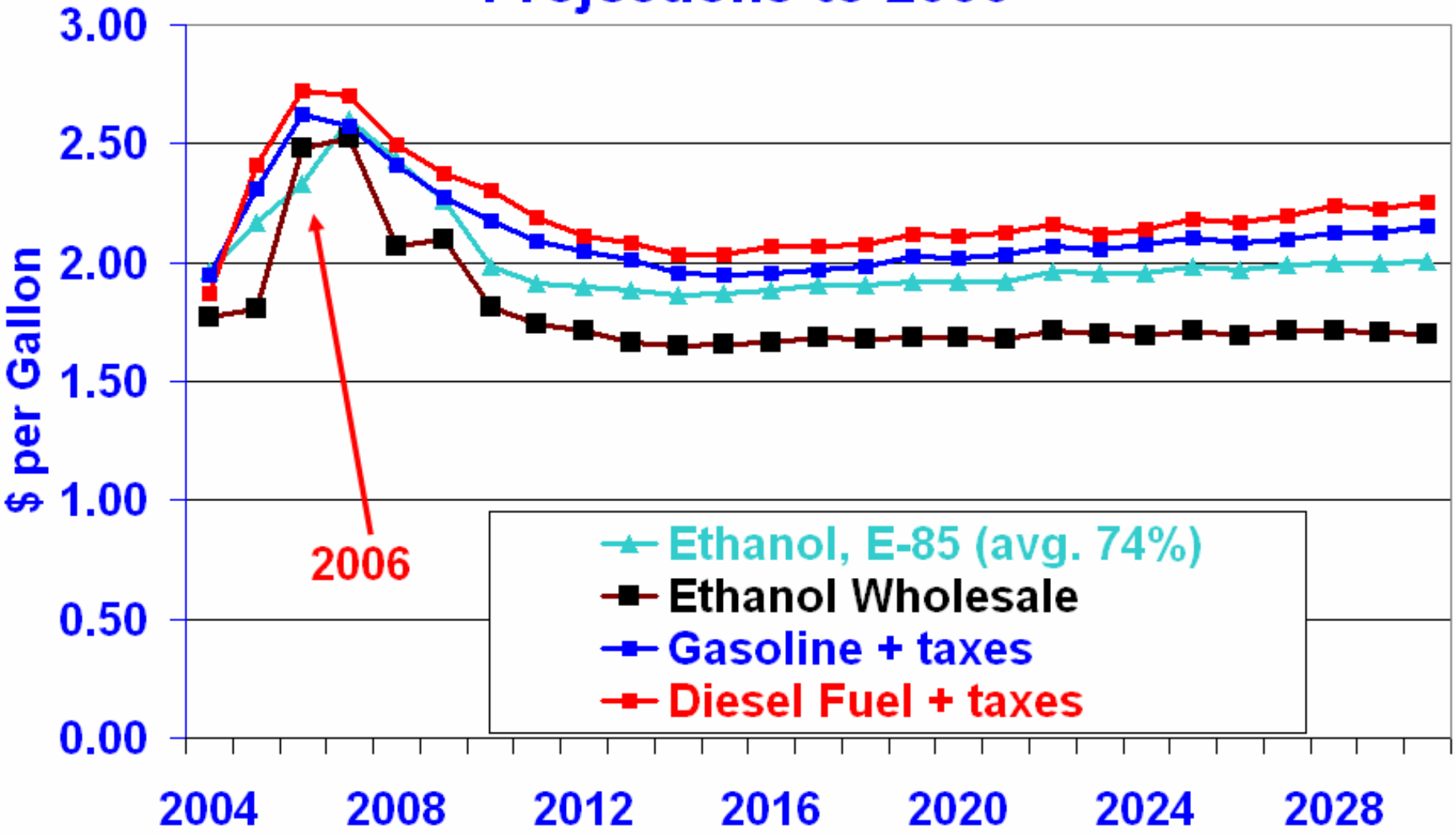
Potential Future Co-Product Changes

- Removing Corn Oil from DDGS
- Converting Fiber to Ethanol
- Pelleting DDGS
- Grades & Standards
- Converting biodiesel glycerine to ethanol
- Reduced feed energy supplies

