Sugarcane, the Energy Crop. Tres Valles, a Business Decision Case.

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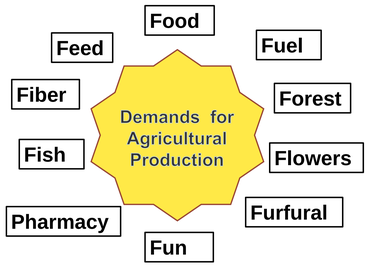
Introduction

There are ten sources of demand for agricultural products.

The Gallos's 10 Fs

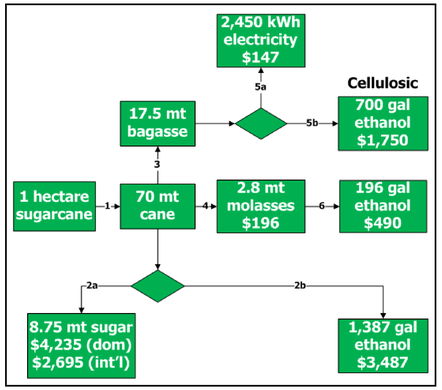


All those demands compete for the world fixed agricultural resources: land, water, pollution rights.

Sugarcane
The Energy Portfolio:

-Metabolic
-Electricity
-Biofuels

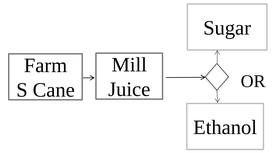
Mainly from its juice and bagasse, biomass from leaves is not used.



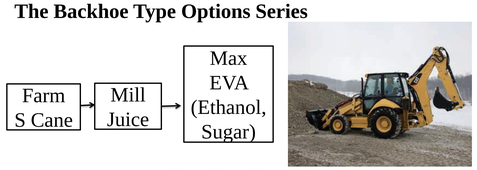
The Flexibility Dilemma

Mandatory biofuels mixes such as E-10 or D-10.
New integrated sugar operations, at least 10,000 ha.
Central America farm productivity is higher than Brazil
Electricity, from imported bunker Imported gas, diesel.
High local sugar prices. New areas: sugar vs. ethanol
A flexible sugar-ethanol plant?

The Traditional Process



The Backhoe Type Options Series



By investing in a flexible plant, the firm can transform the sugarcane juice from the mill, in sugar or in ethanol, depending on the current market conditions.

The firm buys a series of options, to decide every day or week what to produce.

Investment US $	**Week 1 Revenues**	**Week 2 Revenues**	**Week n Revenues**
Sugar Only Plant (X$)	PS1 * QS1	PS2 * QS2	PSn * QSn
Ethanol Only Plant (Y$)	PE1 * QE1	PE2 * QE2	PEn * QEn
Flexible Plant (X+Y) $	MAX ((PS1 * QS1), (PE1 * QE1))	MAX ((PS2 * QS2), (PE2 * QE2))	MAX ((PSn * QSn), (PEn * QEn))

Sample of Weekly EVA Calculations

Week N	Date	Sugar Pr $/Lb	Ethanol Pr $/Gl	Sugar	Ethanol	Option
3	11/30/2000	10.5	1.4	993,094	1,009,291	938,107
81	4/10/2003	7.9	1.2	736,090	843,792	772,608
155	2/23/2006	18.8	1.9	1,836,632	1,439,856	1,765,449
241	1/14/2010	28.1	2.7	2,782,911	2,112,413	2,711,728

Stochastic Dominance Analysis

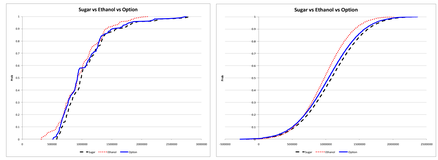
We use EVA (Stern) contribution to measure the returns from the alternatives: Revenues - an annuity equivalent to the marginal investment at 15% Ke. Marginal Investment is assumed to be $ 15 MM for the sugar line and also for the ethanol line and $ 30 MM, for a flexible line. Farm and mill are constants.

