Corn Producers, Ethanol Markets, and Co-Products: When 92 Million Acres is Not Enough

Jamey Cline, Director of Biofuels and Business Development
### More Corn Per Acre

<table>
<thead>
<tr>
<th>Year</th>
<th>Million Acres</th>
<th>Acreage</th>
<th>Production</th>
<th>Billion Bushels</th>
</tr>
</thead>
<tbody>
<tr>
<td>1930</td>
<td>103.9</td>
<td>1.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1940</td>
<td>88.7</td>
<td>2.2</td>
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</tr>
<tr>
<td>1950</td>
<td>82.9</td>
<td>2.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1960</td>
<td>81.4</td>
<td>3.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1970</td>
<td>66.9</td>
<td>4.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1980</td>
<td>84.0</td>
<td>6.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1990</td>
<td>74.2</td>
<td>7.9</td>
<td></td>
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</tr>
<tr>
<td>2000</td>
<td>79.6</td>
<td>9.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>88.2</td>
<td></td>
<td></td>
<td>12.4</td>
</tr>
</tbody>
</table>

Source: USDA
CORN YIELD TREND ACCELERATING OVER PAST 15 YEARS

After (1) Freedom to Farm in 1996, (2) Beginning adoption of GMO seeds in mid-1990s (and then stacked traits), and (3) Relatively benign weather 1996-2009, the corn yield trend is increasing at about 2.4 bu/ac per year, vs. 1.9 longer term.

Source: PRX
Corn Production Change
11-12 vs. Previous Year

Source: PRX
U.S. Corn Markets

2011-12 crop projection, 336 MMT total Use

- Feed 37%
- Ethanol 30%
- Export 14%
- Distiller Grains 35 MMT
- Other Food, Industrial 6%
- HFCS 4%
- DDG Displacement 9%

Source: PRX
Corn Demand for Feed

2010 Projected; Source: USDA, ERS; ProExporter Network
CORN FEED USE DECLINES WITH DDG DISPLACEMENT

Corn feed use in current Blue Sky model assumes that some 2/3 rds of DDG production will displace corn in livestock feeding, rising to nearly 20% of total fed.

Source: PRX
Estimates of DDGS Replacing Corn

Source: PRX
Corn Demand for Export

2010 Projected; Source: USDA, WAOB; Census Bureau
DDGS Market Development:
Export Growth - 2002-2010

Source: USDA
2007 EISA (Energy Act or RFS2)

Source: EPA

Renewable Fuels Standard

- Conventional Biofuels
- Cellulosic
- Other Advanced Biofuels
- Ethanol-based diesel

Source: EPA
Ethanol Production Increasing

2010: 13.2 million gallons produced

Source: RFA
Fueling the United States

Top Crude Oil Sources and the U.S. Ethanol Contribution

U.S. Ethanol A Major Supplier
Next time you wonder about ethanol’s impact consider this: if the U.S. ethanol industry were a foreign supplier, only Canada would supply the U.S. with more fuel than the U.S. ethanol industry.

Source: Growth Energy
Figure 3. Increase in production of corn and use of corn to produce ethanol since 2001
Is Corn for Ethanol Overestimated?

Ethanol and Co-Products

<table>
<thead>
<tr>
<th></th>
<th>Bil Bu</th>
</tr>
</thead>
<tbody>
<tr>
<td>USDA</td>
<td>5.05</td>
</tr>
<tr>
<td>RFA</td>
<td>4.95</td>
</tr>
</tbody>
</table>
Corn for Feed and Ethanol

USDA Estimate of Corn for Feed and Residual

5.0 Billion Bushels

5.05 Billion Bushels

Total USDA Estimate of Corn for Ethanol, Distillers Grains, Corn Oil and Other Ethanol Coproducts

Distillers Grains Corn Feed Equivalence Exported Corn Used as Feed

1.2 bil bu

1.4 bil bu

Numbers based on July 2011 WASDE report and PRX estimate of distillers grains; export amount represents estimated 75% of exported corn that will be used as feed.
Corn for Feed and Ethanol

5.0 Billion Bushels

USDA Estimate of Corn Used for Feed and Residual

5.05 Billion Bushels

Total USDA Estimate of Corn for Ethanol and Distillers Grains

3.85 Billion Bushels

Total USDA Estimate of Corn for Ethanol, Excluding Distillers Grains Corn Feed Equivalence (5.1 minus 1.2)

1.2 bil

Distillers Grains Corn Feed Equivalence

1.5 bil

Exported Corn Used as Feed

Numbers based on USDA’s July 2011 WASDE report and PRX estimate of distillers grains. Export amount represents estimated 80% of exported corn that will be used as feed.
Adjustments to USDA
Projected Carry-out

- 150.8 (-5%)
- 158.2 (PRX)
- 158.7 (USDA)
- 166.6 (+5%)