U.S. Department of Energy Crude Oil Price Projections - January 2007



U.S. Energy Administration Fuel Price Projections to 2030



Ethanol Economics – new plants
U. of Minn. 2005 costs

- **$0.10/gal. increase in ethanol price raises break-even Corn price $0.28/bu.**

- **$1.00/bu. rise in corn price increases cost/gal. $0.36/gal.**

Ethanol Economics – new plants

- Ethanol prod'n cost $1.30/gal. (Univ. of Minnesota- @$2/bu. corn -- 2005)
- June 26,'07 Iowa ethanol price: $2.27/gal.
- Recent margin: $0.76/gal. (33%) Drops to 20%@ corn price of about $4.25/bu. in IA -- up 27- 30% from June 26 price
- Note: "Drop-out" corn price for existing plants is much higher
- Other variables: DDGS price, Natural Gas
- Note: Plant construction costs have risen sharply since 2005

MINIMUM SOYOIL PRICE FOR BIODIESEL BREAKEVEN
at GIVEN WORLD CRUDE OIL PRICE

PRX_C_US_BA, GTB-06-03, Mar-14-06

		Crude Oil Price, $/bbl								
		$30.00	$35.00	$40.00	$45.00	$50.00	$55.00	$60.00	$65.00	$70.00
	Add biodiesel									
Soybean	$0.19	($0.10)	$0.02	$0.14	$0.25	$0.37	$0.49	$0.61	$0.73	$0.85
Oil Price	$0.20	($0.18)	($0.06)	$0.06	$0.18	$0.30	$0.42	$0.54	$0.66	$0.78
$/lb	$0.21	($0.25)	($0.13)	($0.01)	$0.11	$0.23	$0.35	$0.47	$0.58	$0.70
	$0.22	($0.32)	($0.20)	($0.08)	$0.04	$0.15	$0.27	$0.39	$0.51	$0.63
	$0.23	($0.39)	($0.28)	($0.16)	($0.04)	$0.08	$0.20	$0.32	$0.44	$0.56
	$0.24	($0.47)	($0.35)	($0.23)	($0.11)	$0.01	$0.13	$0.25	$0.37	$0.48
	$0.25	($0.54)	($0.42)	($0.30)	($0.18)	($0.06)	$0.05	$0.17	$0.29	$0.41
	$0.26	($0.61)	($0.49)	($0.38)	($0.26)	($0.14)	($0.02)	$0.10	$0.22	$0.34
	$0.27	($0.69)	($0.57)	($0.45)	($0.33)	($0.21)	($0.09)	$0.03	$0.15	$0.27
	$0.28	($0.76)	($0.64)	($0.52)	($0.40)	($0.28)	($0.16)	($0.05)	$0.07	$0.19
	$0.29	($0.83)	($0.71)	($0.59)	($0.48)	($0.36)	($0.24)	($0.12)	$0.00	$0.12
	$0.30	($0.91)	($0.79)	($0.67)	($0.55)	($0.43)	($0.31)	($0.19)	($0.07)	$0.05
	$0.31	($0.98)	($0.86)	($0.74)	($0.62)	($0.50)	($0.38)	($0.26)	($0.15)	($0.03)

For Blue Sky Scenario, PRX adopts a crude oil price of $50/bbl and thus a minimum 24 cent/lb soyoil price, to evaluate impact of subsidized biodiesel market.

