AIR Work on GTAP and other Thoughts

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GTAP Work

- Obtained model in October
  - Version used for October ARB workshop (GTAPBIO-AEZ)
  - DG land use credit ~ 33%
- Areas
  - Duplicated the ARB results
  - Yields (mainly coarse grain)
  - Coproducts
- Three concerns right away
  - Results were locked in 2001 (without exogenous yield improvement)
  - Yield improvements looked low (2-3%)
  - DG land use credits looked low
Yields

- Initial AIR GTAP simulations using price-yield elasticity function to increase yields between 2001 and 2015
- But this ignored non-ethanol related demand increases in US and ROW
- \[ \text{LUC} = f(\Delta \text{yield}, \Delta \text{demand})_{\text{US, ROW}} \]
- Informa Economics
  - US: \( \Delta \text{Yield} > \Delta \text{non-ethanol related demand} \)
  - ROW: \( \Delta \text{Yield} < \Delta \text{demand} \), \( \text{Yield}_{\text{ROW}} \ll \text{Yield}_{\text{US}} \)
- Purdue method of externally correcting for exogenous yield improvements assumes yields and demand are balanced
- Conclusion: cannot have confidence in GTAP results w/o adequate baseline to 2015 taking into account demand and yield changes in US and ROW
### Distillers Grains Land Use Credits (Study by Argonne)

**Table 11. Major Components of Corn and DDGS**

<table>
<thead>
<tr>
<th>Item</th>
<th>Corn Grain</th>
<th>DDGs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry Matter (%)</td>
<td>85.5</td>
<td>89.3</td>
</tr>
<tr>
<td>Crude Protein (%)</td>
<td>8.3</td>
<td>30.8</td>
</tr>
<tr>
<td>Fat (%)</td>
<td>3.9</td>
<td>11.1</td>
</tr>
</tbody>
</table>

DGs much higher in protein and fat than corn grain
**DG Land Use Credits**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Beef Cattle</th>
<th>Dairy Cattle</th>
<th>Swine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corr Displace</td>
<td>1.196</td>
<td>0.731</td>
<td>0.8</td>
</tr>
<tr>
<td>SBM Displace</td>
<td>-</td>
<td>0.633</td>
<td>0.095</td>
</tr>
<tr>
<td>Urea Displace</td>
<td>0.056</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

DGs displace a significant amount of SBM in dairy and swine.
DG Land Use Credit Equation and Inputs

- 1 acre produces 151 bu of corn, 393 gal of ethanol and 2512 lbs of DGs
- The 2512 lbs of DGs replace 3216 lbs of feed (1.28* 2512)
- 3216 lbs of feed is divided into 2444 lbs of corn meal, 772 lbs of SBM
  - Argonne 24%/76% SBM/Corn split, wtd over beef, milk, and swine
- This requires 0.29 acres for corn, 0.41 acres of SBM, for total of 0.70 acres
- Land use credit is function of mass replacement ratio and soybean fraction
Land Use Credit versus Percent Soy in Base Feed and DG Ratio

DG Ratio
- 1.28
- 1.20
- 1.10
- 1.00

Percent Land Use Credit

Percent Soy in Base Feed

Air Improvement Resource, Inc.
GTAP DG Credit Method

Have been attempting to modify GTAP so DDGs replace oilseeds as well as coarse grains
Our Goal

- Get GTAP estimate everything
  - Revise DG credits
  - Incorporate exogenous yield improvements in closure rather than externally
  - Hold U.S. exports constant
  - Increase crop production with projected demand in U.S., ROW