Grain Market “Drivers”

Key issues affecting grain markets over the 1998-2017 Period

1) **Major Demand Shocks** – U.S. biofuels use & Chinese soybean imports

2) **Ag Market Price Responsiveness** – Flexibility of Ag Prices

3) **Favorable Weather & Increased Grain Stocks**

4) **Chinese Agricultural Stocks Policy** – Feedgrain impacts

5) **Macroeconomic Factors** – U.S. & World
Grain Market “Drivers”
Key issues affecting grain markets over 1998-2017 Period

1) Major Demand Shocks
   - U.S. biofuels use
   - China soybean imports
Major Demand Shocks:
Steady U.S. Wet Corn Milling Demand

Marketing Years

Billion Bushels

- Beverages
- Cereals
- Starch
- Glucose - Dextrose
- HFCS

Marketing Years

Major Demand Shocks:
China Soybean Use, Imports & Ending Stocks

Marketing Years

Million Metric Tons

- Imports
- Ending Stocks
- Total Use
**Major Demand Shocks:**
**Major World Exporters of Soybeans**

![Graph showing major world exporters of soybeans from 2001/02 to 2016/17 marketing years.](graph)

**Q? What will be the future for these major demand drivers in the grain markets?**

**Q1? Can feedgrain use for U.S. ethanol & other milling processes begin trending higher again?**

- E-15 adoption, DDGS & ethanol exports, corn products?

**Q2? Will Chinese soybean imports continue to grow?**

- Livestock feed demand, inelastic food use demand, continuing free trade with the U.S. & other countries?
2) Market Price Responsiveness

- The **Flexibility** of agricultural market price responses

  - Elasticity = \( \frac{\% \Delta \text{Quantity}}{\% \Delta \text{Price}} \)
  
  - Flexibility = \( \frac{\% \Delta \text{Price}}{\% \Delta \text{Quantity}} \)


U.S. Soybean $ vs U.S. Stx-to-Use
MY 1973/74 through “Next Crop” MY 2017/18

U.S. Soybean % Ending Stocks/Use

U.S. Soybean Price
Q? Which categories of grain demand are most “price inflexible”?  \( p^* = f(q_{bu}) \)

- **U.S. Corn** ⇒ Ethanol use (RFS driven) & Wet Milling  
  - Livestock feed use & exports more price responsive
- **U.S. Wheat** ⇒ Domestic Food use  
  - Exports & livestock feed use are more price responsive
- **U.S. Soybeans** ⇒ Crush for SoyOil & SoyMeal  
  - Soybean exports are price responsive (“interplay” with South America)
- **U.S. Sorghum** ⇒ Exports (were in 2014-15 with China – not currently)

### Grain Market Behavior Over Time

**Economic principles** shown in market patterns over time

▷ **The focus of grain markets tend to vary seasonally**

- **Pre-harvest** ⇒ Focus on “Crop Production Impacts” (Flexibility)  
  \( \text{Price} = fn(\text{Supply}) \): How supply-demand & price scenarios may be affected by varying $ response to “short” vs “abundant” Stocks/Use market scenarios
- **Harvest & Post-harvest** ⇒ Focus on “Crop Use Impacts” (Elasticity)  
  \( \text{Use} = f(\text{Prices}) \): How crop demand & total use will be affected by “high” vs “low” prices
Grain Market “Drivers”

Key issues affecting grain markets over 1998-2017 Period

3) Favorable Weather & Increased Grain Stocks


As of the March 9, 2017 WASDE report

Production: 0.155 mmt/yr (+2.5%/yr) since 2007/08

Wheat Usage: 0.141 mmt/yr (+2.3%/yr) since 2007/08

End Stocks: 249.9 mmt in “Current” MY 2016/17
Up 121.9 mmt (+95%) since 38-year low of 128.1 mmt in MY 2007/08
World Wheat Production & Stocks

- Production: 735
- Ending Stocks: 751
- % Stocks to Use: 20%

World Corn Supply-Demand: MY 2007/08 thru “Current” MY 2016/17

As of the March 9, 2017 USDA WASDE Report
World Corn Production & Stocks

Production: 1,049
Ending Stocks: 962
% Stocks/Use: 21%

World Sorghum Production & Stocks

Production: 23
Ending Stocks: 68
% Stocks/Use: 38.6%
World Soybean Production & Ending Stocks: MY 2007/08 thru “Current” MY 2016/17

As of the March 9, 2017 WASDE Report

Soybean Production
- 16.3 mmt /yr (+7.6% /yr) since 2008/09

Soybean Usage
- 13.6 mmt /yr (+6.1% /yr) since 2008/09

Soybean Ending Stocks
- 82.8 mmt in MY 2016/17
- 42.8 – 82.8 mmt during 2007/08 - 2016/17 period

