

# The Long Term Future of Grain and Oilseeds

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# CURRENT SITUATION

## Comparative Grain Prices, Dollars per Bushel

	<u>Ave.<sup>1</sup></u>	<u>Now<sup>2</sup></u>
Wheat	\$3.36	\$10.67
Corn	2.27	5.16
Grain Sorghum	2.20	5.02
Soybeans	5.64	13.38

<sup>1</sup> Average price per bushel, 2000-2006.

<sup>2</sup> Kansas City cash truck bids, 22 February 2008.

## U.S. Wheat Balance Sheet (Feb)

	05-06	06-07	07/08
Plant A. (mil.)	57.2	57.3	60.4
Harvest A. (mil.)	50.1	46.8	51.0
Bu./A.	42.0	38.7	40.5
Production	2,105	1,812	2,067
Imports	82	122	90
Carryover	540	571	456
<b>Total Supply</b>	<b>2,727</b>	<b>2,505</b>	<b>2,613</b>
Utilization:			
Feed and Residual	154	125	110
Food	914	933	945
Seed	78	81	86
Exports	1,009	909	1,200
<b>Total Utilization</b>	<b>2,155</b>	<b>2,049</b>	<b>2,341</b>
Carryover	571 (26%)	456 (22%)	272 (11%)
<b>U.S. Farm Price</b>	<b>\$3.42</b>	<b>\$4.26</b>	<b>\$6.45-6.85</b>

## Corn Balance Sheet (Feb)

	05-06	06-07	07/08
Plant A. (mil.)	81.8	78.3	93.6
Harvest A. (mil.)	75.1	70.6	86.5
Bu./A.	148.0	149.1	151.1
Production	11,114	10,535	13,074
Imports	9	12	15
Beginning Carryover	2,114	1,967	1,304
<b>Total Supply</b>	<b>13,237</b>	<b>12,514</b>	<b>14,393</b>
<b>Utilization:</b>			
Feed and Residual	6,141	5,598	5,950
Food, seed, industrial	2,981	3,488	4,555
<b>Ethanol for fuel</b>	<b>1,603 (14%)</b>	<b>2,117 (20%)</b>	<b>3,200 (24%)</b>
Exports	2,147	2,125	2,450
<b>Total Utilization</b>	<b>11,270</b>	<b>11,210</b>	<b>12,955</b>
Ending Carryover	1,967 (17%)	1,304 (12%)	1,438 (11%)
U.S. Farm Price	\$2.00	\$3.04	\$3.75-4.25

## Corn Usage Estimates (Millions of Bushels)

	USDA/WASDE 2006/07	USDA/WASDE (Feb) 2007/08 est.
Feed and Residual	5,598	5,950 <sup>1</sup> (+6%)
Food, Seed, and Industrial	1,371	1,355 <sup>2</sup> (-1%)
Ethanol for Fuel	2,117	3,200 (+51%)
Net Exports	2,125	2,450 (+15%)
Ending Stocks	<u>1,304</u>	<u>1,438</u> (+10%)
<b>Total Usage</b>	<b>12,515</b>	<b>14,393</b> (+15%)
<b>Production</b>	<b>10,535</b>	<b>13,074</b> (+24%)

<sup>1</sup> Assumes DDGS retain 30% of the feed value of corn and are included in the feed and residual category by the USDA.

<sup>2</sup> Industrial, food, and seed less ethanol.

## Soybean Balance Sheet (Feb)

	05-06	06-07	07/08
Plant A. (mil.)	72.0	75.5	63.6
Harvest A. (mil.)	71.3	74.6	62.8
Bu./A.	43.0	42.7	41.2
Production	3,063	3,188	2,585
Imports	3	9	6
Beginning Carryover	256	449	574
<b>Total Supply</b>	<b>3,322</b>	<b>3,647</b>	<b>3,165</b>
<b>Utilization:</b>			
Crushings	1,739	1,806	1,835
Seed	93	78	86
Exports	947	1,118	1,005
Residual	93	71	79
<b>Total Utilization</b>	<b>2,873</b>	<b>3,073</b>	<b>3,055</b>
Ending Carryover	449 (16%)	574 (19%)	160 (5.3%)
U.S. Farm Price	\$5.66	\$6.43	\$10.09-10.80

## Current Grain Market Situation (Feb)

- Wheat – Global shortage of quality milling wheat, Australian short crop, and increased planting in N. Hemisphere.
- Corn/G.S. – Strong demand from overseas buyers, ethanol demand, low U.S. carryover stocks, and bid for acres.
- Soybeans – Critically small U.S. carryover, uncertain Brazilian harvest, and acres planted in the U.S.

### Factors to Watch:

- Global S/D balances
- Battle for Acres
- Southern Hemisphere Crop Harvests
- Ethanol Profit Margin

# FUTURE DEMAND

## WORLD LAND AREA

**13.2 BILLION HECTARES -  
32.6 BILLION ACRES**

38% is wasteland, cities, highways, etc.

