The University of Georgia

Center for Agribusiness and Economic Development

College of Agricultural and Environmental Sciences

THE FEASIBILITY OF CRUSHING COTTONSEED OIL FOR USE IN DRYING COTTON

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December 2007

Feasibility Rerport: FR-07-07

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Introduction

The Center for Agribusiness and Economic Development (CAED), College of Agriculture and Environmental Sciences, University of Georgia was contacted by Mr. Mr. Lloyd Strickland and asked to conduct a feasibility analysis of the proposal for taking cottonseed produced at the Bulloch Gin, Inc in Brooklet, Georgia and converting it into fuel for use in drying cotton at the gin. The gin produces about 5,000 tons of cottonseed in a typical year of operation and uses considerable amounts of butane to dry the cotton prior to ginning. Mr. Strickland wanted to know if it was economically feasible to extract the oil from the cottonseed and use it to replace the purchase of butane used to create the heat for drying cotton. Mr. Strickland proposes to create a separate business entity to process the cottonseed produced at Bulloch Gin, create a crude cottonseed oil and market it and other co-products to Bulloch Gin and other buyers.

The Situation

Prior to contacting CAED, Mr. Strickland had contacted Carver, Inc., a cotton processing equipment provider located in Savannah, Georgia and received a pro forma bid for the sale of a cottonseed processing equipment. That pro forma bid formed the base from which capital costs for the process were estimated. The Carver bid sheet is in the addendum to this report. Mr. Strickland proposes to locate the new business venture on the property and in a building now owned and occupied by Bulloch Gin, Inc. Bulloch Gin, Inc. will transfer ownership of approximately two acres of land and one large warehouse to the new entity as an equity contribution. A portion of the warehouse not planned to be used by the new entity will be leased back to Bulloch Gin, Inc. The new entity will purchase all of the cottonseed produced by Bulloch Gin, Inc.

The process to be analyzed is to use an extruder/expeller to extract oil from cottonseed. Prior to extruding the seed, it must be cleaned and delinted. The marketable products from the process (and the approximate percent per ton of cottonseed) are crude cottonseed oil (18%), cottonseed meal (76%) and linters (6%).

Capitalization

The new entity is proposed to be funded by Bulloch Gin, Inc. with the transfer of land and warehouse valued at $1,000,000, the sale of stock in the proposed amount of $500,000, a loan from One Georgia in the amount of $1,000,000 and a grant from One Georgia for bio-fuels production in the amount of $500,000 and a intermediate term borrowings of about $251,110 for a total capitalization of $3,251,110.

Capital costs include a total of $1,251,110 process equipment, installation and storage

tanks. Cottonseed inventory will amount to approximately $1,000,000 based on early ginning estimates for the entire crop. The land and buildings have a value of $1,000,000 for a total capital cost of $3,251,110.

Assumptions for the Analysis

Mr. Lloyd Strickland was the source for many of the details concerning the capital costs and costs of operation of the process equipment. The validity of the analysis depends on the reliability of the information provided to CAED. In addition, the following assumptions were used in the analysis:

1. Labor requirements: the process will require two and one-half operators running the equipment 10 hours per day, five days per week for 250 days per year.
2. The average cottonseed oil content of the cottonseed is 18 percent.
3. The average yield using the extrusion process is 95 percent of the oil content.
4. The process equipment will operate 90 percent of the available work time.
5. The process equipment has a named capacity of 50 tons per day.
6. Assumed prices are: cottonseed = $230 per ton, cottonseed meal = $180 per ton, linters = $500 per ton.
7. Cottonseed oil contains about 126,900 BTUs per gallon while Butane contains 102,600 BTUs per gallon. Cottonseed oil it thus worth 1.24 times Butane in terms of BTUs per unit of value. Thus if Butane costs $2.29 per gallon, then crude cottonseed oil has a heating value of $2.83 in terms of displaced Butane. This value was used as the "selling price" in determining the feasibility of the venture.

Description of the Proposed Process

Cottonseed will be warehoused at the Bulloch Gin, inc. warehouse. The seed will be transferred as needed – approximately 19 tons per day – to the process building. The cottonseed will be cleaned by passing through a rotary drum magnet to remove any ferrous metals. The next step in the cleaning process is to pass the cottonseed through a rock trap and fountain cleaner that removes fly lint, bran, bole particles and other easily separated particles. Other cleaning actions remove large locks of loose lint and unginned cotton as well as dehulled seed, small sticks and stems and other materials that contaminate the lint.

