The University of Georgia

Center for Agribusiness and Economic Development

College of Agricultural and Environmental Sciences

Economics of Peanuts for Biodiesel Production

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Biodiesel can be made from vegetable oils or animal fats. The largest potential source of Georgia produced oil is from peanuts. In light of recent high petroleum prices, it is understandable that many would question the potential of growing peanuts in Georgia and using the oil product to produce biodiesel. In order to evaluate the potential, the Center for Agribusiness and Economic Development developed cost models for each step of the peanut to Biodiesel processing system. The objective of the research was to determine what peanut producers could be paid at various Biodiesel market prices. The feasibility of producing high oil, minimum input peanuts chiefly for the energy market can thus be determined.

The farm value of the peanut crop when the oil is used for biodiesel production can be determined by the combining the values of the two main products of the peanut – the biodiesel value of the oil and the value of the meal. The following worksheet illustrates the economics under three scenarios:

1. Using the current traditional methods for shelling, oil extraction, oil refining and biodiesel production.
2. Using an extruder to press the oil rather than using hexane extraction.
3. Using estimated minimum costs methods for shelling and oil extraction.

The worksheet is broken into four main sections dealing with the various processes needed to produce biodiesel from farmer stock peanuts. Each step has been modeled based on detailed CAED feasibility studies of the processing steps. The analysis shown is based upon the costs and returns for one farmer stock ton of peanuts. To illustrate the analysis view the column “Traditional Methods”. Typical storage, transport and handling costs for one farmer stock ton are about $111.00. Shelling costs are about $51.00 per ton. There is an estimated 7% shrink loss in the handling process. Thus one farmer stock ton yields about 1,390 pounds of shelled peanuts and about 437 pounds of hulls. The hulls would be worth about $1.09.

The crush or oil extraction costs about $45.90 for the nuts from the original ton and would yield about 667 pounds of oil and about 720 pounds of peanut meal (.36 ton). The meal would be worth about $37.95. The crude oil must be de-gummed, refined and bleached to make it suitable for biodiesel production for a cost of about $16.68.

The oil from one farmer stock ton will yield about 85.4 gallons of biodiesel with production costs of about $0.70 per gallon. The net biodiesel value after all costs and sales of by-products is about $168.31.

The total revenues generated from one farmers stock ton would be about $271.65 while total costs of operation would total near $286.85 leaving a negative net residual of about -$15.19. This value is “breakeven purchase price” for farmer stock peanuts entering into this process. So, given the current markets for peanut meal, hulls and biodiesel and traditional processing methods, farmer stock peanuts have a negative value to the processor. The implied value of the peanut oil for biodiesel production is about $0.252

cents per pound. This is well below the early February, 2007 price of about $0.51 per pound.

Only a hypothesized system designed to handle oil-only peanuts (minimum cost method) shows potential for a positive price being paid to peanut producers. However, this is only about $30 per ton, certainly not in the range of reasonable production cost even with minimum inputs.

Rather than evaluating what, if anything can be paid to producers for peanuts under current Biodiesel and meal prices, one might evaluate what the Biodiesel markets have to reach to MAKE minimum input peanut production for Biodiesel profitable.   In order to evaluate such a scenario, one would have to know what minimum input peanut production cost to produce. No definitive cost analysis are know to the researchers, but an evaluation of traditional peanut production cost in light of optimistic assumptions of those inputs most likely to be reduced revealed that variable cost may be reduced to around $200 per acre (from $414/acre). Fixed cost can not be appreciably reduced so that equipment ownership may represent about another $90/acre. Thus to cover variable cost at a 1.4 ton per acre yield, the break-even price would be $142/ton and to cover total cost of $290/acre, $207/ton. Under the minimum cost scenario, the total cost of production would be returned at $5.00/ gal Biodiesel or an approximate 185% increase over current prices. The traditional system would require Biodiesel prices to reach about $5.35/gal. in order to return producers their total production cost, approximately double current Biodiesel prices.

The implied oil price shows what the value of oil would be when subtracting at the different Biodiesel levels. Interestingly, at implied oil prices of roughly 55 cents per pound, roughly 10% higher than current peanut oil prices, processors would be able to pay around the total hypothesized minimum input break-even price to producers. Thus while minimum input peanut production for Biodiesel appears far from feasible, peanuts produced for the edible oil market may not.

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Alternative Scenarios for Derived Farm Value of Peanuts for Biodiesel