30% is forest

21% is permanent grass

11% is productive cropland

**.22 HECTARES PER PERSON or .54 ACRES**  
(United States 1.58 A. per person)

## MORE MOUTHS TO FEED

- Brazil, Russia, China, India, and several other country economies are growing faster than the world average
- People want to buy an improved diet with increased income
- **Challenge - feed a billion additional people every 10 to 15 years**

## Growing Demand, Higher Price



## The Largest Economies and Oil, 2006

1.	United States	\$13.201 Trillion
2.	Japan	4.340
3.	Germany	2.906
4.	China	2.668
5.	United Kingdom	2.345
6.	France	2.230
7.	Italy	1.845
8.	Canada	1.251
9.	Spain	1.224
10.	Brazil	1.068
11.	Russia	.987
12.	India	.906

## U.S. Oil Import Suppliers, 2006

1. Canada
  2. Mexico
  3. Saudi Arabia (OPEC)
  4. Venezuela (OPEC)
  5. Nigeria (OPEC)
  6. Iraq
  7. Angola
  8. Algeria (OPEC)
  9. Russia (Aligns with OPEC)
  10. Ecuador
- Source: Energy Information Administration

## Price Effect of an Interruption in OPEC Oil Imports



## What would it take to replace imported transportation fuels?

To replace the OPEC gasoline (59 bgpy) with ethanol would require 22 billion bushels of corn. This year's production – 13.1 billion bushels.

To replace the OPEC diesel (27 bgpy) with soy-diesel would require 18 billion bushels of soybeans. This year's production – 2.6 billion bushels.

## Small Increase in Supply, Large Decrease in Price



# ETHANOL

## U.S. Ethanol Industry at a Glance

	2006	2008
■ Number of operating ethanol plants:	97	143
■ Plants under construction or expanding:	35	64
■ Announced plants:	300 <sup>(17%)</sup>	?
■ Current production capacity: (BGPY)	4.8	8.2
■ Projected production capacity:	12.4 BGPY end of 2008	13.4 BGPY end of 2009
■ Feedstock percentage:		
Corn	97	
Sorghum	2	
Other	1	

## The Kansas Ethanol Industry<sup>1</sup>

### Operating Plants

Campus  
Colwich  
Garden City (2)  
Garnett  
Leoti  
Liberal  
Phillipsburg  
Pratt  
Russell

### Under Construction

Goodland  
Lyons

Capacity: 426.5 mgy + 75 mgy = 501.5 mgy  
At full capacity will use about 186 mil. Bu.  
grain  
(2007 KS corn/milo production 640 mil. Bu.)

<sup>1</sup> February 2008

## Ethanol Plant Economics

- Cost to build a 100 MGPY plant - \$200 million
- Purchase about 37-39 million bushels of corn  
(240,000 acres)
- Daily water use: 1.5 million gallons
- Natural gas expense - \$15 to \$25 million
- Payroll expense about \$2 million
- Distiller's Dried Grains income about \$50 million
- CO<sup>2</sup> income - \$0
- Goal 30% R.O.I.

## Ethanol Profit Margin (\$ per gallon)

<u>Prices</u>	<u>Mid-July</u>	<u>Feb. 08</u>	<u>Change</u>
Corn (\$/bu.)	3.2725	5.345 <sup>1</sup>	+63%
Ethanol	1.905	2.26	+19%
RBOB	1.98	2.5337	+28%

Profit Margin +.26      +.03

<sup>1</sup> Breakeven corn price - \$5.44

To compete with gasoline as substitute, ethanol price would need to fall to \$1.67 per gallon.

## Future Development of Ethanol Technology

- Cellulosic Ethanol

## Corn vs. Cellulosic Ethanol

	<u>Corn</u>	<u>Cellulosic</u>
Capital cost per gallon	\$2.00	\$5-6.00 est.
Raw mat. cost per ton	\$120-160	\$94-100
Enzyme cost per ton	\$3.15	\$33.00
Ethanol yield per dry ton	100-110 gal.	75-90 gal.
Conversion process	simple	complex
Processing time, days	2	7
Cost of prod. per gallon	\$1.10	\$2.20 est.

Sources: Testimony of Keith Collins, USDA Chief Economist, 26 Aug. 2006; Popp and Hogan presentation at Farm Foundation Conference 12-13 April 2007; and M. Woolverton calculations.

## Kansas Hay Prices, \$ Per Ton

### Alfalfa

Horse: (sm sq)	\$200
Dairy: (lg sq) mid-quality	145
Feedyard: ground, dlvd	120

### Grass

Bluestem, burmuda, brome: (lg sq)	100
Sudan: (lg sq)	80
Mulch: (lg sq or rd <sup>1</sup> )	50

### Stover

Straw: (lg sq)	47
Corn Stalks: (lg sq)	45
Milo Stalks: (lg sq)	45

Source: USDA, Kansas Hay Report, 15 Feb. 2008

<sup>1</sup>Large round bales usually sell for a \$5 per ton discount.

