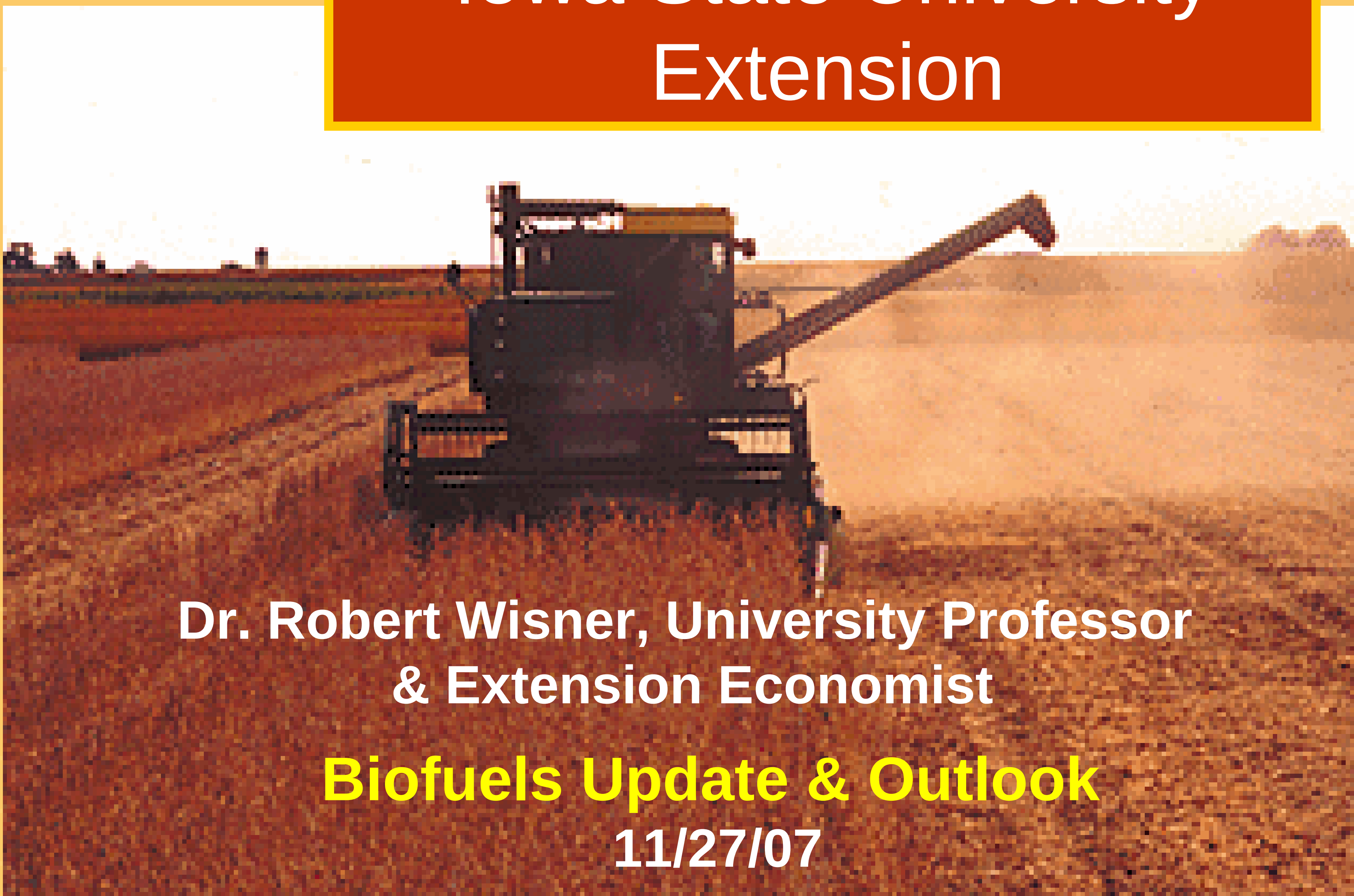
Iowa State University Extension



Dr. Robert Wisner, University Professor
& Extension Economist

Biofuels Update & Outlook

11/27/07

Global Biofuels Developments

- Dramatic changes emerging in global Ag
- Rapid expansion-- in U.S., Brazil, EU
- About 90% of Global Ethanol -- from U.S., Brazil
- EU leading in biodiesel use
- Rapid growth of palm oil production for biodiesel
- *Major constraint: cropland availability*
- Global forces will determine size of industry

41 countries encourage biofuels

Major Countries with Ethanol Fuels

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

Countries considering ethanol fuels

- South Africa
- Ukraine
- Japan, others

Major Countries with Ethanol Fuels

- U.S. – likely production of 14-15 bil. gal. from corn in 4.5 to 5.5 years

- Brazil current 5.34 bil gal. –89 new ethanol plants to be built, 2007-2011 (51 under construction)
  - 2% biodiesel mandate by 2008 & 5% by 2013

- China – 3 corn-based plants, emphasis shifting to other feedstocks (9 mil. T. maize for ethanol)

Major Countries with Ethanol Fuels, cont.

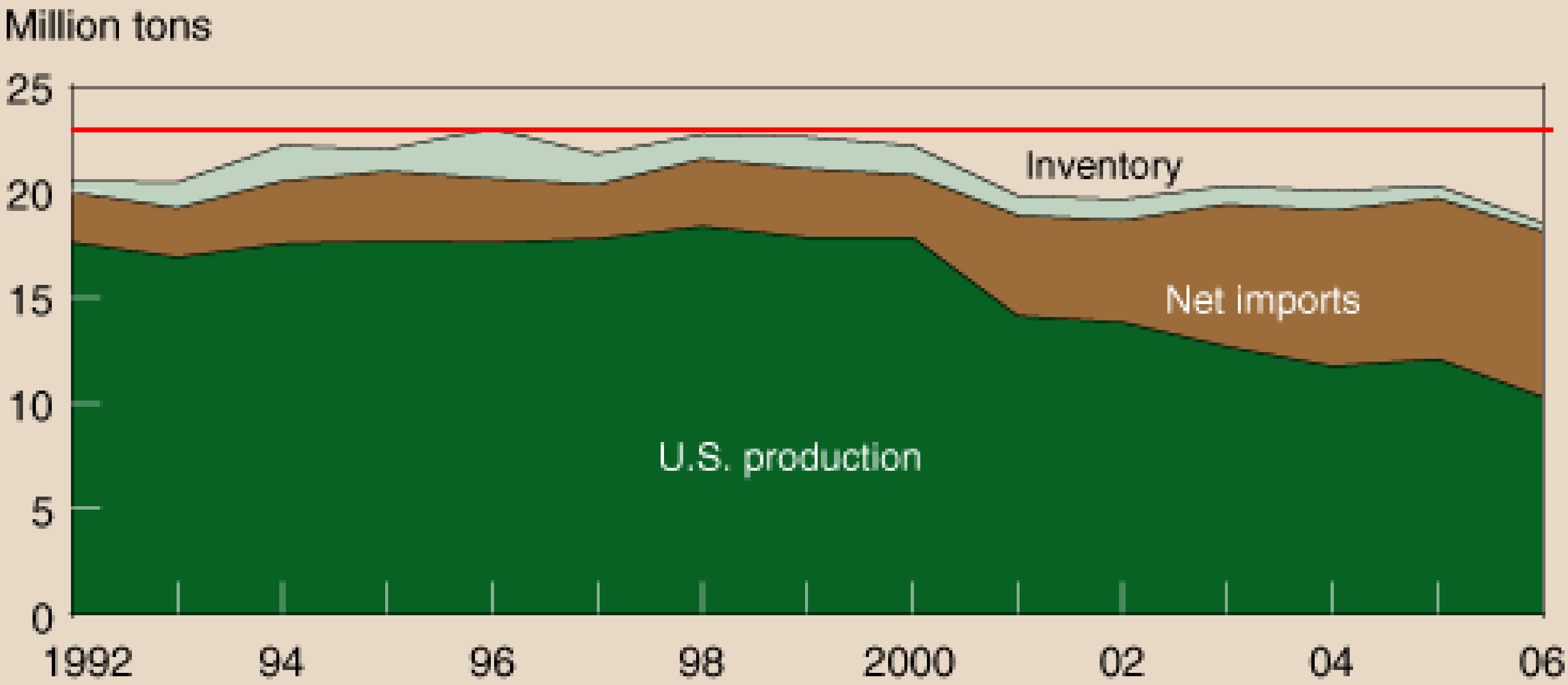
- EU-27 – 5.75% of motor fuel to be renewable by 2010, 10% in 2020
- Canada – 5% ethanol mandate by 2010, 2% biodiesel by 2012
- Thailand – ethanol from sugar, casava

Biodiesel– Competition for crop land

Corn Futures 11/16/07		
Cents Per Bushel		
7-Dec		380
8-Mar		396
8-May		406
8-Jul		415
8-Sep		419
8-Dec		425
9-Mar		430
9-May		433
9-Jul		438
9-Dec		425
10-Mar		428
10-Jul		431
10-Dec		425

Soybean Futures 11/16/07			
Cents Per Bushel			
8-Jan			1084
8-Mar			1100
8-May			1105
8-Jul			1107
8-Aug			1086
8-Sep			1040
8-Nov			1018
9-Jan			1021
9-Mar			1022
9-Jul			1020
9-Nov			965

U.S. ammonia supply more dependent on imports since 2000



Note: Fertilizer year starts from July of the preceding year to June of the year indicated in the chart.

Source: USDA, Economic Research Service, using production and inventory data from the U.S. Department of Commerce and The Fertilizer Institute, and net import data from ERS.


热烈欢迎各级领导莅临天冠检查
请来宾登记后进厂

China Ethanol Policy

- No more grain-based ethanol plants
- Emphasis on root crops
- Operating pilot cellulose plant
- Interest in biodiesel from palm oil

Battle for acreage: S. Am., EU, U.S. wheat, SB, Cotton, & Corn: Key Influences

1. ***Ethanol profitability***

   --Infrastructure & transportation

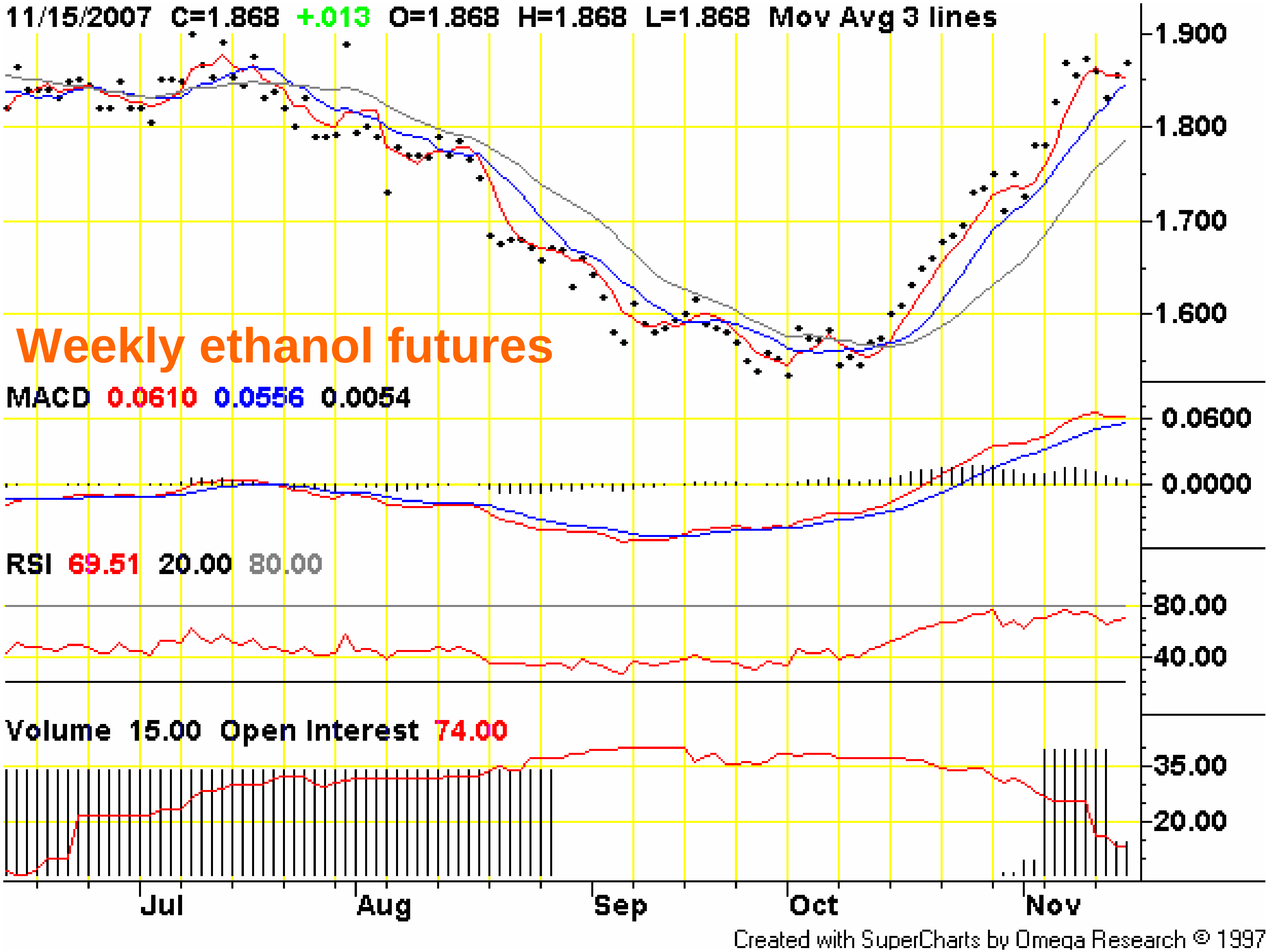
   -- Negative margins ahead -- how long & how bad?