The next process step is delint the cleaned cottonseed. The delinter is best described as a series of turning saw blades located on a bed with very tight clearances. The cottonseed is passed over the blades which snip off the lint to produce the linters product. This linters product goes on for further cleaning to separate very tiny pieces of lint as well as other impurities rendered into the linters. The linters is then baled and stored ready for sale. The linters bale will be about 30" long by 55" wide by 21" high.

The cleaned cottonseed will proceed to a magnetic protector to remove ferrous metals then to a hammer mill that will crack the seed using a cracking mill roll. The product will proceed to the expeller, a screw press that forces the oil from the seed particles. The screw press

uses force and self created heat to remove about 95 percent of the oil from the seed.

The oil is diverted through a screen to remove large solids from the crude oil. It than is agitated to prevent solids from forming before going to a centrifuge to remove small impurities. The oil is filtered to remove small solids and then is sent to tanks for storage awaiting use and or sale. The cake produced from the expeller must be ground and dried. It is then moved to storage awaiting sale.

The oil can be used as a fuel in a burner to create heat that can be used to dry cotton. Cottonseed oil has about 124 percent BTU content of Butane, the fuel currently being used by Bulloch Gin, Inc. to dry cotton. It can be burned in an approved multi-fuel burner with little or no technical problems.

Financial Analysis

There are three main tests that can be applied to determine the feasibility of a proposed venture. Each test evaluates the proposal from a different perspective. The first test determines whether or not the venture has the ability to pay a fair return to the factors of production used. It is termed the test of economic feasibility. The second test determines whether or not proposed venture can cover all the costs of production and provide a net return high enough to attract the resources needed to conduct the operation. A pro forma income statement of one year of operation is used to illustrate this concept. The third test determines whether the venture can generate enough cash flow from product sales to pay all the occurring cash outflows. A one year monthly cash flow analysis will be used to evaluate this concept.

Economic Feasibility

The first test of a proposed venture is whether or not it can return a fair market value return to the resources used to create a product. The resources used are essentially land, labor, capital and management. Each of these resources should be paid a fair market value. Land is included in the capital resource and is paid a 7 percent return. Labor is included in the production cost at the assumed wage rate and management receives a return equal to 5 percent of the total capital expenditure. The remaining returns, if positive indicate that the venture has a true economic feasibility of success.

The following table illustrates the economic feasibility of the proposed venture.

ECONOMIC FEASIBILITY OF USING COTTONSEED OIL TO DRY COTTON
ECONOMIC COSTS AND RETURNS

Revenue	
Cottonseed Oil Value	$440,539
Cottonseed Meal	$663,272
Linters	$140,625
Rental Income	$50,000
Total	$1,294,436
Production Costs	
Feedstock Costs	$1,078,125
Utilities	$18,000
Supplies and Services	$2,500
Labor plus Benefits	$156,250
Repairs & Maintenance	$162,556
Insurance	$10,000
Other/Gen./Admin	$25,000
Marketing	$25,000
Total Production Costs	$1,477,431
Fixed Costs	
Return to all Capital @ 7% Interest Rate	$231,603
Return to Management @ 5% of Investment	$162,931
Total Fixed Costs	$394,533
Total Economic Cost of Operation	$1,871,964
Economic Return before Income Taxes	-$577,528
Return on Investment before Income Taxes	-17.5%

Under the assumptions stated above and price quotes for cottonseed and cottonseed meal as of December 11, 2007, the proposed venture is not economically feasible in that it fails to provide a positive return the basic economic resources employed. The venture falls well short of paying a fair market return to the basic factors of production.

Pro Forma Income Statements

The second test of feasibility determines whether or not proposed venture can cover all the costs of production and provide a return high enough to attract the resources needed to conduct the operation. A pro forma income statement shows the financial feasibility of a venture by estimating the actual costs of production and revenue flows. The following pro forma is based on the first full year of operation at projected capacities and assumes all production is acceptable and sold into the market.

