February 20, 2020

2020 Agricultural Outlook

USDA’s Office of the Chief Economist

February 20, 2020

Outline

1. Trade
2. Crops & Livestock
3. Farm Economy
World growth forecast down, led by weakening of emerging markets and developing countries (not including coronavirus)

Data: International Monetary Fund, World Economic Outlook. April 2019, October 2019, and January 2020.
Coronavirus tops macro global economy concerns; markets expecting recovery

**S&P 500 vs Shanghai Composite Index and Corona Infections**

- **U.S. and China reach Phase One agreement**

Data: Refinitiv and China's National Health Commission
U.S. dollar appreciated early in the year before declining across many currencies

**US $ appreciation in 1st and 2nd half of 2019**

- Argentina peso
- Australian dollar
- Brazil real
- Canadian dollar
- Chinese renminbi yuan
- Euro
- Japanese yen
- Mexican peso
- Russian rouble
- South Korean won
- UK pound

Data: Refinitiv
U.S. agricultural exports by trade agreement status, size of trade

**2020 Agreements:** 51%

- **Canada**
  - USMCA signed into U.S. law Jan. 29, 2020
  - $20.6B

- **Mexico**
  - USMCA signed into U.S. law Jan. 29, 2020
  - $18.6B

- **China**
  - Phase One entered into force Feb. 14, 2020
  - $19.5B

- **Japan**
  - Entered into force Jan. 1, 2020
  - $11.9B

- **Hong Kong**
  - $4.2B

- **TWN**
  - $3B

- **IDN**
  - $3B

- **South Korea**
  - $6.9B

- **Rest of World**
  - $12.6B

- **EU27**
  - $9.7B

- **UK**
  - $1.7B

- **CAFTA**
  - $4.3B

- **Australia, Peru, Israel, Panama, Singapore, Chile**
  - $5.6B

- **Colombia**
  - $2.5B

- **Kenya**
  - $0.1B

**No Agreement:** 26%

- **No Agreement:** $12.6B

**Notification of Intent:** 8%

- **Notification of Intent:** $2B

**Previous FTAs:** 14%

- **Previous FTAs:** $2B

Source: USDA, 2017 data
U.S. agricultural exports in billion $ from 1990 to 2019 (FY) by income level

Source: USDA using gapminder
U.S. agricultural exports forecast to rise $4 bil. in FY2020

Source: USDA using gapminder
And where do we expect the largest growth in import demand?

Projected growth in global imports over the next ten years (2020-2029)

**Coarse Grains: 37 mmts**
- Mexico, 6
- Other Asia, 4
- Egypt, 4
- South America, 4
- Vietnam, 4
- Other Africa, 3
- Saudi Arabia, 3
- Rest of World, 3
- Central America, 2

**Soybeans: 36 mmts**
- China, 26
- Middle East (other), 5
- Asia (other), 3
- Middle East (other), 3
- Rest of World, 2
- Mexico, 1

**Wheat: 30 mmts**
- Other Africa, 7
- Asia (other), 6
- Middle East (other), 5
- Rest of World, 2
- Indonesia, 2
- Vietnam, 1
- Nigeria, 2
- China, 1
- Egypt, 3

**Meats: 9 mmts**
- China, 2.7
- Middle East, 1.0
- Africa, 0.9
- Mexico, 0.8
- Asia (other), 0.7
- Latin America (other), 0.9
- Rest of World, 0.6
- Philippines, 0.5
- South Korea, 0.5
- Japan, 0.3

Source: USDA
U.S. Crop and Livestock sectors forecast to improve in 2020
A wet autumn further delayed an already slow U.S. harvest.
Office of the Chief Economist

United States Department of Agriculture

First 2019 WASDE

Acres = NASS Prospective Plantings
Yield = WAOB trend

Source: USDA.

<table>
<thead>
<tr>
<th>Date</th>
<th>Acres, millions</th>
<th>Yield, Bu/acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-May-19</td>
<td>85.4</td>
<td>176</td>
</tr>
<tr>
<td>11-Jun-19</td>
<td>82.4</td>
<td>168.2</td>
</tr>
<tr>
<td>11-Jul-19</td>
<td>83.6</td>
<td>169.5</td>
</tr>
<tr>
<td>12-Aug-19</td>
<td>82</td>
<td>168.4</td>
</tr>
<tr>
<td>12-Sep-19</td>
<td>81.8</td>
<td>168.4</td>
</tr>
<tr>
<td>10-Oct-19</td>
<td>81.8</td>
<td>167</td>
</tr>
<tr>
<td>8-Nov-19</td>
<td>81.8</td>
<td>167</td>
</tr>
<tr>
<td>10-Dec-19</td>
<td>81.5</td>
<td>168</td>
</tr>
</tbody>
</table>