2. **Govt. biofuels mandates?**
3. ***Strong Corn Export sales***
4. **World Economy?**
5. **EU opening up 10% set-aside in 2008**
6. **Basis behavior, spring & summer**

Market Overview

R. Wisner, ISU Econon.

1. ***Corn Supplies fully adequate for demand***
   --Slower domestic feed demand
   -- Slowing ethanol growth
   -- Sizeable increase in carryover likely in 08
2. ***SB supplies tightening***
   -- How tight depends on S. America
   -- More 5-6 mil. More SB acres needed next spring
3. **Price prospects, <u>cash</u> corn prices:**
   -- steady to modestly higher into mid-winter. ***Down-side risk in summer***
4. **Price prospects, cash SB:**
   -- higher trend into mid-winter, high volatility, summer risk.

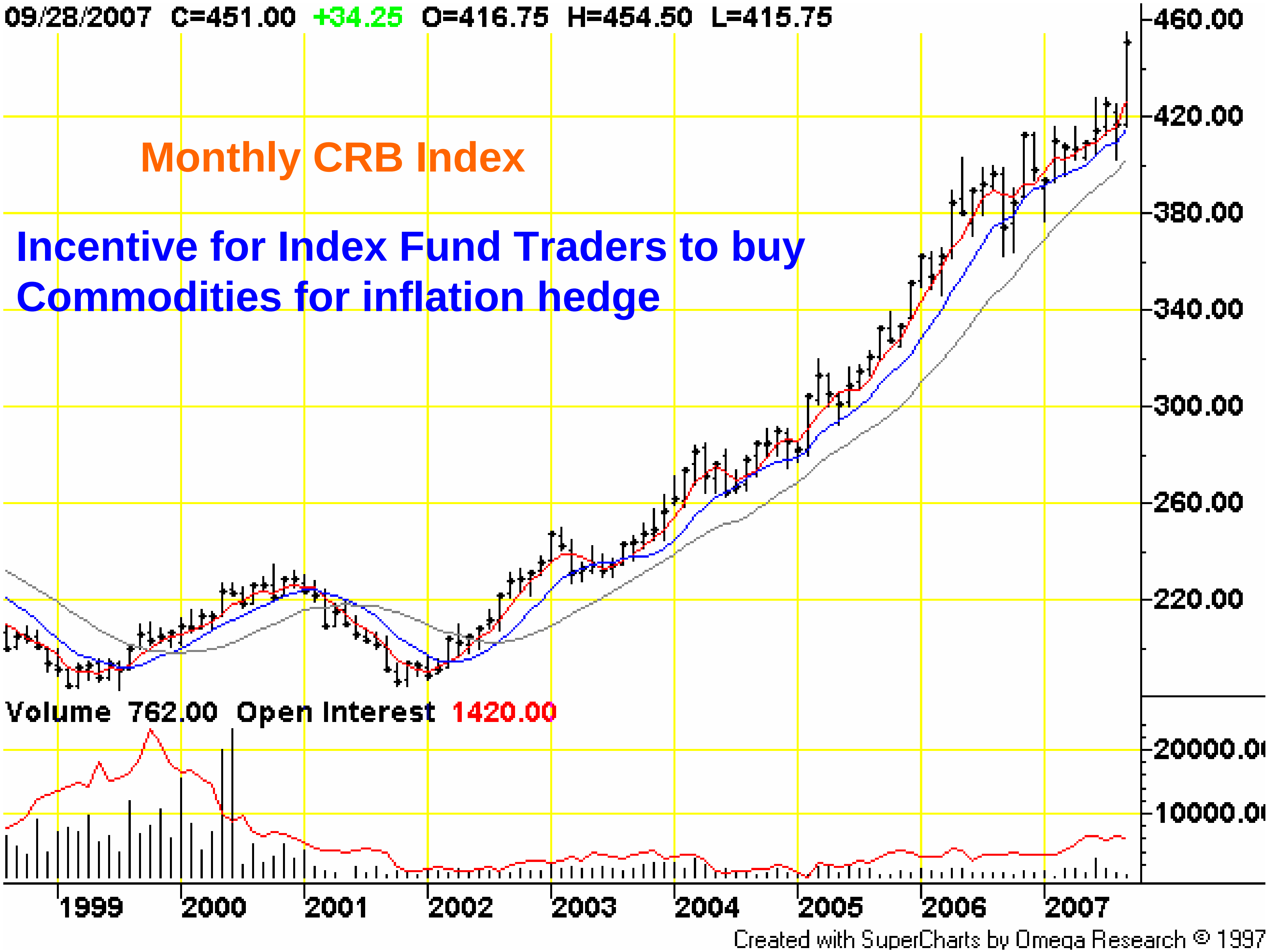

11/15/2007 C=1.868 +.013 O=1.868 H=1.868 L=1.868 Mov Avg 3 lines
Weekly ethanol futures
MACD 0.0610 0.0556 0.0054
RSI 69.51 20.00 80.00
Volume 15.00 Open Interest 74.00
1.900
1.800
1.700
1.600
0.0600
0.0000
80.00
40.00
35.00
20.00
Jul
Aug
Sep
Oct
Nov
Created with SuperCharts by Omega Research © 1997

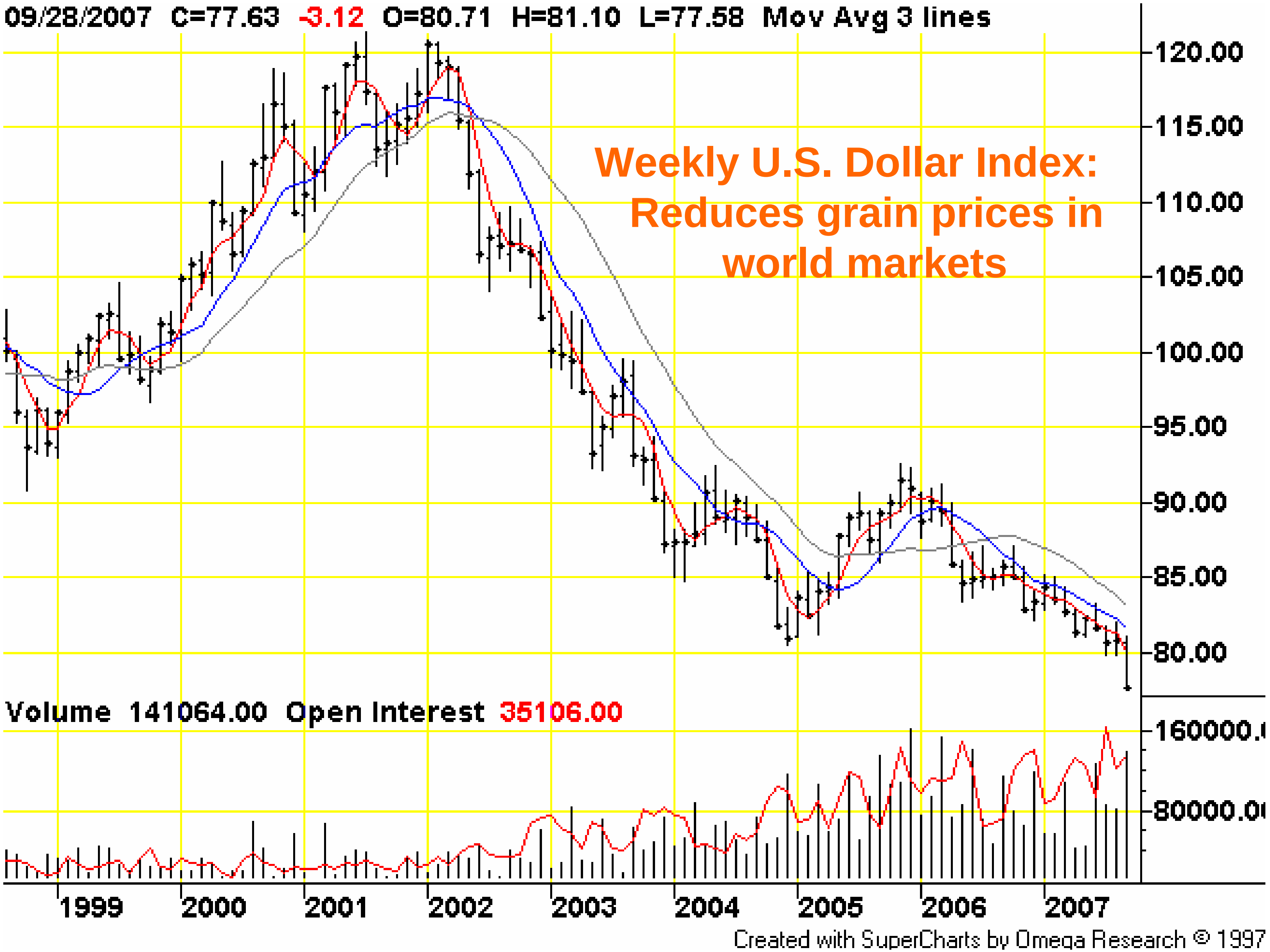
Ethanol Blending Economics- 10/22/07

	Rack Price/Gal.		11/15/07
Unleaded gas	$2.13	2.36	
Ethanol	$1.69	1.92	

Retail Price/Gal.

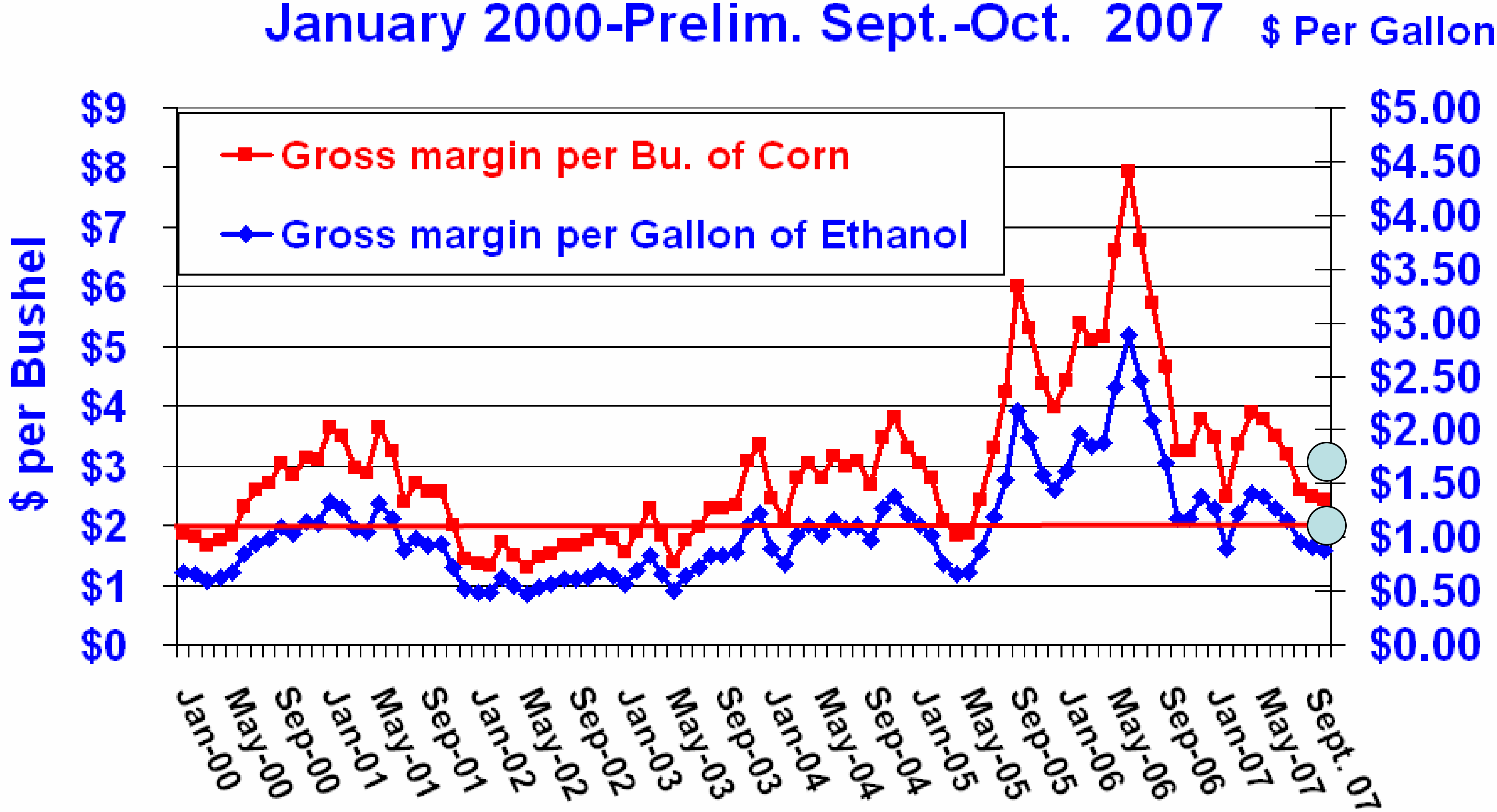
Component costs	Unleaded gas	E-10	E-85	11/25/07 HOI E-85
Ethanol	0	0.17	1.44	1.63
Unleaded Gasoline	2.13	1.92	0.32	0.35
Federal Hwy. Tax	0.185	0.185	0.185	0.185
State Hwy. Tax	0.20	0.20	0.20	0.20
Ethanol tax credit	0	-0.05	-0.434	0.434
Retail Margin	0.20	0.20	0.60	0.059
Retail Price @ pump	$2.72	$2.62	$2.31	$2.00