PRO FORMA INCOME STATEMENT
Typical Year

Revenue	
Cottonseed Oil Value	$544,877
Cottonseed Meal	$663,272
Linters	$140,625
Rental Income	$50,000
Total	$1,398,774
Production Costs	
Feedstock Costs	$1,078,125
Utilities	$18,000
Supplies and Services	$2,500
Labor plus Benefits	$156,250
Repairs & Maintenance	$162,556
Insurance	$10,000
Other/Gen./Admin	$25,000
Marketing	$25,000
Total Production Costs	$1,477,431
Fixed Costs	
Depreciation	$325,111
Interest on Long Term Debt	$20,910
Total Fixed Costs	$346,021
Total Cost of Operation	$1,823,451
Return Before Income Taxes	-$424,678
Return on Equity Before Income Taxes	-12.8%

Based on fundamental accounting principles of recognizing all the actual costs of production along with the revenues generated from the sale of all marketable products at market prices as of December 11, 2007, the proposed venture fails to generate a positive net return. Therefore it fails the second major test of economic feasibility.

Cash Flow Analysis

The third test of feasibility determines whether the venture can generate enough cash flow from product sales to pay all the occurring cash outflows. The following one year monthly cash flow analysis will be used to evaluate this concept.

The venture fails to cover the occurring cash outlays during any month of a typical first year of operation and that trend is likely to continue in any subsequent time frame. The venture fails the cash flow test and thus once again does not appear to be feasible under the conditions analyzed.