92.3 mil planted / 84.9 million harvested
Adoption of E15

- How fast?
- Overcome hurdles

Source: http://www.towncalleddobson.com/?p=571
Looking Ahead to 2020
New Demand

• Growth in Corn for Ethanol slows
  – USDA WASDE:
    • 10/11: 5.05 est.
    • 11/12: 5.15 est.
  – 10/11: 13.2 bgy ~ 4.76 bbu (2.77 gp)  
  – Now: 4.9 bbu (Informa)
  – 2020: 5.3 bbu (Informa)
Figure 98. EISA2007 renewable fuels standard, 2010-2035 (billion ethanol equivalent gallons)

Source: 2011 AEO
Informa Baseline Assumptions

- Long-run corn yields will continue to increase
  - 189 bu/acre in 2020-21
- Ethanol demand capped at 15 bil gallons per year (RFS II)
  - CA LCFS will 1st push Midwest corn ethanol from state and later dramatically reduce all ethanol use in State
- China corn imports will increase (modestly)
- Increasing production, and capped demand will cause stocks to rise and acreage to eventually shift away from corn to soybeans.
Acreage Planted (Informa Baseline)

Million acres


Corn | Soybeans | Wheat | Cotton

Legend:
- Green: Corn
- Blue: Soybeans
- Red: Wheat
- Yellow: Cotton
20 Billion Gallon Scenario

• Allowing higher volumes of conventional ethanol to count toward RFS II is important because of the a shortfall in the volume of cellulosic biofuel that is commercially available

  – 20 billion gallons is approximately equivalent to full nationwide adoption of E-15
  – Additional gallons over RFS II will phase in over time after 2015
Acreage Planted (20 bil gal scenario)

<table>
<thead>
<tr>
<th>Year</th>
<th>Million acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010-11</td>
<td></td>
</tr>
<tr>
<td>2011-12</td>
<td></td>
</tr>
<tr>
<td>2012-13</td>
<td></td>
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<tr>
<td>2013-14</td>
<td></td>
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<tr>
<td>2014-15</td>
<td></td>
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<tr>
<td>2015-16</td>
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<td>2016-17</td>
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<td>2017-18</td>
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<tr>
<td>2018-19</td>
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<tr>
<td>2019-20</td>
<td></td>
</tr>
<tr>
<td>2020-21</td>
<td></td>
</tr>
</tbody>
</table>

Legend:
- Corn
- Soybeans
- Wheat
- Cotton
We have a choice...
What is the effect on Consumers?

- 378 million gallons - Daily Consumption of gasoline\(^1\)
- Cost Savings of $0.89 per gallon (U of WI, Iowa State)
- Ethanol is saving the American gas consumer approximately $330,000,000 per day.
- Additionally, ethanol displaces/substitutes for gasoline sales
- American gas consumers purchase ~ 36 mg of ethanol per day
- Additional loss of more than $100,000,000 per day of lost oil sales

- In short, ethanol is costing the oil industry about
  - $430,000,000 per day in profits and sales

- So where is ethanol’s negative publicity coming from? You be the judge.

\(^1\)(http://www.eia.doe.gov/energyexplained/index.cfm?page=oil_home#tab2)

Source: Dr Gregg Carlson, South Dakota State University
Thank you!
Reference Slides
## UNITED STATES CORN SUPPLY-DEMAND DETAIL, 2010-2019