<table>
<thead>
<tr>
<th>Year</th>
<th>Production</th>
<th>Usage</th>
<th>Exports</th>
<th>Ending Stocks</th>
</tr>
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<tbody>
<tr>
<td>2007/08</td>
<td>219</td>
<td>264</td>
<td>268</td>
<td>320</td>
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<tr>
<td>2008/09</td>
<td>230</td>
<td>252</td>
<td>263</td>
<td>302</td>
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<td>2009/10</td>
<td>236</td>
<td>252</td>
<td>263</td>
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<td>2010/11</td>
<td>240</td>
<td>252</td>
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<td>2011/12</td>
<td>236</td>
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<td>263</td>
<td>302</td>
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<td>2012/13</td>
<td>240</td>
<td>252</td>
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<td>302</td>
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<tr>
<td>2013/14</td>
<td>236</td>
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<td>302</td>
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<tr>
<td>2014/15</td>
<td>240</td>
<td>252</td>
<td>263</td>
<td>302</td>
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<td>2015/16</td>
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<tr>
<td>2016/17</td>
<td>240</td>
<td>252</td>
<td>263</td>
<td>302</td>
</tr>
</tbody>
</table>

World Soybean Production & Stocks

Production | Ending Stocks | % Stocks/Use
---|---|---
0% - 15% | 10% - 25% | 10% - 25%
Q? Will record high crop production continue in 2017-2018+

• **Weather Patterns - La Nina to El Nino Impact on U.S.?**
  - “ENSO-neutral conditions are favored to continue through at least the Northern Hemisphere spring 2017, with increasing—but uncertain—chances for **El Niño development** into the fall.” (Climate.gov - 3/13/2017)
  - “With **La Niña** in the rear-view mirror, forecasters expect that neutral conditions will continue through the spring. After that, there are increasing chances of **El Niño** making an appearance, but they’re still not very strong chances—around **50% by the late summer**, but not quite at the point to warrant an El Niño Watch.” (Climate.gov - 3/8/2017)
4) Chinese Agricultural Stock Policy

- Feedgrain impacts ⇒ Sorghum Imports in 2014-15

China Corn Use & Stocks

- Graph showing corn use and stocks from 1980/81 to 2016/17.
China Corn & Sorghum Use - Stocks

- Corn Stocks
- Sorghum Stocks
- Corn Use
- Sorghum Use

China to be more vulnerable to crop problems & periodic need for imports
China Corn & Soybean S-D (China Ministry of Ag, March 2017)

**China corn supply and demand (Ministry of Ag, March 2017)**

<table>
<thead>
<tr>
<th>Item</th>
<th>Unit</th>
<th>2015/16</th>
<th>2016/17 Feb</th>
<th>2016/17 Mar</th>
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<tr>
<td>Planted area</td>
<td>1000 ha</td>
<td>38,117</td>
<td>36,026</td>
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<tr>
<td>Harvested area</td>
<td>1000 ha</td>
<td>38,117</td>
<td>36,021</td>
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<tr>
<td>Yield</td>
<td>Kg/ha</td>
<td>5,892</td>
<td>5,978</td>
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<tr>
<td>Production</td>
<td>MMT</td>
<td>224.58</td>
<td>215.33</td>
<td>215.33</td>
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<tr>
<td>Imports</td>
<td>MMT</td>
<td>3.2</td>
<td>0.8</td>
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<tr>
<td>Consumption</td>
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<td>194.09</td>
<td>211.22</td>
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<td>Food</td>
<td>MMT</td>
<td>7.65</td>
<td>7.82</td>
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<tr>
<td>Feed</td>
<td>MMT</td>
<td>121.01</td>
<td>133.53</td>
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<td>Industrial use</td>
<td>MMT</td>
<td>54.17</td>
<td>58.25</td>
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<td>Seed</td>
<td>MMT</td>
<td>1.66</td>
<td>1.61</td>
<td>1.61</td>
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<tr>
<td>Loss and other</td>
<td>MMT</td>
<td>9.56</td>
<td>10.01</td>
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<td>Exports</td>
<td>MMT</td>
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<td>0.5</td>
<td>0.5</td>
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<tr>
<td>Surplus</td>
<td>MMT</td>
<td>33.73</td>
<td>4.41</td>
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</table>

