Ethanol expansion in Brazil, insights from an allocation methodology

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Advantages and disadvantages of the allocation methodology

✓ Transparency
✓ Simplicity
✓ No methodological prejudgment
✓ Need a smaller number of inputs (information).

✗ Still need theoretical development for consolidate cause-effect relationships.
✗ hard to incorporate changes in technology and behavior patterns.
✗ Confronted by critics many efforts have been made to make models more transparent (simplicity is still an issue).
Methodology Used to Calculate Allocation Coefficients

- **Direct Land Use Change**
  - Secondary data: crops (official surveys) and deforestation (satellite imagery).
  - Processing rules for substitution among uses

- **Indirect Land Use Change**
  - Application of coefficients of uses displaced by sugarcane
  - Productivity gains

- **Total GHG emissions**
  - Results: hectares displaced directly and indirectly by sugarcane
  - Application of GHG emission factors for land use change

Source: ICONE.
### Land use change GHG emissions and ILUC factor associated to sugarcane expansion, 2005 to 2008

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emissions associated to LUC (Ton CO(_2)eq)</td>
<td>-46,884</td>
</tr>
<tr>
<td>Emissions associated to ILUC (Ton CO(_2)eq)</td>
<td>2,462,069</td>
</tr>
<tr>
<td>Total emissions (LUC + ILUC) (Ton CO(_2)eq)</td>
<td>2,415,186</td>
</tr>
<tr>
<td>Additional ethanol production (Ton of total recoverable sugar)</td>
<td>19,672,059</td>
</tr>
<tr>
<td>Energy content of additional ethanol production (Giga Joule)</td>
<td>248,330,532</td>
</tr>
<tr>
<td>ILUC factor (g CO(_2)eq / MJ)</td>
<td>7.63</td>
</tr>
<tr>
<td>Kha/Mtoe</td>
<td>25</td>
</tr>
</tbody>
</table>

Source: ICONE/CGEE.

The full study is available on our website: [www.iconebrasil.org.br](http://www.iconebrasil.org.br)

Seeking for transparency, the database and calculations are also available (in Excel file).
Why we found smaller ILUC factor than other studies?

• Yield gains: Pasture intensification and Multicropping
• Regionalization
• Period chosen for the analysis
• Isolate the demand effect
Multicropping: more production and less competition for cropland

Corn second crop represented in 2008:
- 35% of total corn area;
- 24% of total soybean area.

Source: CONAB
## Pasture intensification

<table>
<thead>
<tr>
<th>Variable</th>
<th>Unit</th>
<th>1996</th>
<th>2008</th>
<th>Growth Rate</th>
<th>Total Variation in the Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beef Production</td>
<td>Million Tons</td>
<td>6,186.9</td>
<td>9,765.4</td>
<td>5.34%</td>
<td>57.8%</td>
</tr>
<tr>
<td>Pasture Area</td>
<td>Million Hectares</td>
<td>184,141</td>
<td>180,143</td>
<td>-0.14%</td>
<td>-2.17%</td>
</tr>
<tr>
<td>Slaughter Rate</td>
<td>% of Cattle Herd</td>
<td>0.1781</td>
<td>0.2175</td>
<td>2.57%</td>
<td>22.1%</td>
</tr>
<tr>
<td>Stock Rate</td>
<td>Heads/Hectare</td>
<td>0.8596</td>
<td>1.1111</td>
<td>2.69%</td>
<td>29.3%</td>
</tr>
<tr>
<td>Carcass Weight</td>
<td>Tons/Head</td>
<td>0.2194</td>
<td>0.2243</td>
<td>0.16%</td>
<td>2.24%</td>
</tr>
<tr>
<td>Beef per Hectare</td>
<td>Tons/Hectare</td>
<td>0.0336</td>
<td>0.0542</td>
<td>5.49%</td>
<td>61.3%</td>
</tr>
</tbody>
</table>

Source: ICONE, original data from IBGE, UFMG and ICONE

Huge stock of pasture area, and significant rate of pasture intensification. But production has also grown very fast.
Productivities gains are strong enough, so there is no need for reallocation of area between Brazilian regions to recover the production losses: Regionalization is important.
Crops area does not fully explain deforestation rates.
Higher sugarcane and ethanol growth are simultaneous to lower deforestation rates.
Meat market: Brazilian exports and world consumption growth rates

On the long term, growth rate of Brazilian beef exports and world consumption growth rates will be similar: we expect less pressure from demand.

Source: PSD USDA
Some last thoughts

- Will LUC in the future be similar to the past (especially for the period 2002-2005)?

- How different is LUC dynamics without pressure from demand?
Recent land use policies and strategies

- Plan to Prevent Deforestation of the Amazon (2004)
- State zoning (different dates)
- Soybean moratorium (2006)
- Sugarcane zoning (2009)
- Plan to prevent deforestation of the Cerrados PPCerrado (2010)

The effect of those policies are not represented in any of the models actually used to measure ILUC.