Source: Dr. Terry Francel, American Farm Bureau Federation

5.9 bil. Bu. Processed to ethanol by 2012

Figure 4. Extra U.S. Corn Acres Needed to Maintain Exports & Projected Ethanol Production

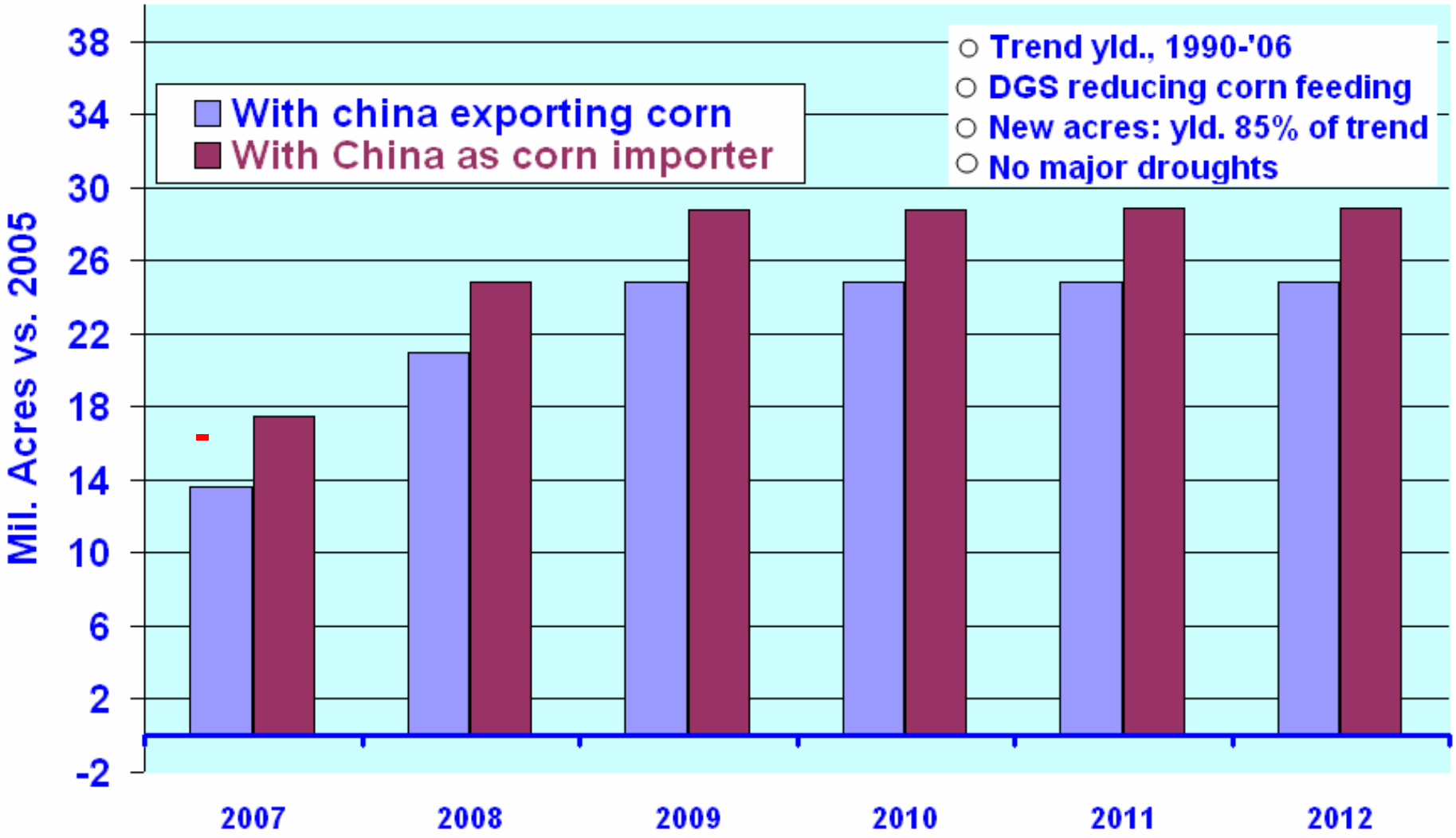
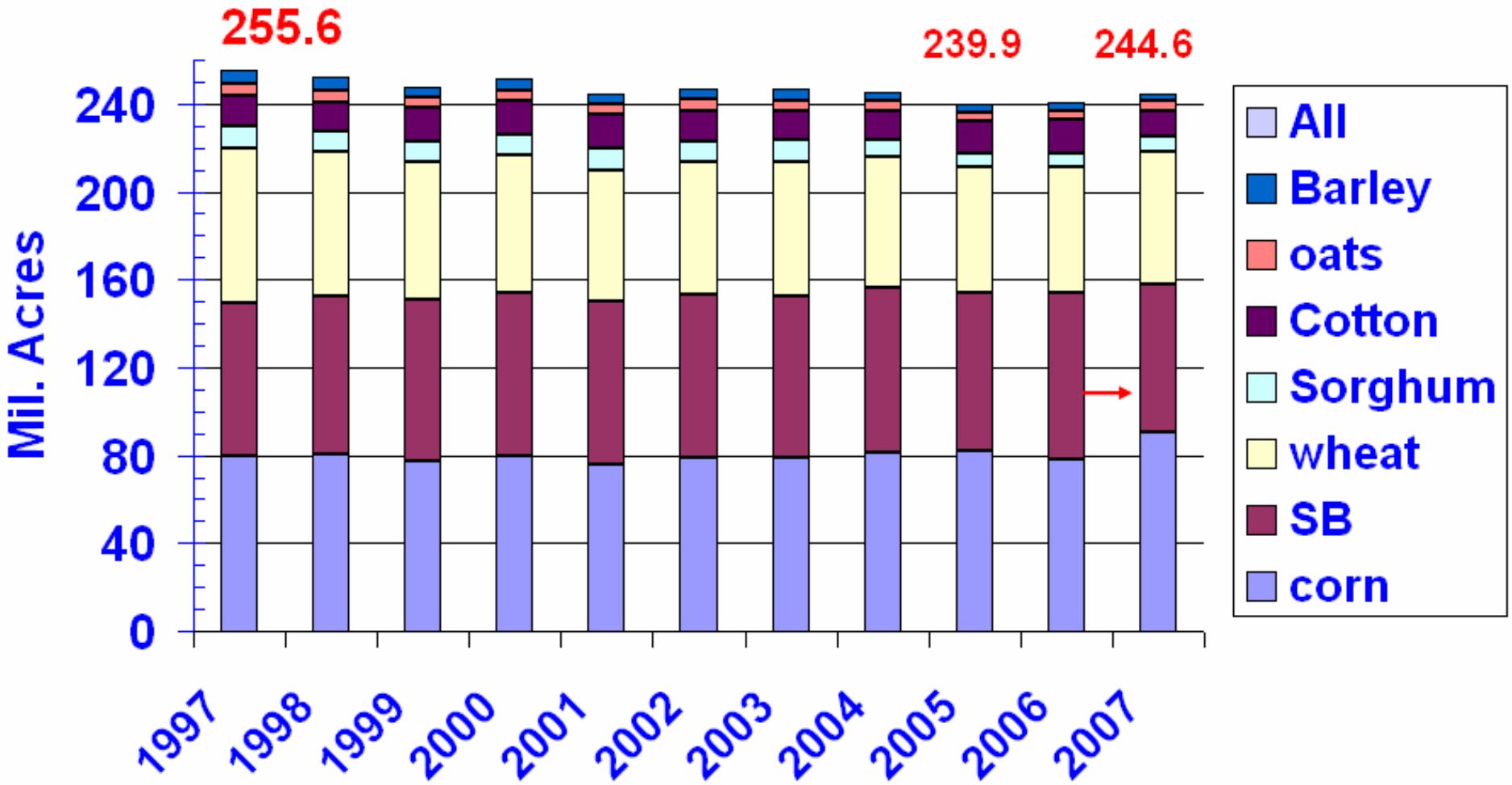