**China soybean supply and demand (Ministry of Ag, March 2017)**

<table>
<thead>
<tr>
<th>Item</th>
<th>Unit</th>
<th>2015/16</th>
<th>2016/17 Feb</th>
<th>2016/17 Mar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planted area</td>
<td>1000 ha</td>
<td>6,590</td>
<td>7,156</td>
<td>7,156</td>
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<tr>
<td>Harvested area</td>
<td>1000 ha</td>
<td>6,590</td>
<td>7,150</td>
<td>7,150</td>
</tr>
<tr>
<td>Yield</td>
<td>Kg/ha</td>
<td>1,762</td>
<td>1758</td>
<td>1758</td>
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<tr>
<td>Production</td>
<td>MMT</td>
<td>11.61</td>
<td>12.57</td>
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<tr>
<td>Imports</td>
<td>MMT</td>
<td>83.23</td>
<td>85.31</td>
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<tr>
<td>Consumption</td>
<td>MMT</td>
<td>96.67</td>
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<tr>
<td>Food</td>
<td>MMT</td>
<td>82.89</td>
<td>85.50</td>
<td>85.50</td>
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<tr>
<td>Seed</td>
<td>MMT</td>
<td>10.25</td>
<td>11.18</td>
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<td>Crushing</td>
<td>MMT</td>
<td>0.54</td>
<td>0.61</td>
<td>0.61</td>
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<td>Loss and other</td>
<td>MMT</td>
<td>2.89</td>
<td>2.58</td>
<td>2.58</td>
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<tr>
<td>Exports</td>
<td>MMT</td>
<td>0.11</td>
<td>0.2</td>
<td>0.2</td>
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<tr>
<td>Surplus</td>
<td>MMT</td>
<td>-1.96</td>
<td>-2.19</td>
<td>-2.19</td>
</tr>
</tbody>
</table>

**China and U.S. Corn Prices, 2001-15**

- China (Jilin Province)
- China support price
- U.S. Price (Gulf ports)
Q? How quickly & completely will China lower it’s domestic com support prices?

- China is making **step-wise reductions in domestic com support prices** over the next several years
  - Attempting to balance “domestic production incentives” for Chinese farmers with their burdensome oversupply/stockpile problem

- **Impact on U.S. grain sorghum export demand?**
  - China will continue to seek the “**best deal**” it can find between corn & sorghum, from whatever country is the low cost, quality, reliable source.
  - **But** China has now found that U.S. sorghum is a viable use option D. O’Brien KSU

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**Grain Market “Drivers”**

Key issues affecting grain markets over 1998-2017 Period

5) **Macroeconomic Factors**

- Currency Exchange Rates
- Weak World Economies & Energy Markets
- Other Risks (geopolitical, etc)
Q? Do U.S. / World financial & economic factors impact U.S. grain markets?

- **Direct Impact** of high U.S. dollar on Exports
  - **U.S. Wheat Exports** ⇒ “high cost, last resort supplier” in the World
  - Reducing **U.S. corn & soybean exports** “on the margin”
    (effect is mitigated by limited # of export competitors)

- **Indirect Impact** of inflation fears on U.S. agriculture?
  - **Higher interest rates, tighter credit & higher risk** - causing **lower net returns** in U.S. agriculture

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**Kansas Farmland Values: 1997-2016**

<table>
<thead>
<tr>
<th>Year</th>
<th>Irrigated</th>
<th>Nonirrigated</th>
<th>Pasture</th>
</tr>
</thead>
<tbody>
<tr>
<td>1997</td>
<td>$761</td>
<td>$761</td>
<td>$761</td>
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<tr>
<td>1998</td>
<td>$1,060</td>
<td>$1,060</td>
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<tr>
<td>1999</td>
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<td>2000</td>
<td>$1,540</td>
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<td>2002</td>
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<tr>
<td>2003</td>
<td>$2,090</td>
<td>$2,090</td>
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</tr>
<tr>
<td>2004</td>
<td>$2,770</td>
<td>$2,770</td>
<td>$2,770</td>
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<tr>
<td>2005</td>
<td>$3,000</td>
<td>$3,000</td>
<td>$3,000</td>
</tr>
<tr>
<td>2006</td>
<td>$3,270</td>
<td>$3,270</td>
<td>$3,270</td>
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<tr>
<td>2007</td>
<td>$3,500</td>
<td>$3,500</td>
<td>$3,500</td>
</tr>
</tbody>
</table>

Source: USDA
**Transportation Logistics have Impacted Grain Exports**

- U.S. exports have been limited by **higher shipping costs** to key markets versus the Black Sea, Australia & other competitors.
- **Panama Canal improvements** may help U.S. export competitiveness to Asian markets.
- **U.S. Railroad Shipping Capacity Issues**
  - Periodic winter weather events cause slowdowns in shipping grains from the U.S. Midwest to either the Louisiana Gulf or Pacific NW.

**Grain Market Behavior Over Time**

**Economic principles** shown in market patterns over time.

- **Prices tend to return to breakeven cost over time**
  - High grain prices & profits lead to economic responses that eventually cause lower prices & losses (& vice versa).
  - Evidence in **U.S. Corn, Soybean & Wheat** markets over the 2005-2016 period.
  - The economic principal of “**Mean Reversion**” in prices over time.
The Dynamic, Cyclical Nature of U.S. Agricultural Supply-Demand & Profitability

“Thinking Beyond Stage 1” (Economist Thomas Sowell)

D. O’Brien KSU Perspective:

“Short term profits & losses impact U.S. farmers’ profit maximizing decisions regarding crop & livestock production, what they pay for farm assets, & grain-livestock prices.”

“We need to be aware of the dynamic nature of U.S. agricultural supply-demand & profitability over time.”
Questions?

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