09/28/2007 C=451.00 +34.25 O=416.75 H=454.50 L=415.75
Monthly CRB Index
Incentive for Index Fund Traders to buy Commodities for inflation hedge
460.00
420.00
380.00
340.00
300.00
260.00
220.00
Volume 762.00 Open Interest 1420.00
20000.00
10000.00
1999
2000
2001
2002
2003
2004
2005
2006
2007
Created with SuperCharts by Omega Research © 1997



09/28/2007 C=77.63 -3.12 O=80.71 H=81.10 L=77.58 Mov Avg 3 lines
Weekly U.S. Dollar Index:
Reduces grain prices in
world markets
120.00
115.00
110.00
105.00
100.00
95.00
90.00
85.00
80.00
Volume 141064.00 Open Interest 35106.00
160000.0
80000.0
1999
2000
2001
2002
2003
2004
2005
2006
2007
Created with SuperCharts by Omega Research © 1997

Figure 1. Iowa Gross Processing Margins for Ethanol, January 2000-Prelim. Sept.-Oct. 2007



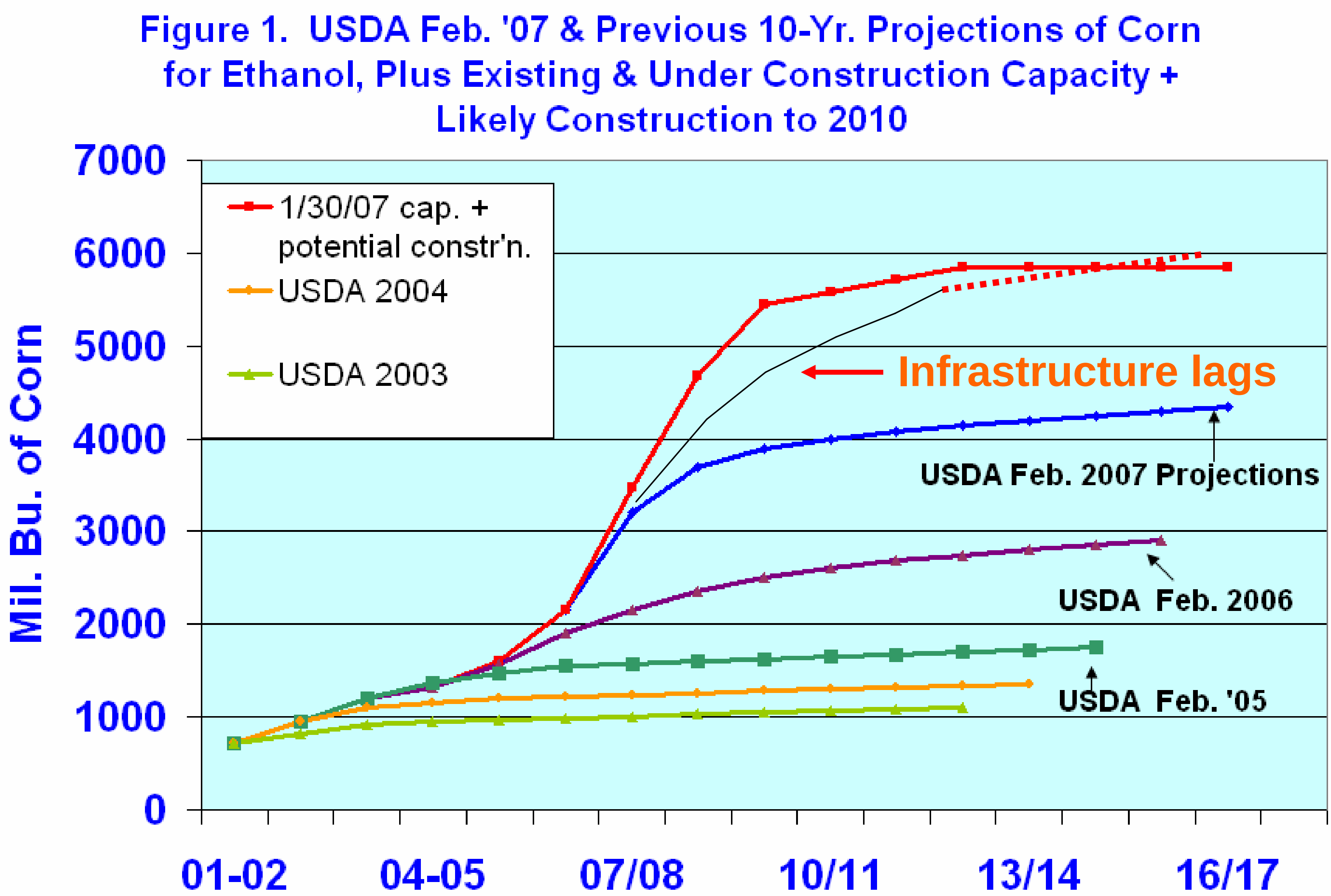
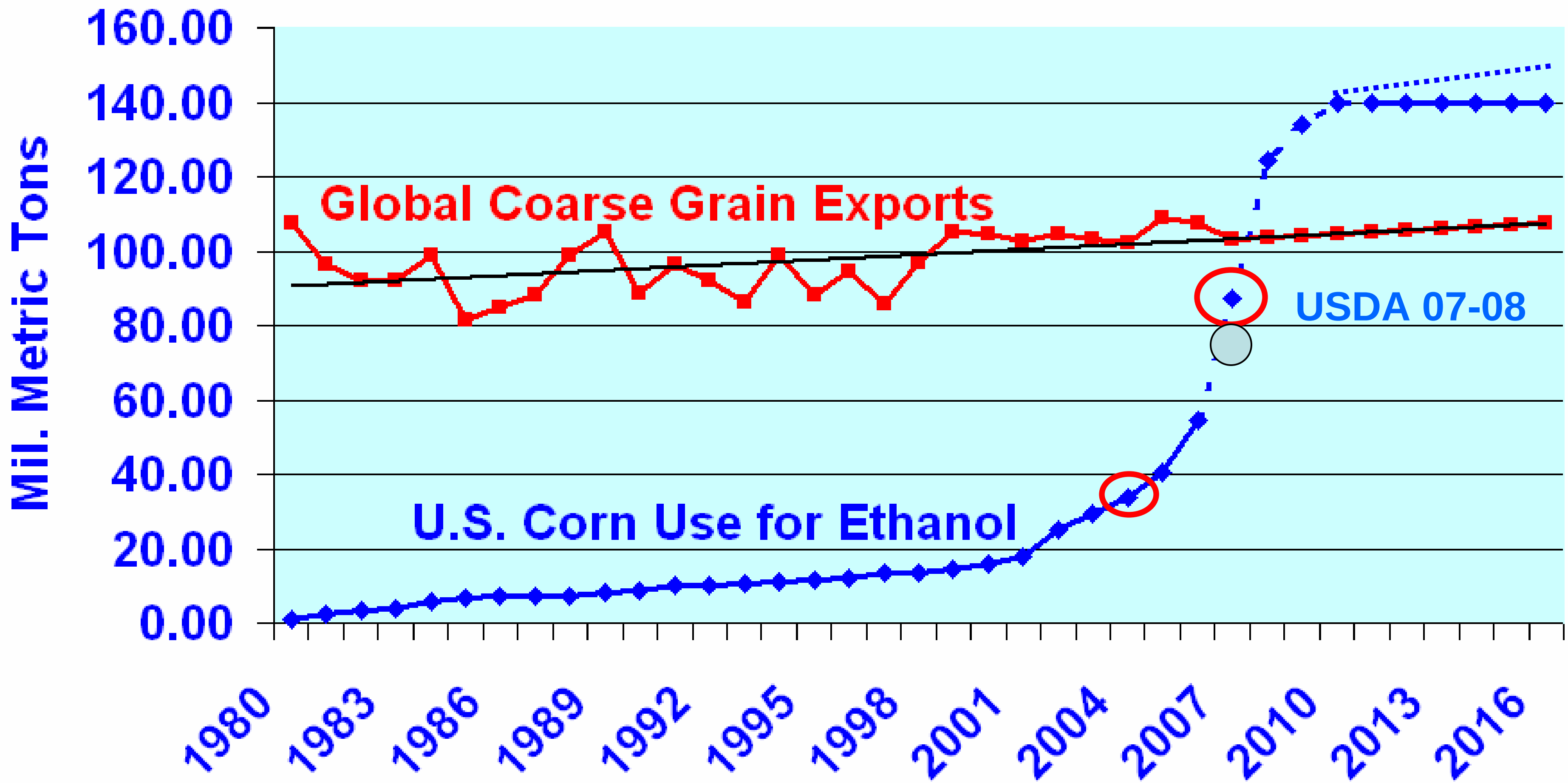


Figure 1. USDA Feb. '07 & Previous 10-Yr. Projections of Corn for Ethanol, Plus Existing & Under Construction Capacity + Likely Construction to 2010
Mil. Bu. of Corn
7000
6000
5000
4000
3000
2000
1000
0
01-02
04-05
07/08
10/11
13/14
16/17
1/30/07 cap. + potential constr'n.
USDA 2004
USDA 2003
Infrastructure lags
USDA Feb. 2007 Projections
USDA Feb. 2006
USDA Feb. '05