- Acres = NASS June Acreage
- Yield = WAOB, adjusted to reflect weather conditions
- Acres and Yield = NASS surveys

acres harvested

<table>
<thead>
<tr>
<th>Date</th>
<th>Acres harvested</th>
<th>Yield</th>
</tr>
</thead>
<tbody>
<tr>
<td>18-Nov-18</td>
<td>84.6</td>
<td>176.5</td>
</tr>
<tr>
<td>22-Feb-19</td>
<td>84.6</td>
<td>176</td>
</tr>
<tr>
<td>10-May-20</td>
<td>85.4</td>
<td>176</td>
</tr>
<tr>
<td>11-Jun-19</td>
<td>82.4</td>
<td>166</td>
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</tr>
<tr>
<td>8-Nov-19</td>
<td>81.8</td>
<td>167</td>
</tr>
<tr>
<td>10-Dec-19</td>
<td>81.5</td>
<td>167</td>
</tr>
<tr>
<td>10-Jan-20</td>
<td>81.5</td>
<td>168</td>
</tr>
</tbody>
</table>
USDA August corn production forecast minus average private trade expectations

Source: Adjemian, Arita, Hungerford, Breneman, and Johansson (Illinois FarmDoc, October 2019)
When USDA and the trade are on opposite pages, a price correction is usually coming

50 cent drop in futures price

Source: https://farmdocdaily.illinois.edu/2019/10/market-reaction-to-usda-august-corn-crop-reports.html
Forecasts of final corn production have been getting more accurate since 2010, August corn production estimates have been < 5% from final.

Data: USDA, Refinitiv
16 million acre decline in 2019 --- where do they end up?

Source: USDA-NASS.
Global stocks in days of use: stocks are relatively high but expected to decline over the next few years (except rice)

Data: USDA
Continued expansion expected in Brazil’s soybean and corn production

Source: CONAB. 2nd Corn assumed to be all corn minus 1st crop.
New crop futures soybean:corn price ratio for 2020 points to a large corn crop, with some basis effects

Data: CME, Geograin.
## Corn and rice prices expected to edge down in 2020/21

<table>
<thead>
<tr>
<th>Crop</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
<th>2020F</th>
<th>%Δ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheat ($/bu)</td>
<td>3.89</td>
<td>4.72</td>
<td>5.16</td>
<td>4.55</td>
<td>4.90</td>
<td>8%</td>
</tr>
<tr>
<td>Corn ($/bu)</td>
<td>3.36</td>
<td>3.36</td>
<td>3.61</td>
<td>3.85</td>
<td>3.60</td>
<td>-6%</td>
</tr>
<tr>
<td>Soybeans ($/bu)</td>
<td>9.47</td>
<td>9.33</td>
<td>8.48</td>
<td>8.75</td>
<td>8.80</td>
<td>1%</td>
</tr>
<tr>
<td>Cotton (cents/lb)</td>
<td>70.5</td>
<td>68.6</td>
<td>70.3</td>
<td>63.0</td>
<td>64.0</td>
<td>2%</td>
</tr>
<tr>
<td>All Rice ($/cwt)</td>
<td>10.4</td>
<td>12.9</td>
<td>12.6</td>
<td>13.0</td>
<td>12.0</td>
<td>-8%</td>
</tr>
</tbody>
</table>

Data: USDA-OCE.
Cropland area mostly up from last year

<table>
<thead>
<tr>
<th>Crop (mil. acres)</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
<th>2020F</th>
<th>%∆</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corn</td>
<td>94.0</td>
<td>90.2</td>
<td>88.9</td>
<td>89.7</td>
<td>94.0</td>
<td>5%</td>
</tr>
<tr>
<td>Soybeans</td>
<td>83.5</td>
<td>90.2</td>
<td>89.2</td>
<td>76.1</td>
<td>85.0</td>
<td>12%</td>
</tr>
<tr>
<td>Wheat</td>
<td>50.1</td>
<td>46.1</td>
<td>47.8</td>
<td>45.2</td>
<td>45.0</td>
<td>0%</td>
</tr>
<tr>
<td>Cotton</td>
<td>10.1</td>
<td>12.7</td>
<td>14.1</td>
<td>13.7</td>
<td>12.5</td>
<td>-9%</td>
</tr>
<tr>
<td>Other feedgrains</td>
<td>12.6</td>
<td>10.7</td>
<td>11.0</td>
<td>10.8</td>
<td>11.1</td>
<td>3%</td>
</tr>
<tr>
<td>Rice</td>
<td>3.2</td>
<td>2.5</td>
<td>2.9</td>
<td>2.5</td>
<td>3.1</td>
<td>21%</td>
</tr>
<tr>
<td>Total 8 crops</td>
<td>253.4</td>
<td>252.3</td>
<td>253.9</td>
<td>238.0</td>
<td>250.7</td>
<td>5%</td>
</tr>
<tr>
<td>CRP</td>
<td>23.9</td>
<td>23.4</td>
<td>22.6</td>
<td>22.6</td>
<td>22.7</td>
<td>0%</td>
</tr>
<tr>
<td>8 crops + CRP</td>
<td>277.3</td>
<td>275.7</td>
<td>276.5</td>
<td>260.6</td>
<td>272.7</td>
<td>5%</td>
</tr>
</tbody>
</table>