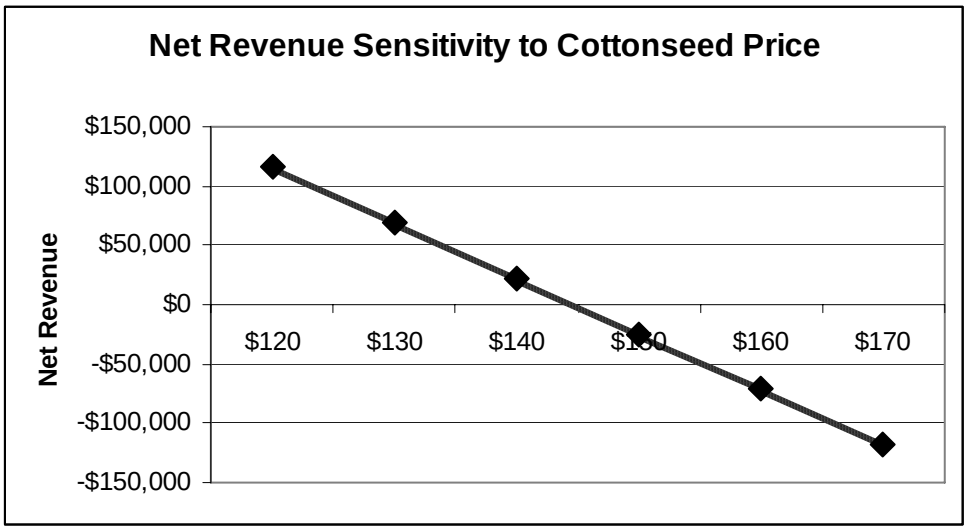
MONTHLY CASH FLOW PROJECTION for YEAR 1

Cash Receipts	1st Month	2nd Month	3rd Month	4th Month	5th Month	6th Month	7th Month	8th Month	9th Month	10th Month	11th Month	12th Month	Annual
Beginning Cash Balance	0	-34,684	-69,368	-104,052	-138,736	-173,420	-208,104	-242,788	-277,472	-312,156	-346,840	-381,524	
Capital Contributions	1,500,000												1,500,000
Proceeds from Loans	1,751,110												1,751,110
Cottonseed oil	45,406	45,406	45,406	45,406	45,406	45,406	45,406	45,406	45,406	45,406	45,406	45,406	544,877
Cottonseed Meal	55,273	55,273	55,273	55,273	55,273	55,273	55,273	55,273	55,273	55,273	55,273	55,273	663,272
Linters	11,719	11,719	11,719	11,719	11,719	11,719	11,719	11,719	11,719	11,719	11,719	11,719	140,625
Rental Income	4,167	4,167	4,167	4,167	4,167	4,167	4,167	4,167	4,167	4,167	4,167	4,167	50,000
Total Cash In	**$3,367,674**	**$116,564**	**$116,564**	**$116,564**	**$116,564**	**$116,564**	**$116,564**	**$116,564**	**$116,564**	**$116,564**	**$116,564**	**$116,564**	**$4,649,884**
Cash Outflow													
Variable Expenses													
Feedstock Cost	89,844	89,844	89,844	89,844	89,844	89,844	89,844	89,844	89,844	89,844	89,844	89,844	1,078,125
Utilities	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	18,000
Supplies and Services	208	208	208	208	208	208	208	208	208	208	208	208	2,500
Labor plus Benefits	13,021	13,021	13,021	13,021	13,021	13,021	13,021	13,021	13,021	13,021	13,021	13,021	156,250
Repairs & Maintenance	13,546	13,546	13,546	13,546	13,546	13,546	13,546	13,546	13,546	13,546	13,546	13,546	162,556
Insurance	833	833	833	833	833	833	833	833	833	833	833	833	10,000
Other/Gen./Admin	2,083	2,083	2,083	2,083	2,083	2,083	2,083	2,083	2,083	2,083	2,083	2,083	25,000
Marketing	0	0	0	0	0	0	0	0	0	0	0	0	0
Interest	1,883	1,858	1,833	1,808	1,782	1,757	1,731	1,705	1,678	1,652	1,625	1,598	20,910
Total Variable	**122,919**	**122,894**	**122,869**	**122,844**	**122,818**	**122,792**	**122,767**	**122,740**	**122,714**	**122,688**	**122,661**	**122,634**	**1,473,340**
Fixed Expenses (Financing)													
Loan Principal Payment	3,329	3,354	3,379	3,405	3,430	3,456	3,482	3,508	3,534	3,561	3,588	3,615	41,642
Georgia One Stop Loan	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	300,000
Facility Construction	3,251,110												3,251,110
Total Fixed Expense	**3,279,439**	**28,354**	**28,379**	**28,405**	**28,430**	**28,456**	**28,482**	**28,508**	**28,534**	**28,561**	**28,588**	**28,615**	**3,592,752**
Total Cash Out	**$3,402,359**	**$151,249**	**$151,249**	**$151,249**	**$151,249**	**$151,249**	**$151,249**	**$151,249**	**$151,249**	**$151,249**	**$151,249**	**$151,249**	**$5,066,092**
Surplus/Deficit	-$34,684	-$34,684	-$34,684	-$34,684	-$34,684	-$34,684	-$34,684	-$34,684	-$34,684	-$34,684	-$34,684	-$34,684	-$416,208
Dividends Declared & Paid													
Cash on Hand	**-$34,684**	**-$69,368**	**-$104,052**	**-$138,736**	**-$173,420**	**-$208,104**	**-$242,788**	**-$277,472**	**-$312,156**	**-$346,840**	**-$381,524**	**-$416,208**	

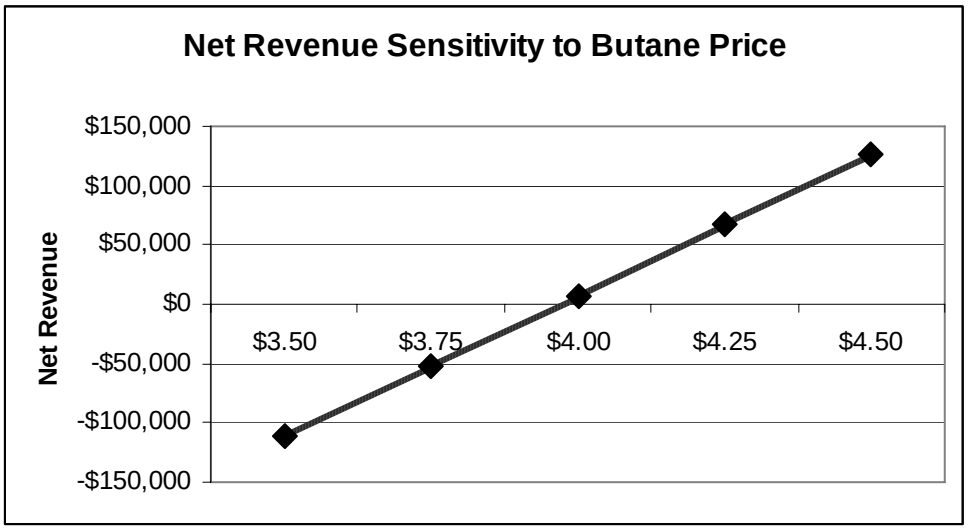
Sensitivity Analysis

The following three charts illustrate the impact upon net revenues based on changes in key market prices for cottonseed, cottonseed meal and butane. Each chart illustrates how net revenues change when the price of one factor is changed while all other variables are held constant.