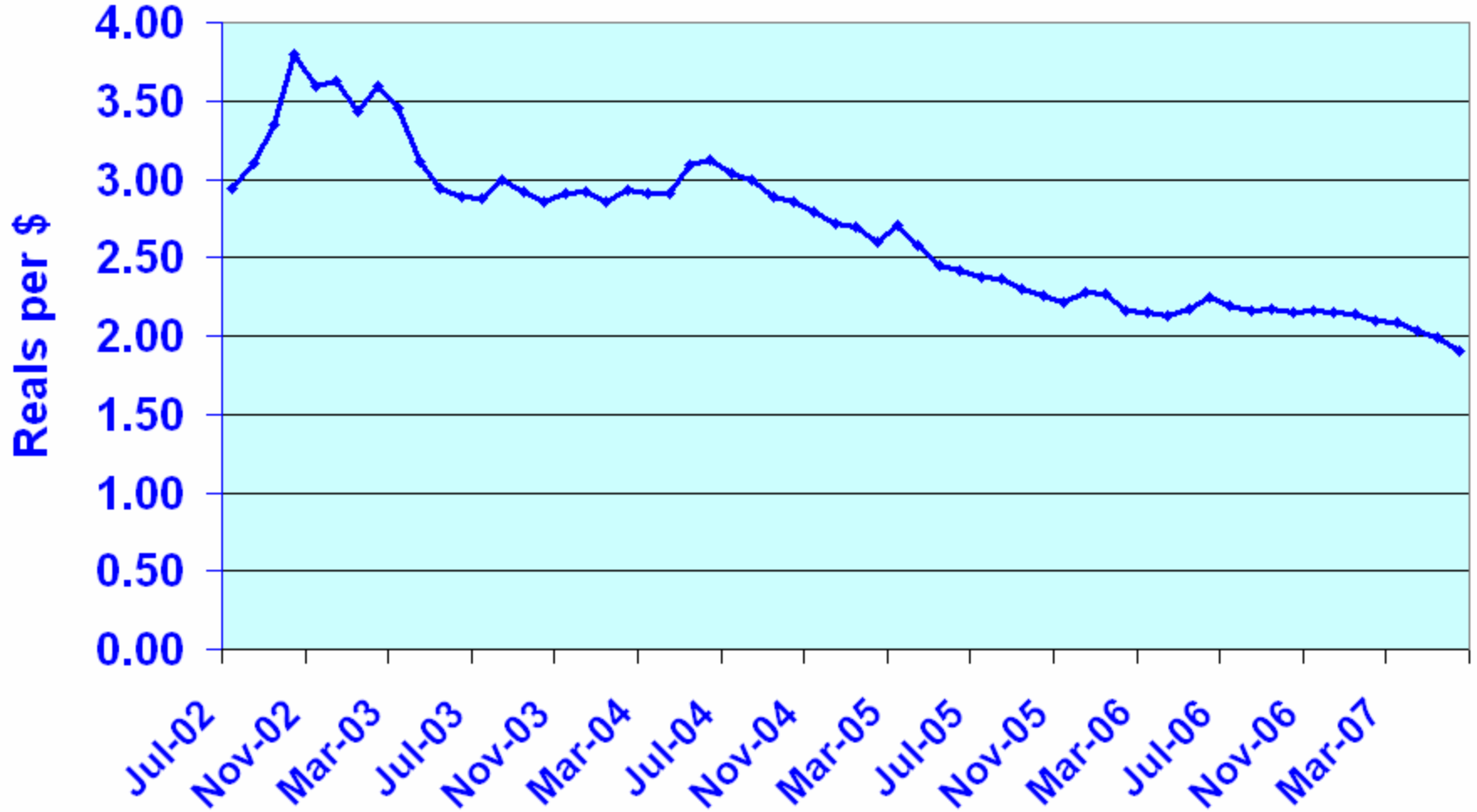
Figure 3. U.S. Planted Acreage of Major Grains, Oilseeds, and Cotton