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

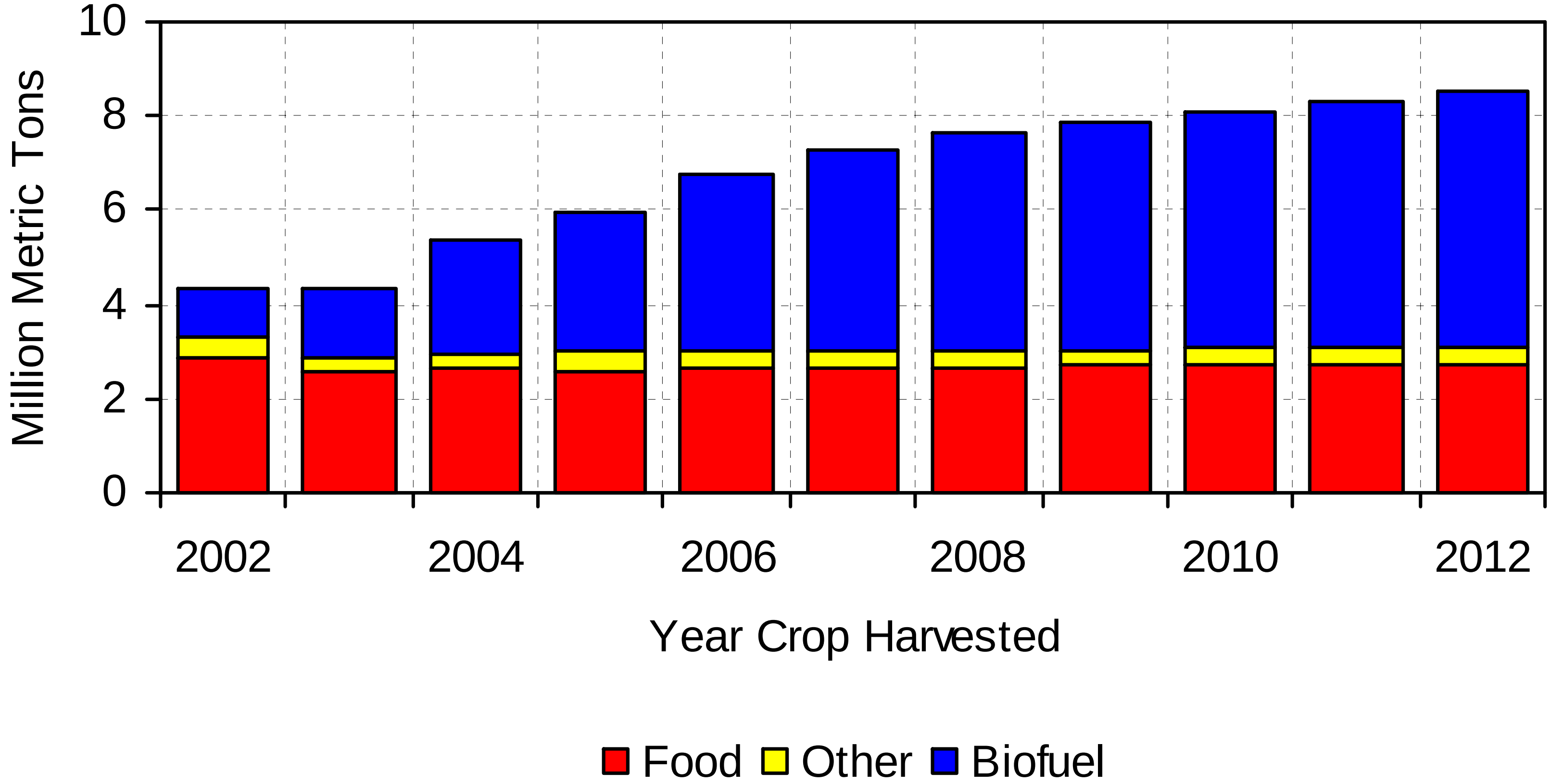


International Impacts

- U.S. ethanol plants under construction to use 55 mil. tons of corn (doubling use)
  - 3.5 times the volume of Japan imports of U.S. corn
  - 123% of 2006 EU corn crop
  - 66% 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

(Growth 2007-12 = 147% of U.S. soybean oil exports)
(Food demand for vegetable oil highly inelastic)

EU Use of Rapeseed Oil

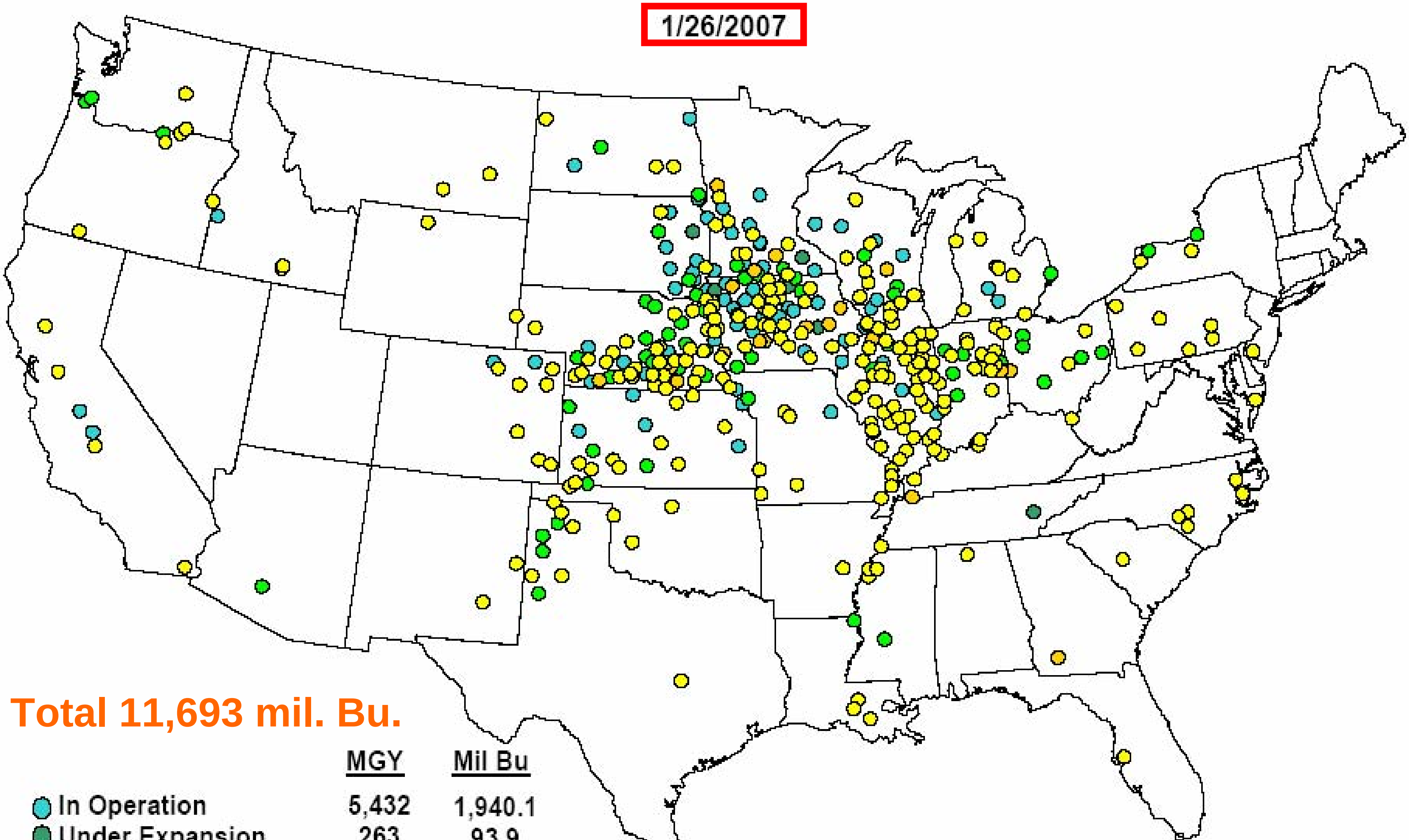


Source: FAPRI estimates

Pulls land away from food uses

Figure 3. US Ethanol Plants

1/26/2007

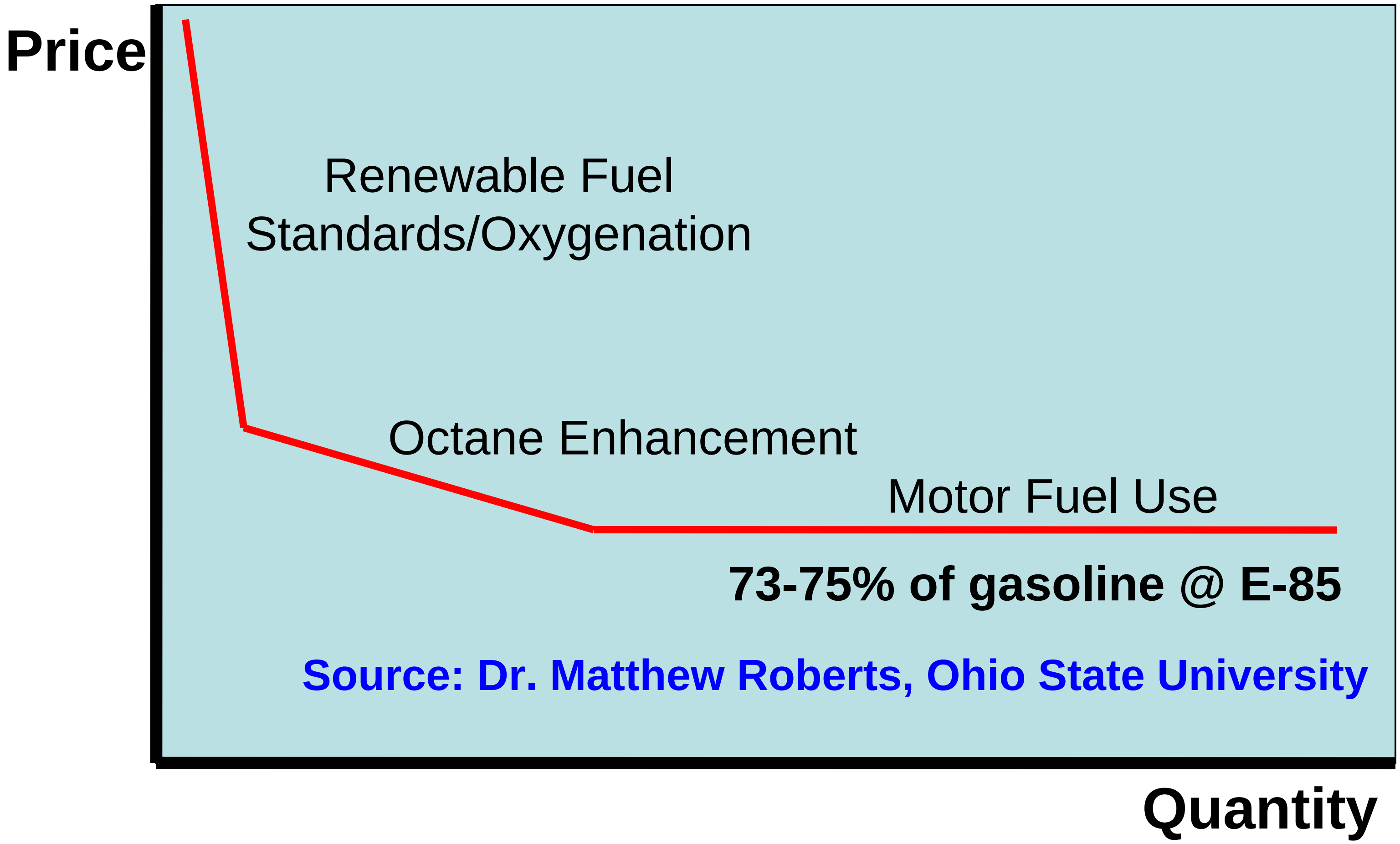


Total 11,693 mil. Bu.

	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.

Demand Curve for Ethanol



2007-08 U.S. corn supplies adequate to meet demand

- Crop up 25%, 20% increase in corn acres
- But at expense of:
  - *16% decline in soybean planted area*
  - *29% decline in cotton area*
  - *8% decline in non-durum spring wheat*
  - *Declines in other minor crops*
- *Soybean supplies to tighten substantially, increased plantings needed in 2008*
- Cotton more needed in 2008
- *More U.S. corn likely will be needed in 2009*

Prospective Number of future Ethaonl Plants, 7/25/07 (Excludes Current Plants)			
	Under Constr'n	Planned Plants	Total to build
Iowa	13	27	40
Indiana	7	30	37
Illinois	4	56	60
Kansas	6	10	16
Michigan	3	5	8
Minnesota	6	7	13
Missouri	1	9	10
Nebraska	14	36	50
Ohio	12	7	19
S. Dakota	4	4	8
Wisconsin	4	10	14
Corn Belt Total	74	201	275
Non-Corn Belt			
California	3	14	17
Colorado	1	14	15
Idaho	2	1	3
New York	3	6	9
N. Carolina	1	6	7
Penn.	1	7	8
Texas	5	11	16
Other non-Corn Belt	11	83	94
Total non-Corn Belt	27	128	155
U.S. Total	101	329	430

