Economics of Ethanol from Sucrose

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American Crystal Sugar Company

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- Co-op located in RRV of MN/ND
  - Approximately 2,900 shareholders & 500,000 planted acres
  - 5 RRV factories
  - Non-Co-op, wholly owned factory located in Sidney, Mt
- Largest beet sugar producer in the U.S.
  - Annual production = 3.0 – 3.5 billion pounds
U.S. Sucrose Ethanol

Amounts shown are approximate

- No sucrose ethanol plants are operating in the U.S. currently
- Costs estimates from different sources vary widely
  - USDA beet cost = $2.35/gallon
  - LECG beet cost = $3.85/gallon

The Problem for Sucrose Ethanol in U.S. is Feedstock Cost

Corn as feedstock
- $3.00/bushel of corn
- Divided by 3.00 gallons/bushel =
- $1.00/gallon raw material cost

Raw sugar as feedstock
- $21/CWT of raw sugar
- Divided by 6.77 gallons/CWT =
- $3.10/gallon raw material cost
## U.S. Ethanol Total Cost
### Corn Vs. Sucrose

<table>
<thead>
<tr>
<th></th>
<th>Raw Corn</th>
<th>Raw Sugar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feedstock</td>
<td>$1.00</td>
<td>$3.10</td>
</tr>
<tr>
<td>Agri-product Cr.</td>
<td>(.45)</td>
<td>-</td>
</tr>
<tr>
<td>Processing</td>
<td>.50</td>
<td>.35</td>
</tr>
<tr>
<td>Marketing</td>
<td>.45</td>
<td>.45</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$1.50</strong></td>
<td><strong>$3.90</strong></td>
</tr>
</tbody>
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### ACSC Preliminary Conclusion

- Assuming $2.50 wholesale/spot price
  - Ethanol spot price approximately equals retail gas price
  - Includes impact of $.51/gallon tax credit
- Ethanol made from U.S. sugar currently not economically viable
How does Brazil do it?

Very low feedstock costs
• Brazil produces sugar at a much lower cost than any other country in the world
• Cost/CWT produced is less than 1/2 of that in the U.S.

30 years of national support programs
• Ethanol volume mandates, diesel ban, fuel tax credits, producer subsidies, debt relief, low environmental standards and other governmental support

Integrated Sucrose/Ethanol Facility - Potential Savings

• Fixed cost spreading
  – Only works if mill/factory is currently underutilized
• Transportation
  – $1.00/CWT = $.15/gallon
• Agri-product credits
  – Some savings from pulp (for beet) and molasses (beet & cane)
  – Approximate savings = $.25/gallon
Integrated Sucrose/Ethanol Facility - Potential Savings

- Lower operating cost by utilizing less processed feedstock (ie. thin juice)
  - However, vinasse (residue) disposal could offset operating cost savings
- Synergies
  - Energy from cane bagasse could be significant
  - Water savings for beet likely not significant

Integrated Sucrose/Ethanol Facility Savings

- Total savings from integration not enough to economically justify U.S. sucrose ethanol
- Assuming $2.50 spot ethanol price, tax credit would need to be increased from $.51 to $1.00-$2.00/gallon for sucrose ethanol to be economically viable
Other Reasons for Sucrose Ethanol Program

- Increase energy security
- Create jobs
- Promote renewable energy
- Diversify U.S. feedstock
- Increase ethanol production
  - If 100% of corn converted to ethanol only 10%-15% of 140B gallon annual gasoline “addiction” would be replaced

Other Reasons for Sucrose Ethanol Program

- Promote passage of Free Trade Agreements with countries that subsidize sugar exports
  - The sugar industry can not support FTAs that allow subsidized imports to replace domestic production
  - NAFTA will allow approximately 1.0 billion pounds of unneeded Mexican sugar into the U.S. market this year even though almost half of the mills in Mexico are government owned
  - Sucrose ethanol could act as a home for subsidized surplus sugar from current and future FTAs
Sugar Industry Position on Sucrose Ethanol Program

- U.S. sugar industry does not believe sucrose ethanol is economically viable under current prices and credits
  - Hawaii is the exception
- Would consider program that compliments current sugar for food structure while allowing subsidized imports to be converted to ethanol