Source of data: USDA, NASS

Potential CRP Acres for Corn?	
	Mil. Acres
ILLINOIS	1.03
INDIANA	0.29
IOWA	1.92
MICHIGAN	0.26
MINNESOTA	1.76
MISSOURI	1.55
OHIO	0.29
Total	7.10
Includes wetlands, buffer	
strips, etc.	

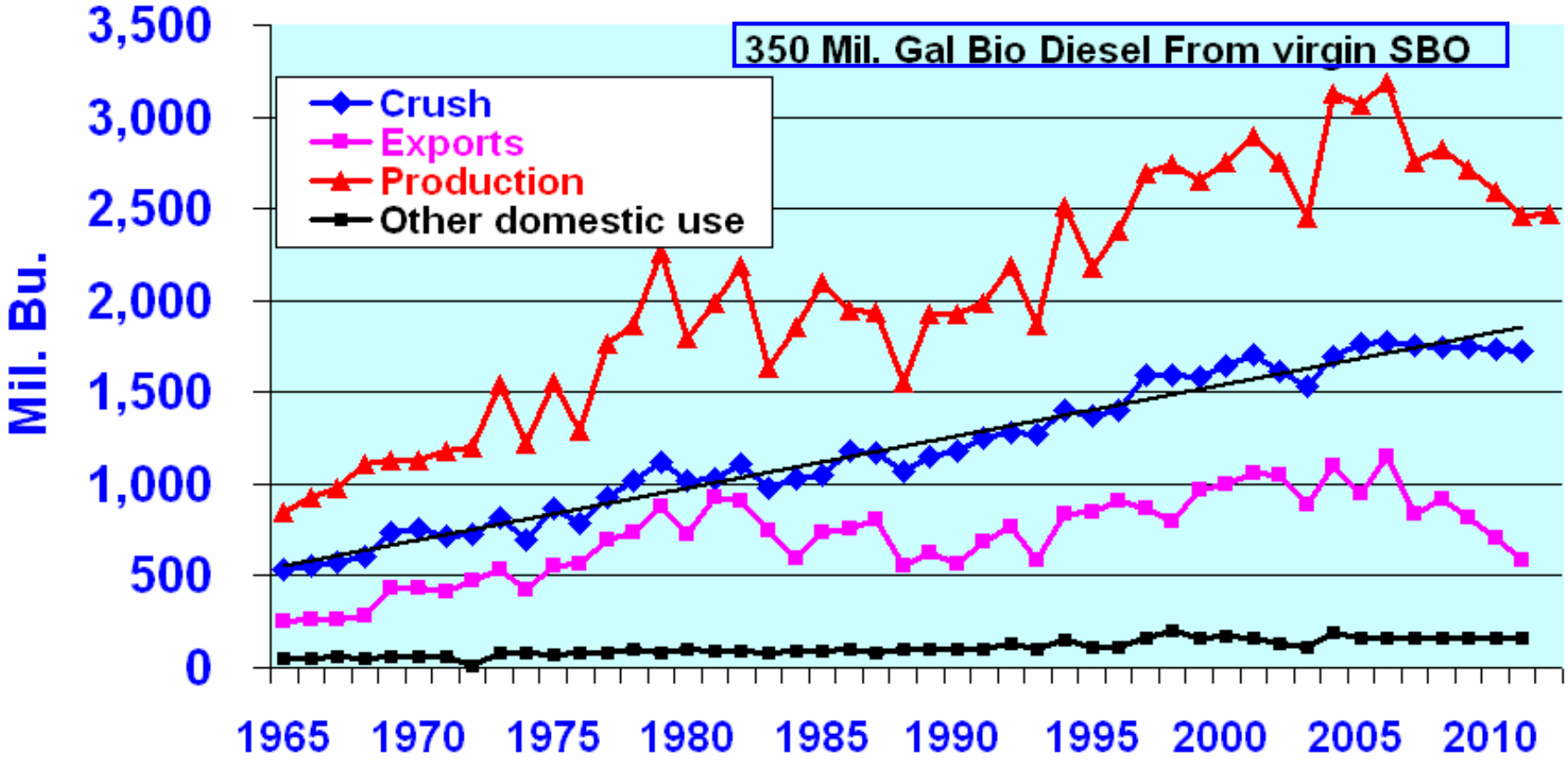
Brazil Real Exchange Rate to U.S. Dollar



Illinois Corn Yields
Drought Tolerant?