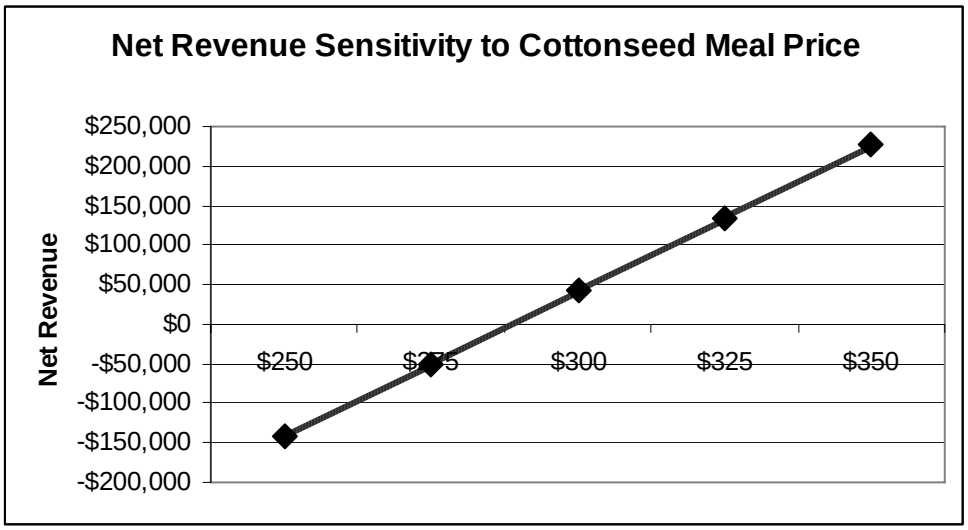
The prices for these key variables as of December 11, 2007 are: cottonseed = $230 per ton; cottonseed meal = $180 per ton; and butane $2.29 per gallon.



Note in the above chart that cottonseed prices would need to fall from the current $230 per ton to $145 per ton, all else unchanged, to generate positive net revenues. That would represent a price fall of about 37 percent before the venture would break even.



The above chart illustrates that the price of butane, quoted at $2.29 per gallon on December 11, 2007, would need to rise to about $4.00 per gallon, all other variables held constant, before the venture would break even. That would represent a price rise of about 75 percent.



Cottonseed meal represents the largest revenue stream from the proposed venture. The price of cottonseed meal on December 11, 2007 was quoted at $180 per ton. Cottonseed meal prices would need to rise to about $287, all other variables held constant, before the venture would return a positive net revenue stream.

Other Factors to Consider

Other factors that could have an impact upon the venture that were not evaluated include obtaining markets for the excess cottonseed oil produced that would not be used for fuel to dry cotton at the Bulloch Gin, Inc. Locating markets at prices for the crude cottonseed oil equal to or better than the assumed $2.83 per gallon used in the analysis could be problematic, given the location of the operation relative to potential buyers and the relatively modest volume available for sale.

Locating markets for the cottonseed meal could also be problematic. The volume of meal produced needs to be compared to potential local market need. Sales to the poultry feed market, the largest feed market in the area are unlikely. The next largest local feed market would be to area cattlemen as a feed supplement. The likely seasonal nature of the demand for cottonseed meal would necessitate locating other markets. Local swine producers and dairies are two potential cottonseed markets that were not explored.

Summary

The proposed venture would crush cottonseed into crude cottonseed oil to be used as a heat source for drying cotton. The venture would also produce and sell cottonseed meal and linters as well as generate rental income from storage space on the premises.

The CAED analyzed the proposed venture to determine whether or not it was economically feasibility to proceed with the concept. Three major economic tests were applied to the project to see if there were positive returns available under typical operating conditions. The proposed venture failed to demonstrate the likely ability to yield positive returns under the assumptions and conditions presented for analysis. Therefore, it is the opinion of the CAED analysts that the proposed venture is not feasible as presented.

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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Report Number FRO7-07 **Date/Year December, 2007**

Issued in furtherance of Cooperation Extension Acts of May 8 and June 30, 1914, the University of Georgia College of Agricultural and Environmental Sciences, and the U.S. Department of Agriculture cooperating.

J. Scott Angle, Dean and Director