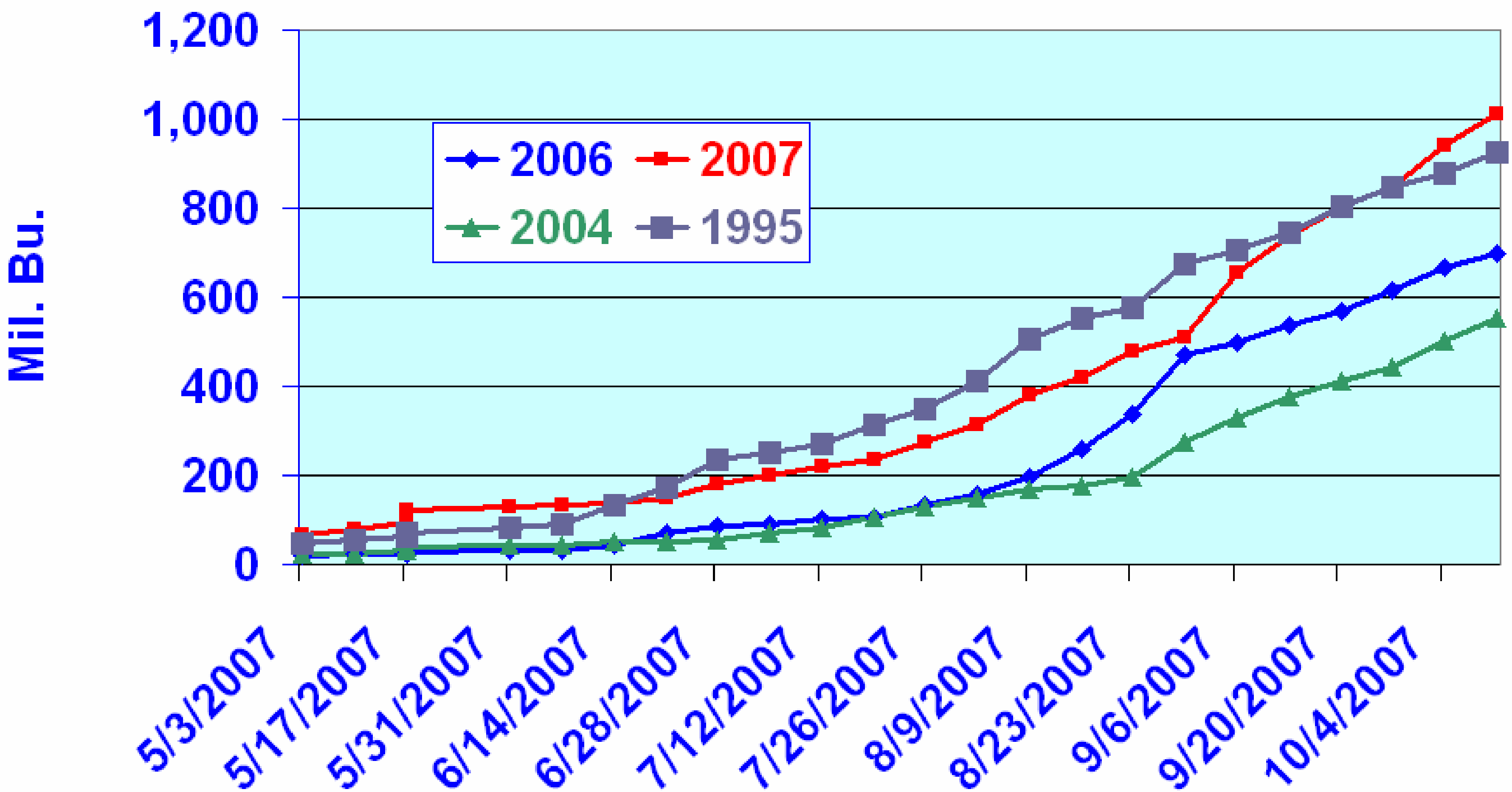
Plant Numbers Sources: Renewable Fuels Association http://www.ethanol.org/index.php?id=37&parentid=8#USEthanolFacilities & DTN Ethanol Web Site, http://www.dtnethanolcenter.com/index.cfm?show=47&mid=48

Changes in Ethanol Plants, 7/27 to 11/06/07 (From DTN)

Expansion hasn't stopped

	7/27/07	11/06/07
• U.S. Operating Plants	134	139
• U.S. Plants Under Const.	89	91
• Planned plants	329	343

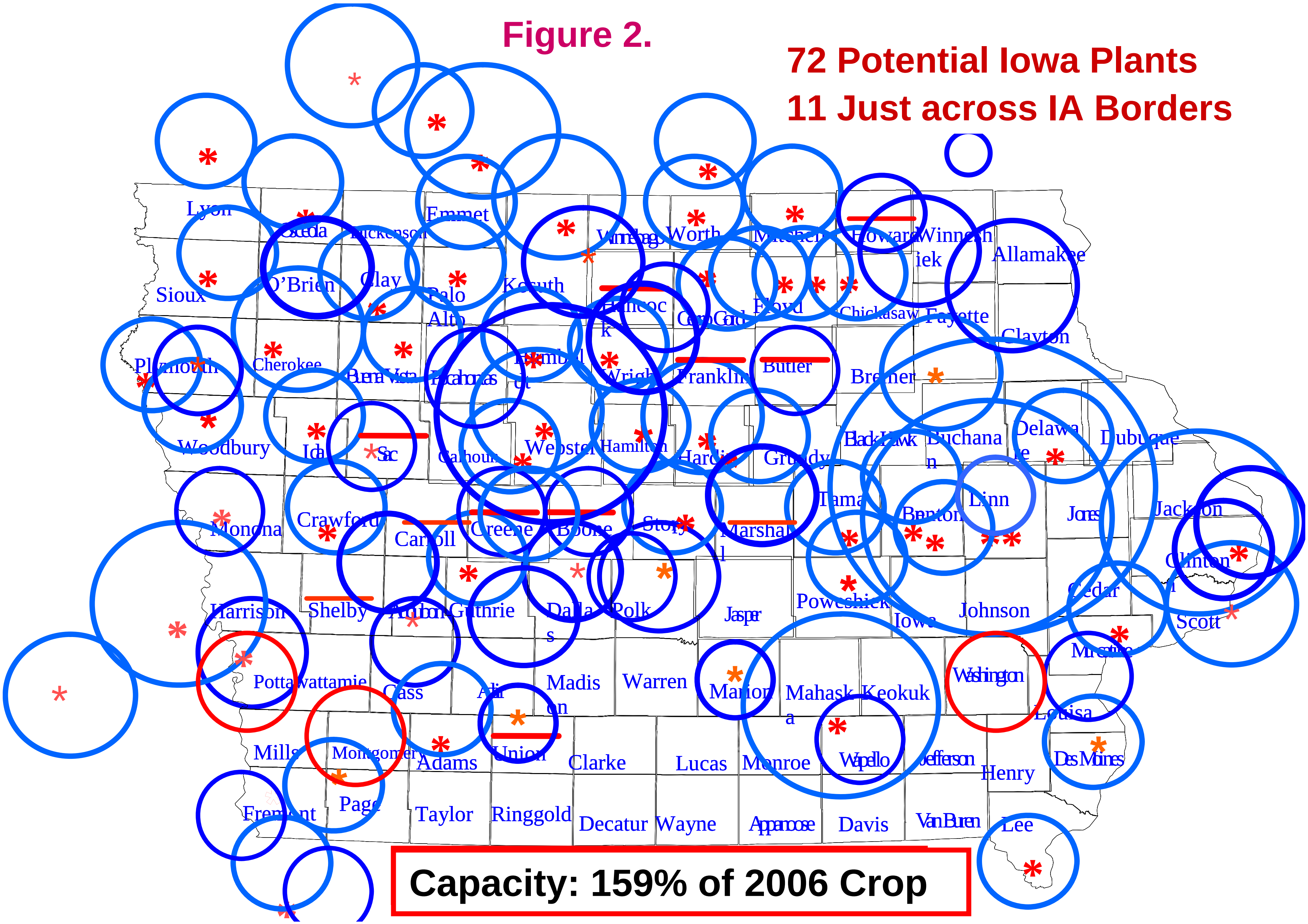
Outstanding New-Crop U.S. Corn Export Sales + Shipments



11/15/2007 Corn Balance Sheet (Mil. Bu.)

	2004-05	2005-06	Est.	Projected 2007-08		Projected 2008-09			Projected 2009-10		
Supplies:			2006-07	A	USDA-Crop	A	B	C	A	B	C
Plant. A(mil.)	80.9	81.8	78.3	93.6	93.6	88.5	88.5	88.5	93.5	93.5	93.5
Harv.A.(mil)	73.6	75.1	70.6	85.8	86.1	80.5	81.0	81.0	86.0	86.0	86.0
Bu./A.	160.4	147.9	149.1	151.0	152.9	148.0	155.5	158	149.0	158	163
Production	11,807	11,114	10,535	12,956	13,168	11,914	12,596	12,798	12,814	13,588	14,018
Carryover	958	2,114	1,967	1,304	1,304	1,822	1,822	1,822	1,363	1,363	1,363
Total Supply	12,776	13,237	12,514	14,275	14,487	13,751	14,433	14,635	14,192	14,966	15,396
Feed & resid.	6,158	6,155	5,598	5,700	5,725	5,540	5,700	5,775	5,500	5,700	5,750
Food, ind. & seed	2,686	2,981	3,488	4,520	4,540	5,275	5,290	5,330	5,865	5,940	5,990
Corn for fuel ethanol*	1,323	1,603	2,117	3,130	3,150	3,885	3,900	3,940	4,475	4,550	4,600
Exports	1,818	2,134	2,125	2,350	2,400	1,990	2,080	2,100	1,925	1,950	1,975
Total Utilization	10,662	11,270	11,210	12,570	12,665	12,805	13,070	13,205	13,290	13,590	13,715
Carryover	2,114	1,967	1,304	1,705	1,822	946	1,363	1,430	902	1,376	1,681
Weeks carryover supply	10.3	9.1	5.2	7.1	7.5	3.8	5.4	5.6	3.5	5.3	6.4
U.S. weighted Avg. FARM PRICE	$2.06	$2.00	$3.03	$3.75	3.55	$4.20	3.60	3.45	$4.45	3.55	3.35
IOWA weighted Avg. PRICE, $/Bu.	1.96	1.95	$2.95	3.70	3.50	4.15	3.55	3.40	4.40	3.50	3.30
Counter-Cyclical Pmt.	0.30	0.35	$0.00	0	0	0	0	0	0	0	0
HARV. PRICE, C.IA	1.60	1.40	$2.80	3.30	3.30	3.95	3.00	2.90	4.30	3.25	2.90
DEC. FUT. @ HARV.	$1.98	$2.00	$3.15	$3.80	$3.80	$4.40	$3.50	$3.45	$4.70	$3.75	$3.45
Historical Probability				18%	65%	18%	65%	17%	18%	65%	17%
Feed use % chg. Drought years vs. current				1.8%		-1.0%			-5.6%		

Figure 2.



Iowa Corn Processing Plants, Current & Planned, 7/25/07

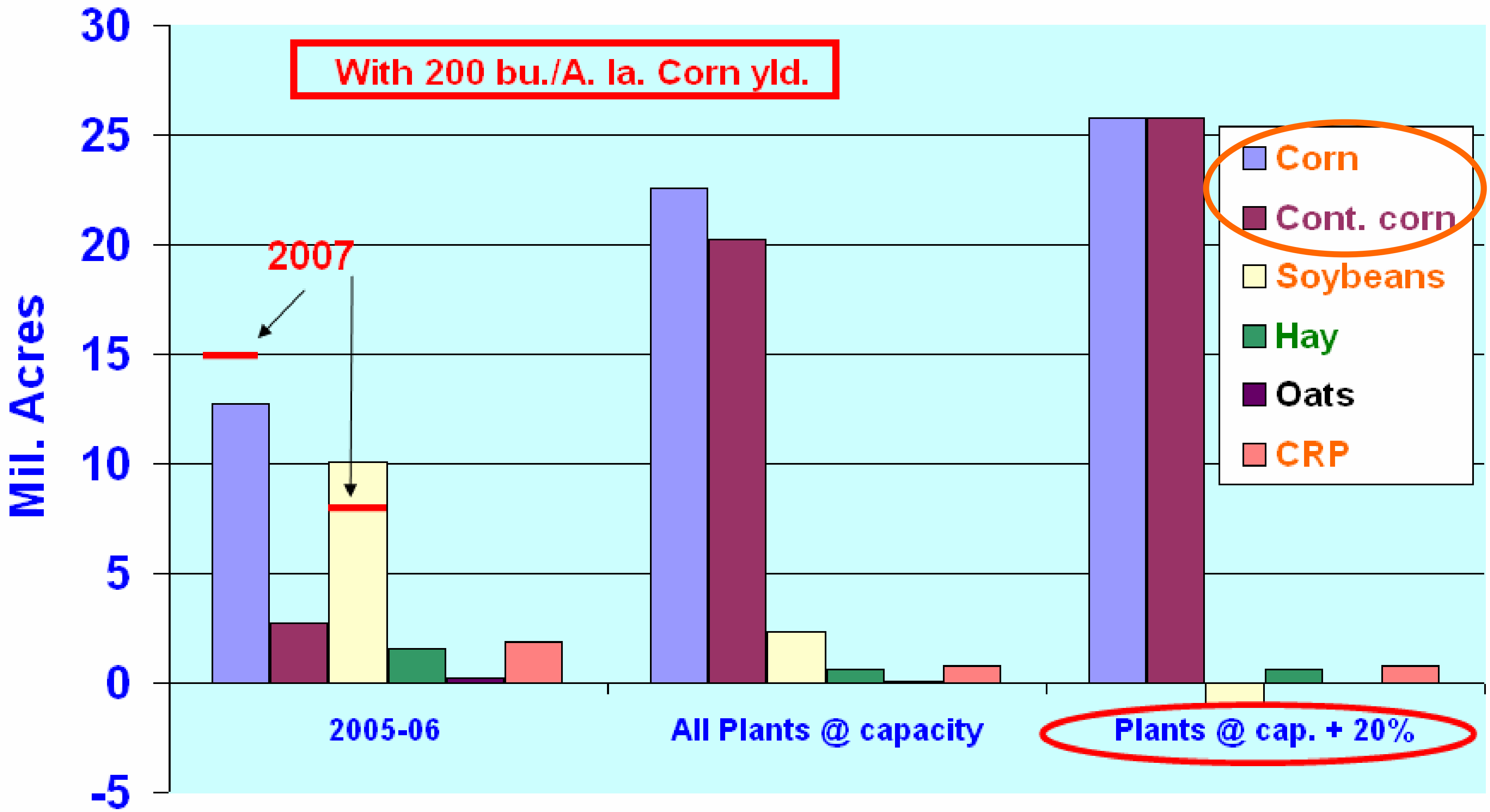
Iowa Corn Processing, 7/23/07	No. plants	Mil. Bu.	of '06 Crop
Total operating	30	1,294	63%
Total Under Construction or expansion	10	447	22%
Total Planned, not yet under construction	34	1,513	74%
Grand Total (adjusting for plant expansions)	71	3,254	159%