## Cellulosic Ethanol Conclusions

- High initial investment calls for economies of size, but the large tonnages required, logistical costs, and slow speed of processing will keep plant capacities small and unit cost of output high.
- Grain will continue to provide the basic feedstock for ethanol plants which will be supplemented by a cellulosic feedstock stream when available.
- Cellulosic industry development will be slow and require substantial federal subsidies and/or strict usage mandates.

## Future Development of Ethanol Technology

- Cellulosic Ethanol
- Bio-butanol

# BIO-DIESEL

## Biodiesel Capacity and Production, U.S. and Europe, 2000-2006 (million gallons)

Year	U.S.		Europe	
	Cap.	Pdn.	Cap.	Pdn.
2000	50	2	-	198
2001	50	5	-	227
2002	54	15	-	310
2003	85	20	597	418
2004	157	25	654	563
2005	290	75	1,232	928
2006	580	250 <sub>(43%)</sub>	1,768	1,420 <sub>(80%)</sub>

Sources: NBB, EBB

## Soybean Oil Futures Price



## BD Profit Margin Calculation

### Soybean oil to Bio-diesel Conversion:

- Soybean oil (\$.6358 per pound) -\$4.77
- Diesel wholesale per gallon \$2.895
- Cost of methanol = Glycerin credit
- Cost to process \$0.00
- BD Net Processing Margin -\$1.87

Biodiesel producers receive a \$1 dollar per gallon subsidy for converting vegetable oil or animal fat to biodiesel fuel.

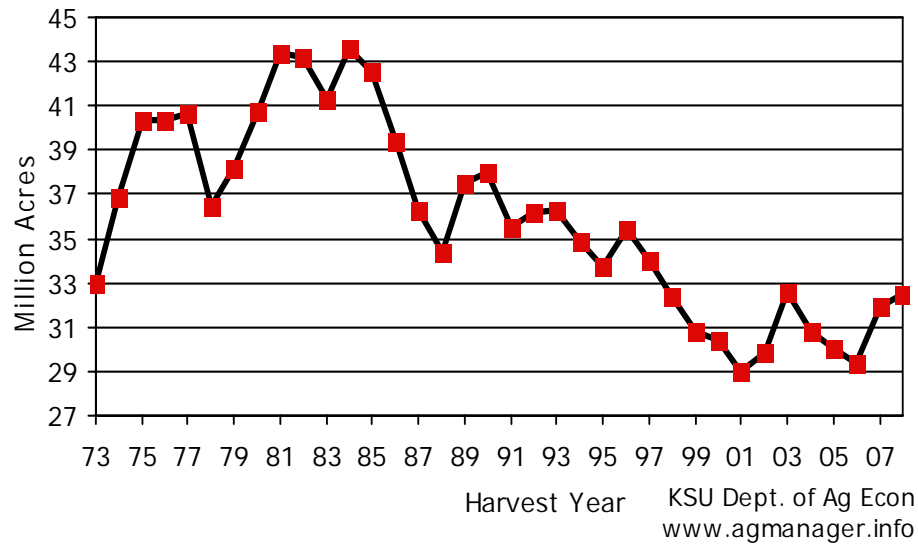
## Land in Crops

(Millions of acres)

	5_yr. Ave.	07/08USDA	Proj. 08/09 <sup>1</sup>	
Corn	79.6	93.6	90.0	(-4%)
Soybeans	74.2	63.7	71.0	(+11%)
Hay	62.4	61.8	61.8	(-)
Wheat	59.5	60.4	64.0	(+6%)
Cotton	14.1	10.9	9.5	(-13%)
Grain Sorghum	8.1	7.7	7.4	(-4%)
Principle Crops	297.9	298.1	303.7	
CRP		35.9	34.9	(-3%)

<sup>1</sup>Estimates for corn, soybeans, wheat, and cotton from the USDA Commodity Outlook Forum, released February 22, 2008.  
Total crop land in the United States – 441.6 million acres

## Hard Red Wheat Planted Acreage



## CONCLUSIONS ABOUT THE FUTURE

- Growth in global demand will continue to put pressure on available supplies
- Bio-processing demand will grow
- Global production will increase given time
- U.S. crop production patterns will shift
- Markets will be highly sensitive to weather variations
- Prices are likely to fall long term, but not to previous levels

## Comparative Grain Prices, Dollars per Bushel

	<u>Ave.<sup>1</sup></u>	<u>Now<sup>2</sup></u>	<u>Future<sup>3</sup></u>
Wheat	\$3.36	\$10.67	\$4.50-5.50
Corn	2.27	5.16	\$3.50-4.50
Grn Sorghum	2.20	5.02	\$3.40-4.40
Soybeans	5.64	13.38	\$7.50-8.50

<sup>1</sup> Average price per bushel, 2000-2006.

<sup>2</sup> Kansas City cash truck bids, 22 February 2008.

<sup>3</sup> Suggested long term average price to be used for planning purposes.