EVAs under Historical Prices

Sugar		*Ethanol*		*Option*	
Mean	542,655	Mean	488,783	Mean	484,757
Standard Error	13,705	Standard Error	11,464	Standard Error	13,586
Median	493,470	Median	461,896	Median	426,050
Mode	368,045	Mode	#N/A	Mode	429,915
Standard Deviation	212,766	Standard Deviation	177,969	Standard Deviation	210,906
Sample Variance	45,269,440,297	Sample Variance	31,672,992,419	Sample Variance	44,481,228,000
Kurtosis	4	Kurtosis	0	Kurtosis	3
Skewness	2	Skewness	1	Skewness	2
Range	1,120,429	Range	897,819	Range	1,117,479
Minimum	289,210	Minimum	158,388	Minimum	220,976
Maximum	1,409,639	Maximum	1,056,207	Maximum	1,338,455
Sum	130,779,959	Sum	117,796,625	Sum	116,826,473
Count	241	Count	241	Count	241

Cumulative Distribution and SD

Historical Prices SIMETAR Simulation



First Degree Dominance Table

	Sugar	Ethanol	Option
Sugar FDD:			FDD
Ethanol FDD:			
Option FDD:			

Second Degree Dominance Table

	Sugar	Ethanol	Option
Sugar SDD:		Ethanol	Option
Ethanol SDD:			
Option SDD:		Ethanol	

SDRF 0 to 9 Levels of Risk Aversion

Efficient Set Based on SDRF at Lower RAC 0

Name	Level of Preference
1 Sugar	Most Preferred
2 Option	2nd Most Preferred
3 Ethanol	3rd Most Preferred

Efficient Set Based on SDRF at Upper RAC 6

Name	Level of Preference
1 Ethanol	Most Preferred
2 Sugar	2nd Most Preferred
3 Option	3rd Most Preferred

Efficient Set Based on SDRF at Lower RAC 2

Name	Level of Preference
1 Ethanol	Most Preferred
2 Sugar	2nd Most Preferred
3 Option	3rd Most Preferred

Efficient Set Based on SDRF at Upper RAC 9

Name	Level of Preference
1 Ethanol	Most Preferred
2 Sugar	2nd Most Preferred
3 Option	3rd Most Preferred

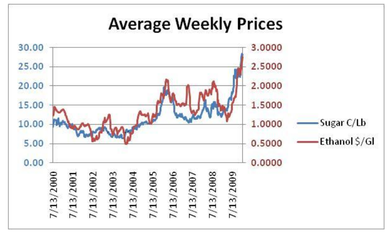
At any level of positive Risk Aversion Coefficient, SIMETAR defines Ethanol as the most preferred alternative, sugar is the second and option is the third.

Business Decision Case for MABs. Tres Valles

Teaching Note

Issues to Describe Before Discussion

The firm produces sugar and electricity in a 5,000 ha farm.
Internal sugar prices are high. Local protectionism.
A new operation requieres10,000 hectares and a mill.
Should they build an ethanol plant, a sugar plant or a flexible plant to take advantage of the series of options generated by the backhoe type investment?
In Brazil most of new plants and facilities are oriented to ethanol. Fava.
Given the current prices (Feb 2010), sugar producers regret not having ethanol facilities. Sanwa Jank



Teams Discussion

Should world sugar production grow?
What are the trends in sugar and sweetener markets?
What is the impact of mandatory blends in
Which production can increase more without affecting its own price? Sugar or ethanol?
Is the backhoe type series of options valuable?

Plenary Session Discussion

Market prices and Feed vs. Food , vs 10 Fs controversy
Expected value and risk aversion
EVA as a decision tool.

Case Conclusions

That option series is too expensive.
Ethanol demand will grow more than sugar.

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