Metric tons Total 82.6

12.5 tons/Ha. yield

7/26/07

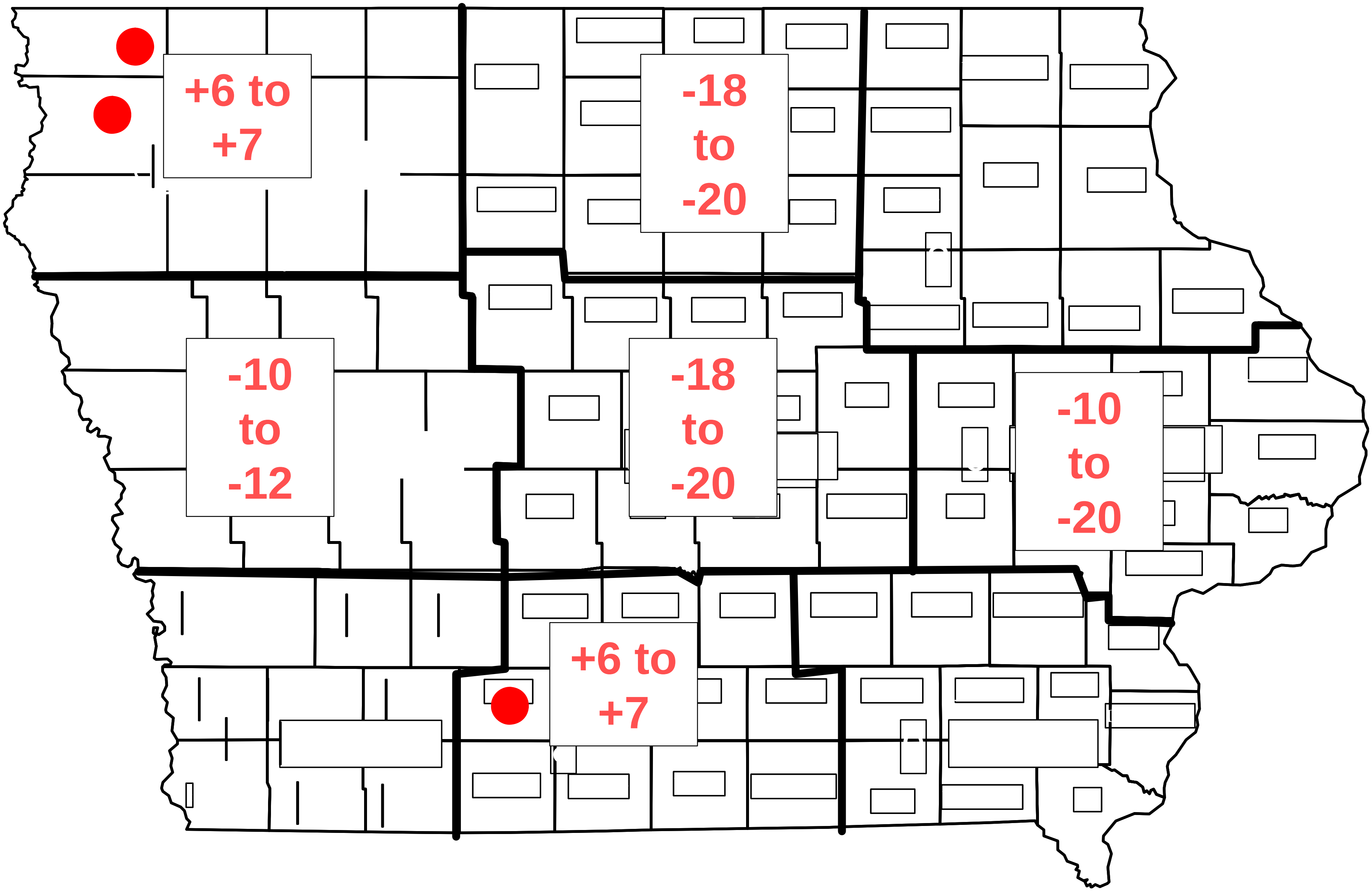
Iowa Current & Potential 2010 Crop Acreages



Basis Impacts from Ethanol

- Iowa regional price surface shifting
- Large local variability at point in time
- Increased variability over time
- A few key peaks in price surface, more to come
- Top bidders: processors & feed mills
- Large response to short crops
- Biofuels mandates a potential factor

August 07 High Points in Iowa Corn Basis
Feed Mills & Ethanol Plants



N.C. Iowa

Basis Examples, Corn 9/28/07

	Harv. Delivry	July Delvry
Garner	3.18 (-.55)	3.66 (-.42)
Kebler Milling	3.41 (-.32)	3.86 (-.22)
Hobartan	3.29 (-.44)	3.80 (-.28)
Global Lakota (ethanol)	3.28 (-.45)	3.73 (-.35)
Algona	3.20 (-.53)	3.66 (-.42)
Emmetsburg - Ethanol	3.33 (-.40)	3.78 (-.30)
Range	.23	.20

N.W. Iowa

Basis Examples, Corn 9/28/07

	Harv. Delivry	July Delvry
Rock Rapids elevator	3.41 (-.32)	3.77 (-.31)
Ashton ethanol	3.40 (-.33)	3.80 (-.28)
Siouxland Energy	3.51 (-.22)	3.84 (-.24)
Albert City	3.30 (-.43)	3.78 (-.28)
Alton Terminal	3.44 (-.29)	3. 81 (-.27)
Orange City elevator	3.44 (-.29)	3.81 (-.27)
Sheldon	3.44 (-.29)	3.81 (-.27)
Visser Elevtr Sioux Cntr.	3.48 (-.30)	N.A.
Egg Center, Sioux Cntr.	3.51 (-.27)	N.A.
Farmers Coop. Sanborn	3.48 (-.30)	3.80 (-.28)
Range	.21	.07

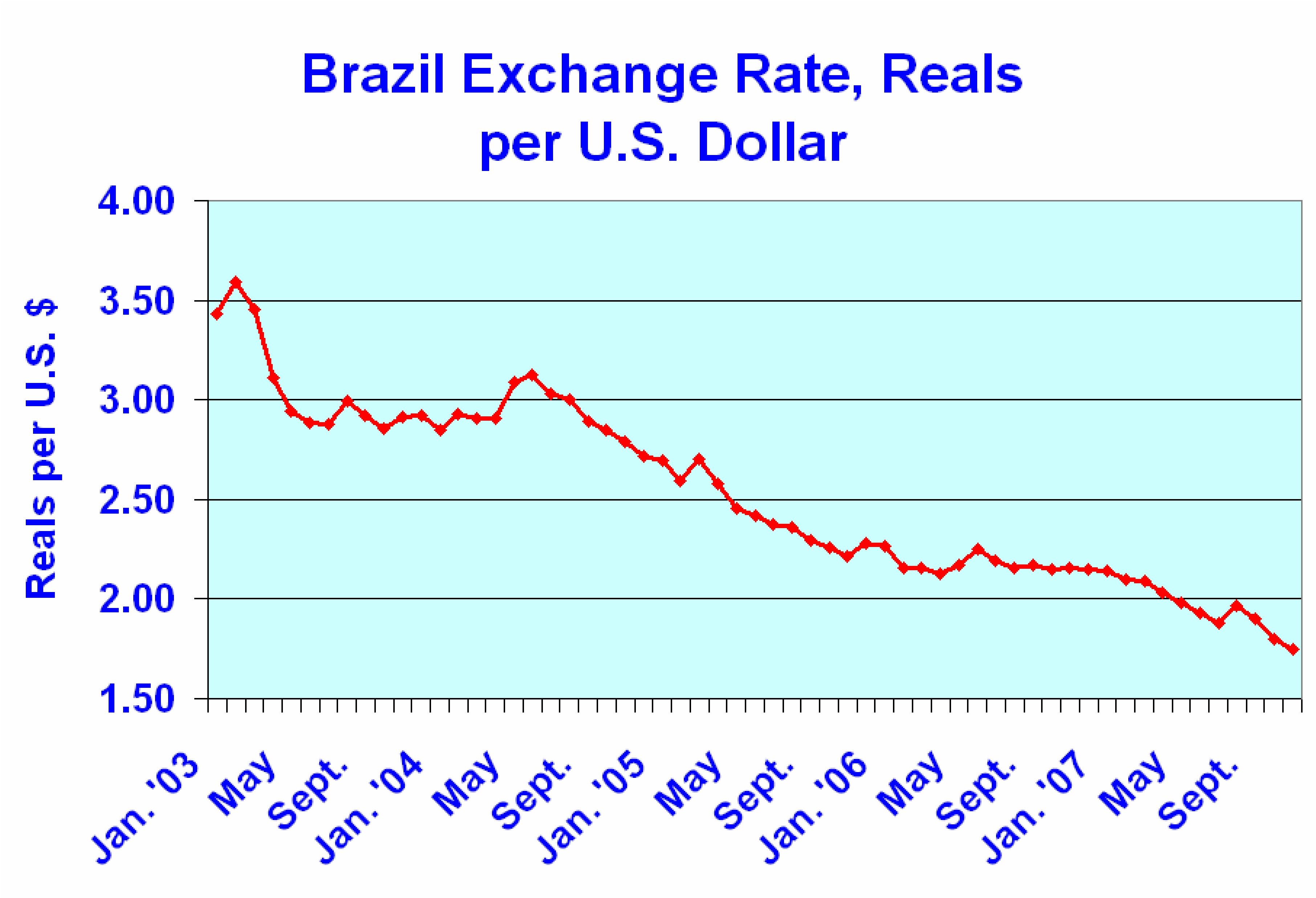
Implications for farm storage economics?