<table>
<thead>
<tr>
<th>Item</th>
<th>Unit</th>
<th>Crop Year</th>
<th>10-11</th>
<th>11-12</th>
<th>12-13</th>
<th>13-14</th>
<th>14-15</th>
<th>15-16</th>
<th>16-17</th>
<th>17-18</th>
<th>18-19</th>
<th>19-20</th>
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<tbody>
<tr>
<td><strong>Carry-in</strong></td>
<td><em>mil bu</em></td>
<td></td>
<td>1708</td>
<td>658</td>
<td>738</td>
<td>997</td>
<td>599</td>
<td>671</td>
<td>1601</td>
<td>1447</td>
<td>1216</td>
<td>880</td>
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<tr>
<td><strong>Area planted</strong></td>
<td><em>thou ac</em></td>
<td></td>
<td>88.2</td>
<td>92.2</td>
<td>91.0</td>
<td>92.0</td>
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<tr>
<td><strong>Area harvested</strong></td>
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<td>81.4</td>
<td>85.2</td>
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<tr>
<td><strong>Yield</strong></td>
<td><em>bu/ac</em></td>
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<td>152.8</td>
<td>161.4</td>
<td>164.7</td>
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<td><strong>Production</strong></td>
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<td>13752</td>
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<td>12997</td>
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<td>15822</td>
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<td><strong>Supply</strong></td>
<td><em>mil bu</em></td>
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<td>14169</td>
<td>14420</td>
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<td>14003</td>
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<td>15959</td>
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<td>15938</td>
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<tr>
<td><strong>Carry-out</strong></td>
<td><em>mil bu</em></td>
<td></td>
<td>658</td>
<td>738</td>
<td>997</td>
<td>599</td>
<td>671</td>
<td>1601</td>
<td>1447</td>
<td>1216</td>
<td>880</td>
<td></td>
</tr>
<tr>
<td><strong>Disappearance (Use)</strong></td>
<td><em>mil bu</em></td>
<td></td>
<td>13511</td>
<td>13681</td>
<td>13519</td>
<td>13404</td>
<td>14212</td>
<td>14902</td>
<td>14742</td>
<td>14742</td>
<td>15131</td>
<td>15044</td>
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<tr>
<td><strong>Feed/Residual Use</strong></td>
<td><em>mil bu</em></td>
<td></td>
<td>5200</td>
<td>5300</td>
<td>5075</td>
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<td>5150</td>
<td>5575</td>
<td>5525</td>
<td>5500</td>
<td>5700</td>
<td>5725</td>
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<tr>
<td><strong>Residual use</strong></td>
<td><em>mil bu</em></td>
<td></td>
<td>822</td>
<td>820</td>
<td>669</td>
<td>534</td>
<td>751</td>
<td>1083</td>
<td>969</td>
<td>902</td>
<td>1011</td>
<td>990</td>
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<tr>
<td><strong>Feed use in state</strong></td>
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<td>4480</td>
<td>4406</td>
<td>4416</td>
<td>4399</td>
<td>4492</td>
<td>4556</td>
<td>4598</td>
<td>4689</td>
<td>4735</td>
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<tr>
<td><strong>Dairy</strong></td>
<td><em>mil bu</em></td>
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<td>783</td>
<td>802</td>
<td>791</td>
<td>793</td>
<td>790</td>
<td>795</td>
<td>800</td>
<td>808</td>
<td>813</td>
<td>821</td>
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<tr>
<td><strong>Beef cattle</strong></td>
<td><em>mil bu</em></td>
<td></td>
<td>1379</td>
<td>1397</td>
<td>1355</td>
<td>1358</td>
<td>1352</td>
<td>1381</td>
<td>1404</td>
<td>1417</td>
<td>1447</td>
<td>1461</td>
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<tr>
<td><strong>Hogs</strong></td>
<td><em>mil bu</em></td>
<td></td>
<td>929</td>
<td>951</td>
<td>939</td>
<td>941</td>
<td>938</td>
<td>972</td>
<td>988</td>
<td>997</td>
<td>1024</td>
<td>1034</td>
</tr>
<tr>
<td><strong>Poultry</strong></td>
<td><em>mil bu</em></td>
<td></td>
<td>1191</td>
<td>1232</td>
<td>1223</td>
<td>1226</td>
<td>1221</td>
<td>1246</td>
<td>1266</td>
<td>1278</td>
<td>1306</td>
<td>1319</td>
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<tr>
<td><strong>Other</strong></td>
<td><em>mil bu</em></td>
<td></td>
<td>96</td>
<td>98</td>
<td>97</td>
<td>97</td>
<td>97</td>
<td>98</td>
<td>98</td>
<td>99</td>
<td>100</td>
<td>101</td>
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<tr>
<td><strong>Processing in state</strong></td>
<td><em>mil bu</em></td>
<td></td>
<td>6312</td>
<td>6331</td>
<td>6444</td>
<td>6554</td>
<td>6762</td>
<td>6827</td>
<td>6817</td>
<td>6807</td>
<td>6798</td>
<td>6789</td>
</tr>
<tr>
<td><strong>Fuel ethanol, wet mill</strong></td>
<td><em>mil bu</em></td>
<td></td>
<td>481</td>
<td>481</td>
<td>481</td>
<td>481</td>
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<td>481</td>
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<td>481</td>
</tr>
<tr>
<td><strong>Fuel ethanol, dry mill</strong></td>
<td><em>mil bu</em></td>
<td></td>
<td>4441</td>
<td>4451</td>
<td>4553</td>
<td>4654</td>
<td>4847</td>
<td>4896</td>
<td>4874</td>
<td>4853</td>
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<tr>
<td><strong>Total fuel ethanol</strong></td>
<td><em>mil bu</em></td>
<td></td>
<td>4922</td>
<td>4932</td>
<td>5034</td>
<td>5134</td>
<td>5327</td>
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<td>5333</td>
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<tr>
<td><strong>Total Use</strong></td>
<td><em>mil bu</em></td>
<td></td>
<td>13511</td>
<td>13681</td>
<td>13519</td>
<td>13404</td>
<td>14212</td>
<td>14902</td>
<td>14742</td>
<td>14742</td>
<td>15131</td>
<td>15044</td>
</tr>
<tr>
<td><strong>Net Exports to foreign</strong></td>
<td><em>mil bu</em></td>
<td></td>
<td>-2000</td>
<td>-2050</td>
<td>-2000</td>
<td>-1900</td>
<td>-2300</td>
<td>-2500</td>
<td>-2400</td>
<td>-2435</td>
<td>-2633</td>
<td>-2530</td>
</tr>
</tbody>
</table>

**Note.** DDG Disposition (na until 06-07), with ruminants 35% ration @ 1.0 feed value of corn; hogs 20% @ 0.8; poultry 5% @ 0.5.
“Farming looks mighty easy when your plow is a pencil and you're a thousand miles from the corn field.”

-- Dwight D. Eisenhower