Source: USDA-OCE. Area planted. Values in red denote record levels.
Record production projected in 2020

<table>
<thead>
<tr>
<th>Item</th>
<th>2010</th>
<th>Exports as a % of prod.</th>
<th>2019</th>
<th>Exports as a % of prod.</th>
<th>2020F</th>
<th>Exports as a % of prod.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beef</td>
<td>26.3</td>
<td>8.7%</td>
<td>27.2</td>
<td>11.1%</td>
<td>27.5</td>
<td>12.0%</td>
</tr>
<tr>
<td>Pork</td>
<td>22.4</td>
<td>18.8%</td>
<td>27.6</td>
<td>22.9%</td>
<td>28.9</td>
<td>25.5%</td>
</tr>
<tr>
<td>Broilers</td>
<td>36.9</td>
<td>18.3%</td>
<td>43.9</td>
<td>16.2%</td>
<td>45.8</td>
<td>16.2%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>92.1</strong></td>
<td><strong>15.2%</strong></td>
<td><strong>105.2</strong></td>
<td><strong>16.3%</strong></td>
<td><strong>108.8</strong></td>
<td><strong>17.3%</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Item</th>
<th>2010</th>
<th>Exports as a % of prod.</th>
<th>2019</th>
<th>Exports as a % of prod.</th>
<th>2020F</th>
<th>Exports as a % of prod.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milk</td>
<td>192.9</td>
<td>15.8%</td>
<td>218.3</td>
<td>19.0%</td>
<td>222.0</td>
<td>19.6%</td>
</tr>
</tbody>
</table>

Data: USDA-OCE.

*Data in red* denote record levels.  
¹ Total red meat and poultry.  
²Skim-solids basis exports as a percent of total milk production.
African Swine Fever shocks China and global pork supply

### China pork production, supply and demand

<table>
<thead>
<tr>
<th>Year</th>
<th>Production (MMTs)</th>
<th>Consumption (MMTs)</th>
<th>Imports (MMTs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018</td>
<td>54</td>
<td>49</td>
<td>2.10</td>
</tr>
<tr>
<td>2019</td>
<td>47</td>
<td>40</td>
<td>3.17</td>
</tr>
<tr>
<td>2020F</td>
<td>36</td>
<td>7</td>
<td></td>
</tr>
</tbody>
</table>

- **2020 Production**: down 18 mmts from 2018
- **2020 China Imports**: projected up 2 mmts from 2018
- **2020 China Consumption**: down 15.8 mmts

**Not enough global export supply to fill China's ASF shortfall**

Data: USDA and TDM
Prices: hogs, milk up, broilers down; steers largely unchanged

<table>
<thead>
<tr>
<th>Item</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
<th>2020F</th>
<th>%Δ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steers</td>
<td>120.86</td>
<td>121.52</td>
<td>117.12</td>
<td>116.78</td>
<td>117.00</td>
<td>0.2%</td>
</tr>
<tr>
<td>Hogs</td>
<td>46.16</td>
<td>50.48</td>
<td>45.93</td>
<td>47.95</td>
<td>49.00</td>
<td>2.2%</td>
</tr>
<tr>
<td>Broilers</td>
<td>84.3</td>
<td>93.5</td>
<td>97.8</td>
<td>88.6</td>
<td>87.0</td>
<td>-1.8%</td>
</tr>
<tr>
<td>Milk</td>
<td>16.30</td>
<td>17.65</td>
<td>16.27</td>
<td>18.60</td>
<td>18.85</td>
<td>1.3%</td>
</tr>
</tbody>
</table>

Data: USDA-OCE.
Recent milk production increases driven by cow numbers and milk per cow gains