W.C. & Sw. Iowa

Basis Examples, Corn 9/28/07

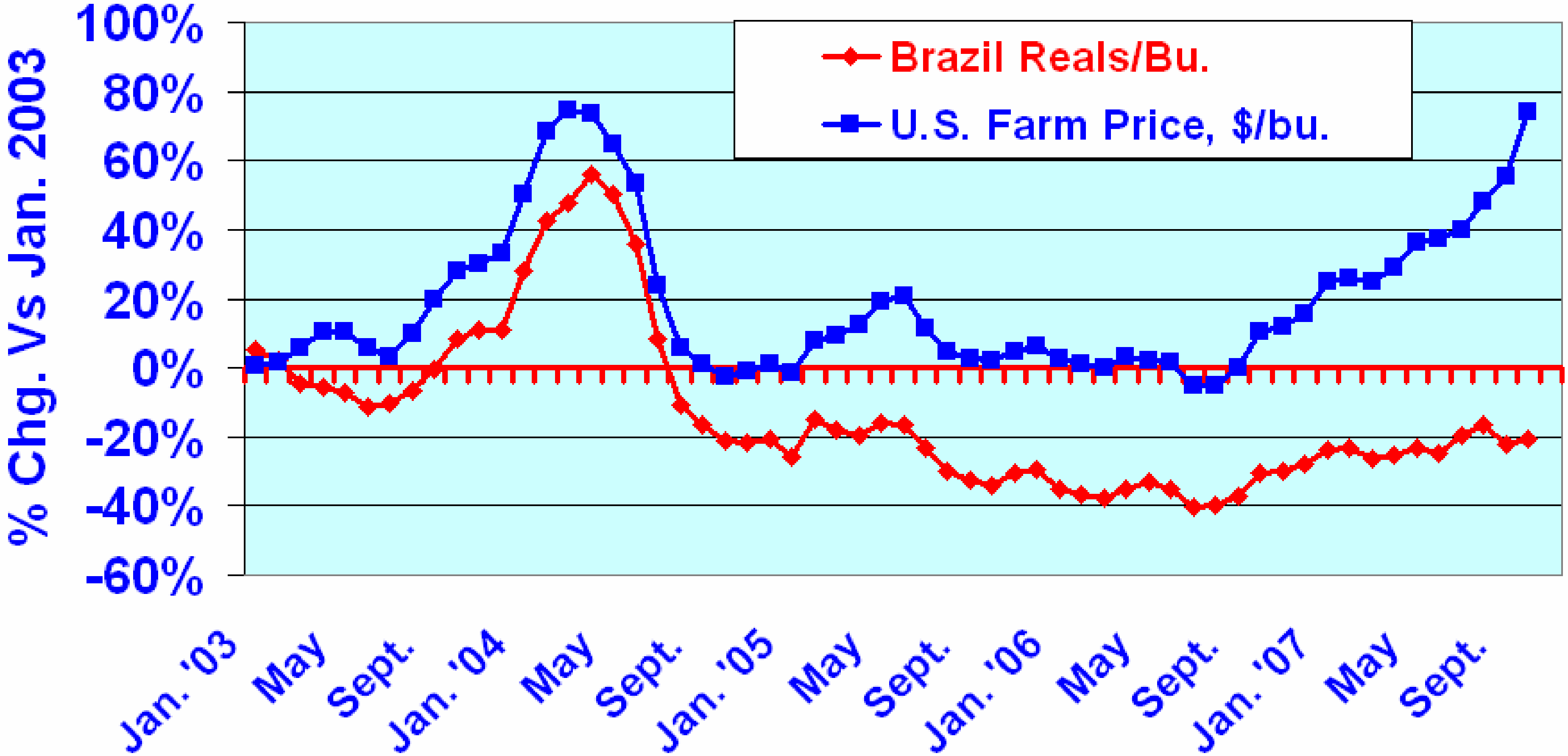
	Harv. Delivry	July Delvry
Coon Rapids ethanol	3.27 (-.46)	3.74 (-.34)
Denison ethanol	3.51 (-.22)	3.84 (-.24)
Creston Elevator	3.30 (-.41)	3.78 (-.28)
Corning ethanol plant	3.32 (-.41)	3.85 (-.23)
Bunge, Council Bluffs	3.29 (-.44)	est. 3.75 (-.33)
Onawa	3.43 (-.35)	N.A.
Lamoni	3.18 (-.53)	N.A.
Shenandoah eth. plant	3.49 (-.24)	3.95 (-.13)
Range	.33	.21

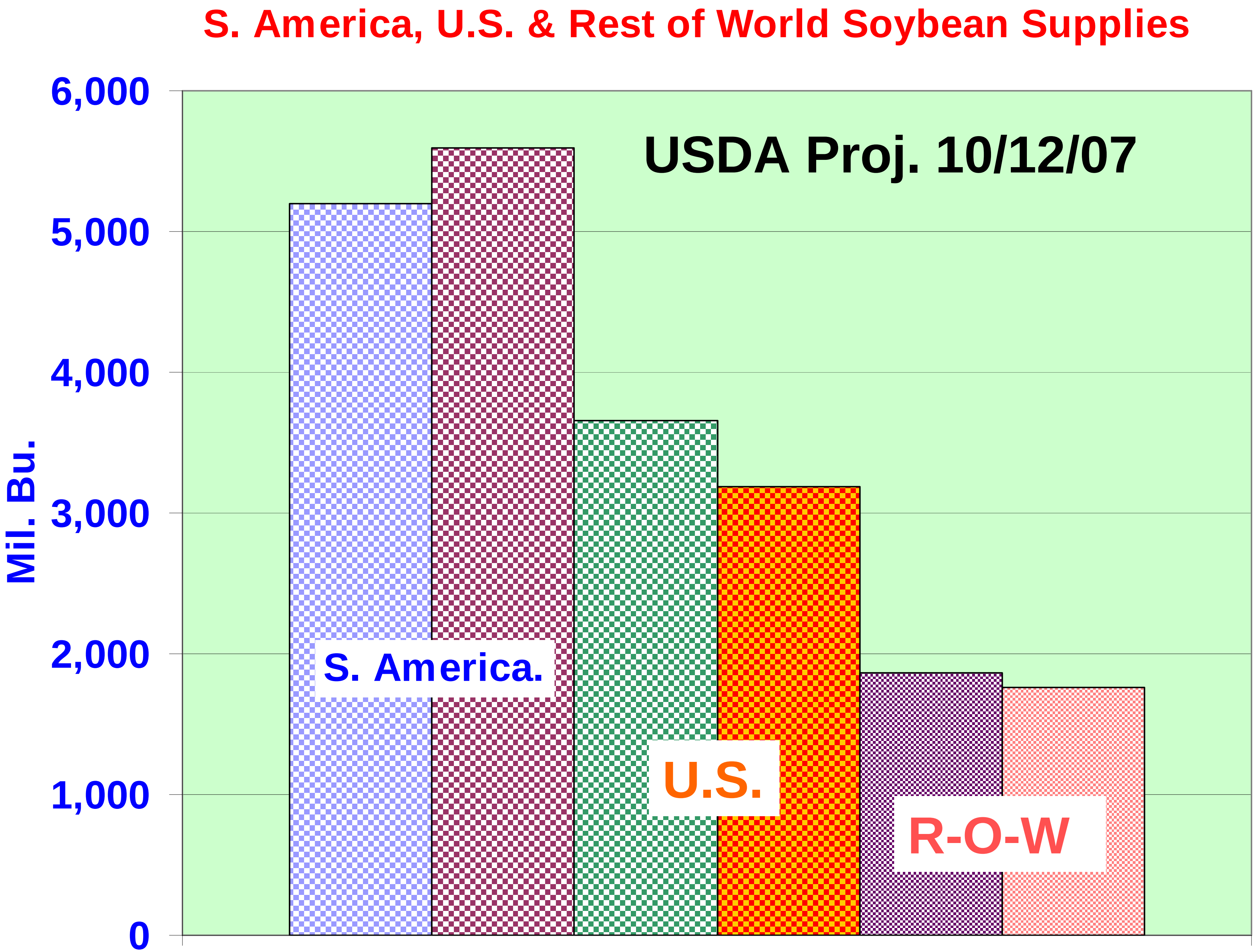
Aug. Corn Price				
	2007	2006	Chg.	% Chg.
IL	3.16	2.15	1.01	47.0%
IN	3.27	2.08	1.19	57.2%
IA	3.26	2.04	1.22	59.8%
KS	3.26	2.23	1.03	46.2%
KY	3.35	2.37	0.98	41.4%
MI	3.30	2.05	1.25	61.0%
MN	3.09	1.93	1.16	60.1%
MO	3.29	2.21	1.08	48.9%
NE	3.26	2.08	1.18	56.7%
NC	3.58	2.52	1.06	42.1%
ND	3.16	1.89	1.27	67.2%
OH	3.33	2.12	1.21	57.1%
SD	3.23	2.00	1.23	61.5%
Tenn	3.27	2.42	0.85	35.1%


Brazil Exchange Rate, Reals per U.S. Dollar
Reals per U.S. $
4.00
3.50
3.00
2.50
2.00
1.50
Jan. '03
May
Sept.
Jan. '04
May
Sept.
Jan. '05
May
Sept.
Jan. '06
May
Sept.
Jan. '07
May
Sept.

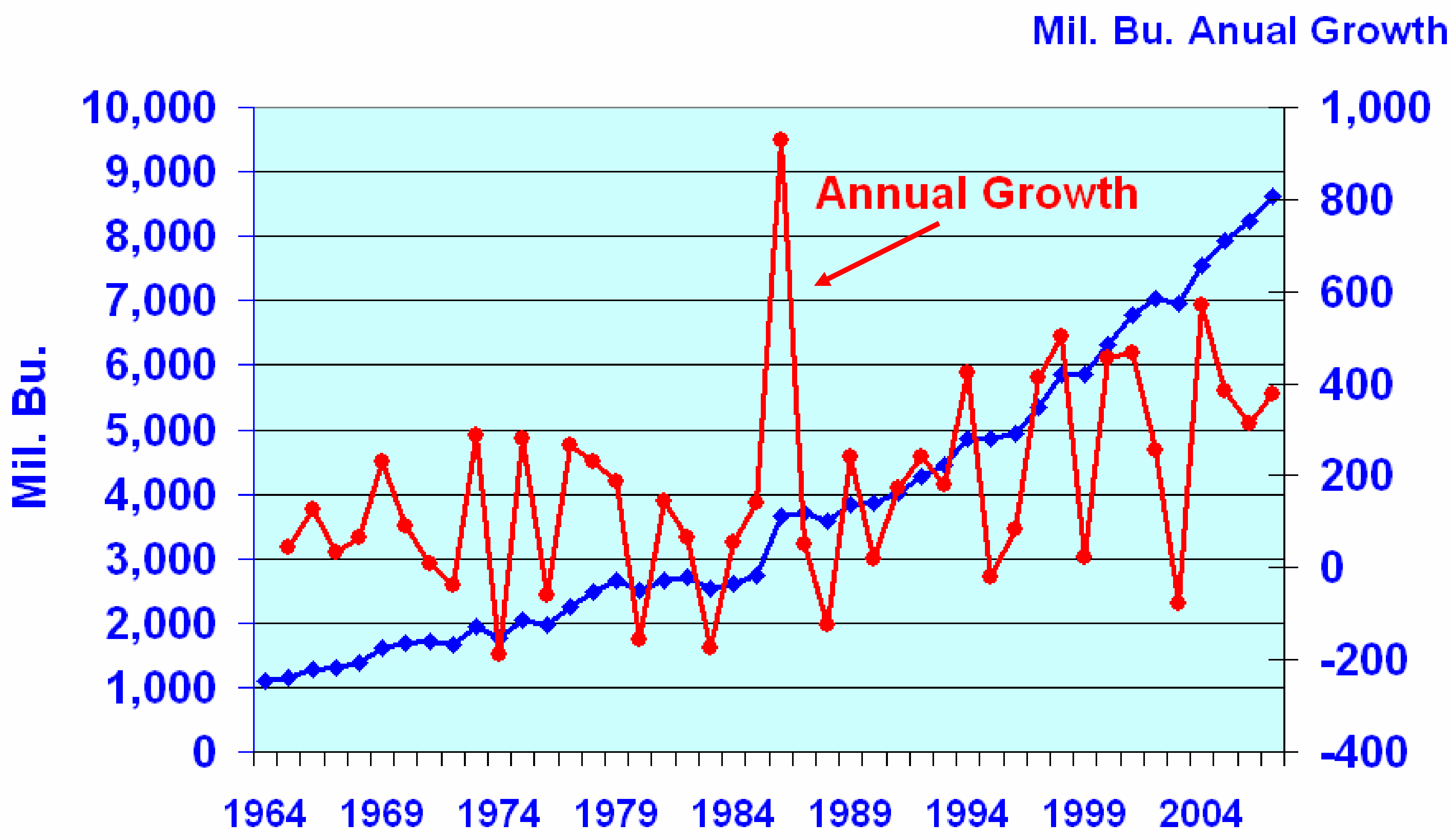
Soybean Prices in Brazilian Reals & U.S. Dollars, Percent Change vs. January 2003

Through Mid-Nov. 07




S. America, U.S. & Rest of World Soybean Supplies
USDA Proj. 10/12/07
Mil. Bu.
6,000
5,000
4,000
3,000
2,000
1,000
0
S. America.
U.S.
R-O-W

World Soybean Utilization



11/15/07

Soybean Balance Sheet, Mil. Bu. R. Wisner, ISU Econ.