Activity	Based on 1 ton of Farmer Stock Peanuts		
	Traditional Methods	Extruder Process	Minimum Cost Method
Shelling			
Storage, Transport, Handling Cost	$111.00	$111.00	$100.00
Shelling Cost	$51.00	$51.00	$20.00
Shelling yield	76.5%	76.5%	76.5%
Storage, Shelling & Handling Shrink	7.0%	7.0%	7.0%
Shelled peanuts in lbs	1,390	1,390	1,390
Peanut Hulls in lbs	437	437	437
Peanut Hull Price per ton	$5.00	$5.00	$5.00
Peanut Hull Value	$1.09	$1.09	$1.09
Crushing			
Crush Cost of Shelled Peanuts	$60.00	$50.00	$50.00
Crushing Cost Farmer Stock Ton	$45.90	$38.25	$38.25
Oil yield	48.0%	44.0%	44.0%
Oil yield in pounds	667	612	612
Oil share of crush costs	$22.03	$16.83	$16.83
Per pound oil crush costs	$0.033	$0.028	$0.028
Meal yield	52.0%	56.0%	56.0%
Meal yield in tons	0.36	0.39	0.39
Meal Price per Ton	$105.00	$110.00	$110.00
Meal Value	$37.95	$42.81	$42.81
Meal share of crush costs	$23.87	$21.42	$21.42
Net Meal Value	$14.08	$21.39	$21.39
Refining - degumming cost / lb	$0.025	$0.025	$0.025
Total Refining Cost	$16.68	$15.29	$15.29
Biodiesel Production			
Peanut oil to Biodiesel Yield	96.0%	96.0%	96.0%
Biodiesel Production @ 7.5 lbs/gal	85.4	78.3	78.3
Biodiesel Production Cost per Gal.	$0.70	$0.70	$0.70
Biodiesel Sales Price per Gallon	$2.70	$2.70	$2.70
Crude Glycerin Co-Product - lbs	67.8	62.2	62.2
Crude Glycerin Co-Product Price	$0.03	$0.03	$0.03
Crude Glycerin Co-Product Value	$2.03	$1.86	$1.86
Gross Biodiesel Oil Value	$230.58	$213.23	$213.23
Cost of Biodiesel Production	$62.27	$57.08	$57.08
Net Biodiesel Value	$168.31	$156.15	$156.15
Implied Oil Value Based on Biodiesel Value $/lb.	$0.252	$0.255	$0.255
Gross Product Value	$271.66	$259.00	$259.00
Total System Cost	$286.85	$272.62	$230.62
Value Net of All Costs	-$15.19	-$13.62	$28.38

The above value is the "breakeven" purchase price for farmer stock peanuts entering into the above process.

4-ROW COMBINE, 6 ROW EQUIPMENT
SOUTH GEORGIA, 2007
ESTIMATED COSTS AND RETURNS

Expected Yield per Acre **1.40** Ton YIELD: YOUR FARM ______

VARIABLE COSTS	Unit	Number of Units	$/Unit	Cost/Acre	$/Ton	Your Farm
Seed	Lb.	115.00	$ 0.52	$ 59.80	$ 42.71	______
Inoculant	Lb.	5.00	$ 1.40	$ 7.00	$ 5.00	______
Lime/Gypsum	Ton	0.50	$ 63.00	$ 31.50	$ 22.50	______
Fertilizer						______
Phospate (P2O5)	Lb.	20.00	$ 0.31	$ 6.20	$ 4.43	______
Potash (K2O)	Lb.	40.00	$ 0.23	$ 9.20	$ 6.57	______
Boron	Lb.	0.50	$ 3.75	$ 1.88	$ 1.34	______
Weed Control	Acre	1.00	$ 41.46	$ 41.46	$ 29.61	______
Insect Control	Acre	1.00	$ 25.48	$ 25.48	$ 18.20	______
Disease Control*	Acre	1.00	$ 68.40	$ 68.40	$ 48.86	______
Machinery: Preharvest						______
Fuel	Gallon	9.48	$ 2.25	$ 21.32	$ 15.23	______
Repairs & Maintenance	Acre	1.00	$ 13.80	$ 13.80	$ 9.86	______
Machinery: Harvest						______
Fuel	Gallon	8.19	$ 2.25	$ 18.43	$ 13.16	______
Repairs & Maintenance	Acre	1.00	$ 16.28	$ 16.28	$ 11.63	______
Labor	Hrs	2.53	$ 10.00	$ 25.29	$ 18.06	______
Crop Insurance	Dol.	1.00	$ 15.00	$ 15.00	$ 10.71	______
Land Rental	Acre	1.00		$ -	$ -	______
Interest on Operating capital	Percent	$ 180.51	8.00%	$ 14.44	$ 10.32	______
Cleaning	Ton	0.47	$ 10.50	$ 4.90	$ 3.50	______
Drying	Ton	0.93	$ 26.00	$ 24.28	$ 17.34	______
GPC&GPPA State	Ton	1.40	$ 3.00	$ 4.20	$ 3.00	______
NPB Checkoff	Dol.	1%	$ 532.00	$ 5.32	$ 3.80	
Total Variable Costs				**$ 414.16**	$ 295.83	

Fixed Costs:						
Machinery: Depreciation, Taxes, Insurance, and Housing						
Preharvest	Acre	1.00	$ 38.23	$ 38.23	$ 27.31	______
Harvest	Acre	1.00	$ 55.46	$ 55.46	$ 39.61	______
General Overhead	% of VC	414.16	5.00%	$ 20.71	$ 14.79	______
Management	% of VC	414.16	5.00%	$ 20.71	$ 14.79	______
Owned Land Costs; Taxes, Cash Payment, Etc.	Acre	1.00	$ -	$ -	$ -	______
Other ______________________						
Total Fixed Costs				**$ 135.10**	$ 96.50	

TOTAL COSTS AND PROFIT GOAL

Total Costs Excluding Land	**$ 549.26**	$ 392.33

The Center for Agribusiness & Economic Development

The Center for Agribusiness and Economic Development is a unit of the College of Agricultural and Environmental Sciences of the University of Georgia, combining the missions of research and extension. The Center has among its objectives:

> To provide feasibility and other short term studies for current or potential Georgia agribusiness firms and/or emerging food and fiber industries.
>
> To provide agricultural, natural resource, and demographic data for private and public decision makers.

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J. Scott Angle, Dean and Director