Data: USDA
U.S. Dairy Herd by Size of Operation

<table>
<thead>
<tr>
<th>Year</th>
<th>Milk Cow Inventory (millions)</th>
<th>Operations with Inventory (thousands)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1997</td>
<td>9.1</td>
<td>125.0</td>
</tr>
<tr>
<td>2002</td>
<td>9.1</td>
<td>92.0</td>
</tr>
<tr>
<td>2007</td>
<td>9.3</td>
<td>69.9</td>
</tr>
<tr>
<td>2012</td>
<td>9.3</td>
<td>64.1</td>
</tr>
<tr>
<td>2017</td>
<td>9.5</td>
<td>54.6</td>
</tr>
</tbody>
</table>

Data: USDA-NASS.
Distribution of Milk Production Cost by Farm and Production

$/hundredweight

- Farms
- Production
- 2019 All-Milk Price

Percentile of Farms or Production

Farm Economy and Policies
How optimistic are you about economic prospects over the next 6 months?

Corn price increases with the knowledge of widespread prevent plant.

Slow planting progress and increased trade tension

Signing of the phase I trade deal with China

Data: Refinitiv, USDA, University of Michigan, NAHB, Creighton, NAHB, Purdue/CME
Distribution of farm household income shows half of all farms earn negative farm income

Source: USDA-ERS, Agricultural Resource Management Survey, 2018
Net returns are expected up, with lower expected government payments and crop insurance indemnities

Data: USDA-ERS
Prevent plant boosted insurance indemnities in 2019 by > $4 billion

Billion dollars (2020$)

Loss Ratio

Source: USDA-Risk Management Agency

* 2019 data collection is still ongoing.
MFP payments overlap areas where estimated damages are the highest

Source: USDA
Debt-to-assets ratio remain low --- 13.59%, and debt financing cost falling despite total debt at historic levels

“Interest repayment capacity” = Interest Expenses divided by (NFI before interest and taxes)

Data: USDA-ERS
The percentage of corn, soybean, and hog farm businesses that are very highly leveraged has been trending upward.

Data: USDA-ERS. Note: very highly leveraged farms have debt to asset ratios of >70%.
Farm bankruptcy rates remain historically low

Source: USDA-ERS, U.S. Courts
Many states remain near their 10-year average bankruptcy rate.
Negative returns for some heading into 2020
--- not including government payments

<table>
<thead>
<tr>
<th>2020F</th>
<th>Cotton</th>
<th>Corn</th>
<th>Soybeans</th>
<th>Wheat</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Market returns:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total costs (dollars/acre)</td>
<td>$952</td>
<td>$864</td>
<td>$617</td>
<td>$271</td>
</tr>
<tr>
<td>Value of production (dollars/acre) (includes cottonseed value for cotton)</td>
<td>$923</td>
<td>$835</td>
<td>$540</td>
<td>$211</td>
</tr>
<tr>
<td><strong>Market returns per acre using total costs</strong></td>
<td>($28)</td>
<td>($29)</td>
<td>($77)</td>
<td>($60)</td>
</tr>
</tbody>
</table>

Data: Illinois, Arkansas, Kansas extension farm management budgets; MFP for 2019 tranche 3 only.
Concluding Remarks

1. Current conditions point towards an improved outlook for 2020
   • Trade deals will improve our access and trading opportunities
   • A return to more normal trade will lower friction

2. Economic fundamentals are stable
   • Interest rates remain low and keep borrowing costs down
   • Equity remains high relative to debt
   • Stable land values

3. Weather conditions will likely be better
   • Corn and soybean area likely to be up from 2019
Concluding Remarks (con’t.)

4. Livestock sector poised for continued growth
   • Modest growth in beef production, stronger growth in pork and poultry
   • Growing opportunities for meat exports reflecting the Phase One deal, U.S.-Japan agreement, and global income growth

5. International competition in crop and livestock production is intense
   • Corn and soybean expansion continues in Brazil

6. U.S. productivity remains remarkably strong
   • Continued investment in technology and innovation key to maintaining markets and profitably, and feeding a growing global population
Expectations for 2029/30?

Productivity of staple commodities continues to grow, fueled by technology

In 1929, approximately 6.3 million farms produced 105 million metric tons of crop and fiber, feeding and clothing 121 million Americans.

In 2017, 2.0 million farms produced 561 million metric tons of crops --- an increase of more than 400% on 9% fewer acres, feeding and clothing 330 million Americans and exporting food and fiber to help feed and clothe billions globally.

And over the next 10 years, we would expect an additional 90 million tons of production.

Data: USDA-NASS; USDA Baseline.
Note: USDA WASDE crops included in the chart are wheat, corn, sorghum, barley, oats, rice, soybeans, and cotton.
The number of undernourished people in the world still number more than 800 million, and is heading in the wrong direction.