	2004-05	2005-06	2006-07	Projected 2007-08		Projected 2008-09			Projected 2009-10		
Supplies:				A	USDA-Crop	A	B	C	A	B	C
Plant. A(mil.)	75.2	72.0	75.5	63.7	63.7	69.5	69.5	69.5	64.5	64.5	64.5
Harv.A.(mil)	74.0	71.3	74.6	62.7	62.7	68.2	68.6	68.8	63.2	63.6	63.8
Bu./A.	42.2	43.0	42.7	39.5	41.4	39.0	42.5	43.5	39.0	43.2	44
Production	3,124	3,063	3,188	2,477	2,594	2,659	2,914	2,992	2,466	2,749	2,808
Carryover	112	256.0	449	573	573	196	196	196	215	215	215
Total Supply	3,242	3,322	3,646	3,062	3,174	2,859	3,115	3,192	2,686	2,969	3,028
Crush	1,696	1,739	1805	1,770	1,825	1,750	1,815	1,820	1,670	1,790	1,800
Seed & Residual	192	188	153	175	163	180	175	175	185	180	180
Exports	1,097	947	1115	970	990	760	910	975	650	800	825
Total Utilization	2,986	2,873	3,073	2,915	2,978	2,690	2,900	2,970	2,505	2,770	2,805
Carryover	256	449	573	147	196	169	215	222	181	199	223
Weeks carryover supply	4.5	8.1	9.7	2.6	3.4	3.3	3.9	3.9	3.8	3.7	4.1
U.S. FARM PRICE	$5.74	$5.66	$6.40	$9.55	8.95	$10.85	8.65	8.40	$9.85	8.80	8.70
IOWA AVE. PRICE, $/Bu.	5.64	5.60	6.35	9.50	8.90	10.80	8.60	8.35	9.80	8.75	8.65
Counter-Cyclical Pmt.	0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HARV. PRICE, C.IA	4.70	5.15	$5.45	8.45	8.45	10.60	8.45	8.15	9.65	8.55	8.45
NOV. FUT. @ HARV.	$5.15	$5.70	$6.05	$9.45	$9.45	$11.05	$9.05	$8.85	$10.10	$9.10	$9.00
Historical Probability						18%	65%	17%	18%	65%	17%
MEAL DECATUR, $/T 48%	$184	$175	205	$284	$286	$322	$260	$239	$279	$267	$250
SOY OIL, DECATUR, cts./Lb.	23.0	23.8	31.0	42.0	36.5	46.5	37.5	36.5	45.0	37.5	37.0
Soybean/Corn Price ratio	2.79	2.83	2.11	2.55	2.52	2.58	2.40	2.43	2.21	2.48	2.60

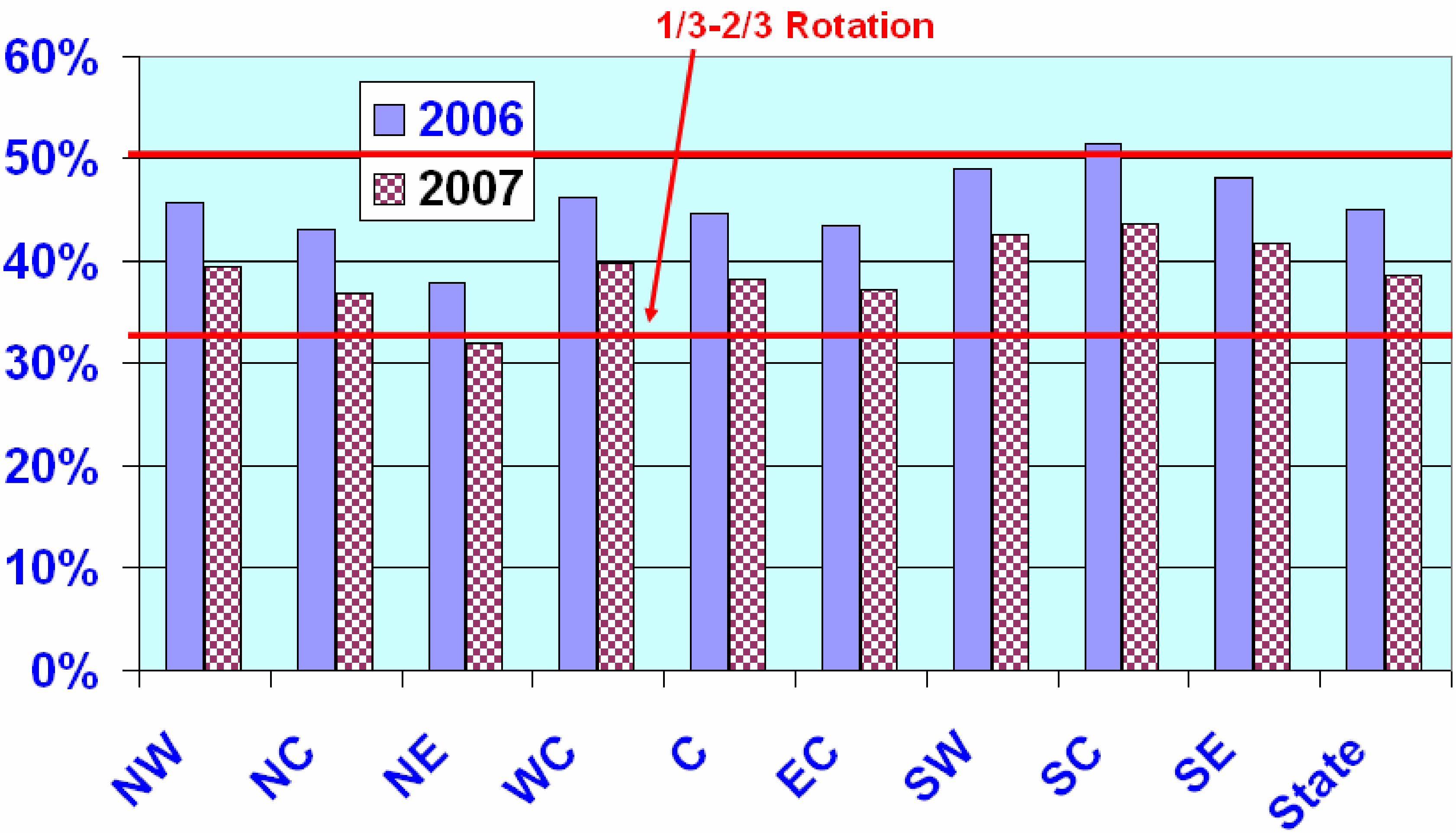
MINIMUM SOYOIL PRICE FOR BIODIESEL BREAKEVEN
at GIVEN WORLD CRUDE OIL PRICE

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	$70.00
	Add biodiesel	Profitability of Biodiesel at given crude oil and soyoil prices, %$/lb								
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.

Figure 3. Iowa Soybean Acres as a % of Row-Crop Acres harvested for Grain, 2006 & 2007

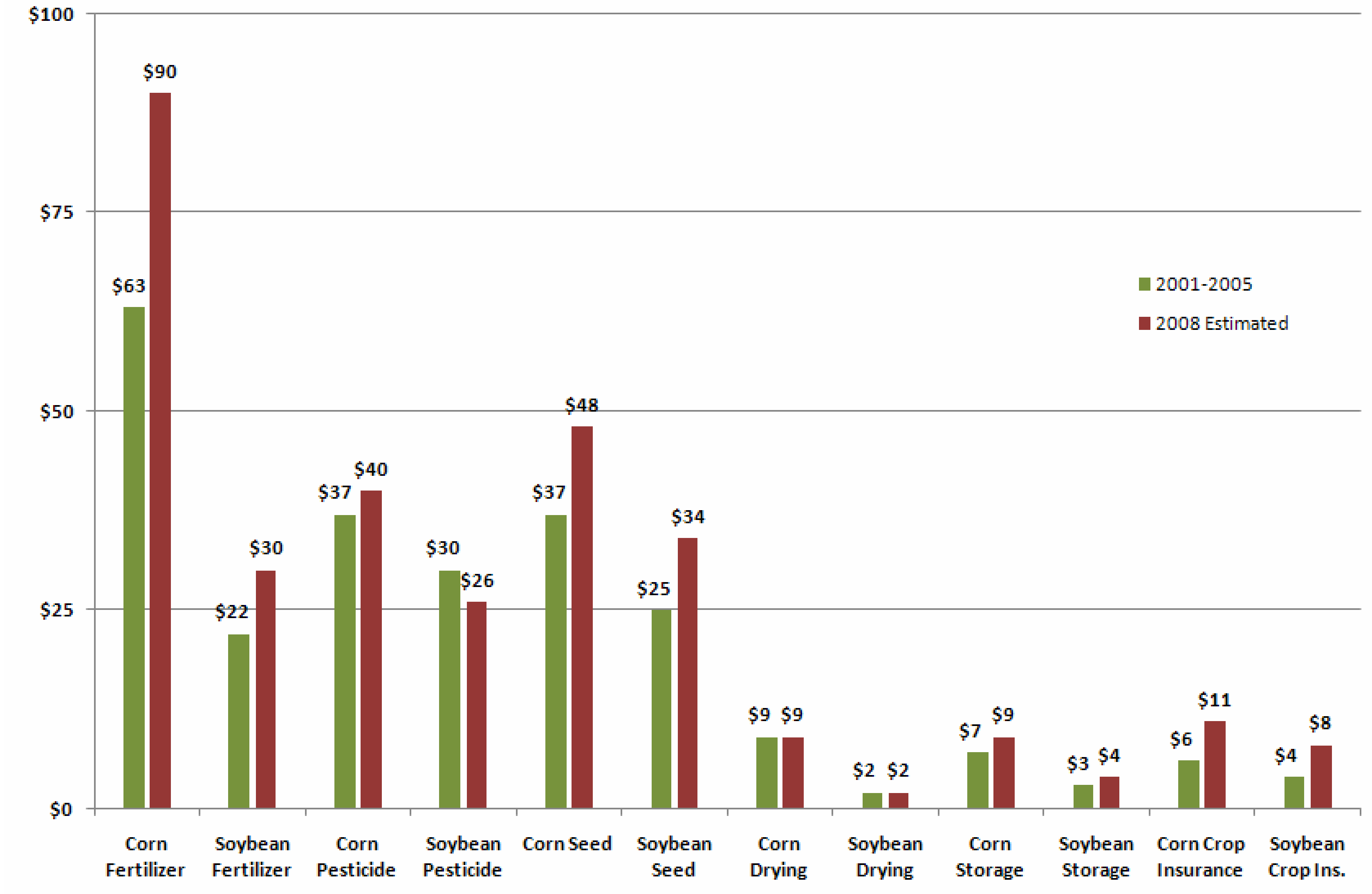


Soybean Basis – Lost Cause?

- **Iowa basis -$1.00 to -$1.25 vs. near-by futures this summer**
- ***CBOT says speculative trading has overwhelmed the delivery mechanism***
- **Delivery area: Illinois River to St. Louis (actually larger than corn)**
- **Mechanism: shipping certificates**
- **Expect basis to be substantially stronger in spring, summer, 2008 – but no guarantees**
- ***SB geographic basis likely to follow corn***

Direct Cost of Crop Production ($/A)

Historical vs. 2008 Estimate



Source: U of IL Extension Economics, July 2007.

The Margins

	CORN			SOYBEANS	
	2007 $3.10bu	2008* $3.35/bu		2007 $6.40/bu	2008* $8.60/bu
Yield bu/a	180	180		55	55
Income	$558.00	$603.00		$352.00	$473.00
Variable Cost	204.97	249.13		113.00	132.54
Fixed Cost	48.20	55.94		21.73	22.63
Labor	28.60	28.60		26.95	26.95
Land	180.00	225.00		180.00	225.00
Total Cost	461.77	558.67		341.68	407.12
Margin/acre	$96.23	$44.33		$10.32	$65.88
Margin/Bu.	$0.53	$0.25		$0.19	$1.20

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Take-Home Points: Corn & SB

- **Biofuels expansion slowing, but still significant**
- **Watch export sales: repeat of '95-96?**
- ***More soybeans, wheat (cotton?) likely to reduce corn acres in 2008***
- **Acreage battle likely to intensify in 2009 & 2010**
- **Higher govt. biofuels mandate key to ethanol infrastructure capacity**
- **Much more Iowa corn needed in 3-5 years**

Take-Home Points: Corn & SB II

- **Forward contracts & HTAs offer above-normal storage profit potential -- for corn**
- **Corn & SB basis likely stronger in spring. Strongest basis: @ ethanol plants, feed mills**
- **Options look expensive, may be better alternative in spring**
- ***Be prepared for bean market to bring sharp increase in 2008 acres, downward trend in bean prices in fall of '08***
- **Corn prices, late summer '08 to depend on improvements in ethanol infrastructure, Govt. biofuels mandate, & blending credit**

Thank You.
Questions?

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

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