	2004	2005	% chg.
• NW	184	140	-24
• NE	174	129	-26
• WEST	192	141	-27
• E.SE.	175	139	-21
• SW	158	133	-16
• SE	158	130	-18

Figure 6. U.S. Soy Production, Use, & Exports to 2012
With 5.5 bil. Bu. Corn for ethanol



Assumes trend yields. Increased DGS Prod'n in 2012-13 replaces soybean meal from about 440 mil. bu. of soybeans

Implications for U.S. and World Livestock, Poultry & Food Costs

- U.S. supplies 2/3 of world corn exports, 20-25% of wheat & 35-40% of cotton exports
- Cost of livestock & poultry feed will increase
- Large increase in variability of feed & food costs
- Food aid impacts?
- Accelerated ag expansion into areas with fragile eco systems
- Shift livestock industries from U.S. to South America?
- Rural employment implications in U.S.

Infrastructure Needs of bioenergy Market
(Time Frame: 3 to 5 years)

Sharp Increases in:

- ***Inputs for corn production***
- **Corn receiving, drying, storage, farm transporting infrastructure**
- **Efficient rail shipping of ethanol & DDGS**
- **More tank cars for ethanol movement**
- **Electric power generation**
- **Water supply systems**
- **Research on pipelines for ethanol**
- **Retail facilities for E-85, E-20 & E-30 stations**

U.S. Cellulose Ethanol

- At least 2 pilot plants being developed
- Expect strong U.S. government emphasis

Potential Feedstocks:

- DDGS
- Corn stover
- Prairie grasses
- Forest wastes
- Municipal wastes

Research for major handling & storage challenges

Environmental Issues for Research: ethanol

- **Impact on groundwater supplies**
- **Long-term effects, mono-culture ag.**
- **Allowable maximum removal of corn stover & grasses**
  - **Soil erosion impacts**
  - **Soil organic matter impacts**
  - **Diminished wildlife habitats**
  - **Water quality impacts from more fertilizer**

Key Issues for Agriculture

- **Alternative feedstocks: which ones, how soon?** **Biomass, sweet sorghum, sugar beets, high-oil crops, cane sugar, others**
- **Differential impacts on livestock & poultry species**
- **Environmental: continuous corn, off-take of biomass, erosion-prone land**
- **Efficient use of distillers grain, including new uses**
- **Risk Management: livestock, crops, ethanol**

Key Issues for Agriculture, II

- Future transition of corn-ethanol plants to other feedstocks
- Policy issues: import tax, blending credit, LDPs, CCPs, E-85 vs. E-10, pipeline possibilities, vehicle redesigning, Hydrogen sources
- Global developments: EU biodiesel, Brazil export potential, Asia, S. Africa bioenergy & global grain supply, demand & prices
- Infrastructure needs: grain handling & storage, transportation, ethanol & ddgs transport
- High Prices encourage oil exploration & conservation

What Could Change Prospects of Tightening Global Grain Supply?

- Accelerated corn yield increases
- Crude oil price collapse
- Early break-through in economical cellulose conversion
- U.S.Ethanol import tax removed – longer term impacts
- U.S. $0.51 blending credit reduced or made variable
- Declining global livestock feeding

Need for Both Ethanol and Animal Agriculture

- **100 million gallon ethanol plant**
  - **37 million bushels of corn**
  - **80 workers directly employed**
- **37 million bu corn** **Direct jobs**

Farrow-finish	**800**
Or Wean-finish	**242**
Or Beef feedlot	**278**

Source: Dr. John Lawrence, Head of ISU Beef Center

http://www.econ.iastate.edu/faculty/wisner/

...and justice for all

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