The University of Georgia

Center for Agribusiness and Economic Development

College of Agricultural and Environmental Sciences

Economic Feasibility of Converting Cotton and Peanut By-Products into Cattle Feed

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Executive Summary

The Center for Agribusiness and Economic Development (CAED) conducted an economic assessment for organizing a value-added venture involving the mixing of cotton and peanut by-products. A local group of producers who currently own and operate a peanut buying point and cotton gin are interested in utilizing the by-products from these two operations to feed cattle. The group requested a study through the Georgia Cooperative Development Center. In early 2006, a study was conducted based on information supplied by the producers, University of Georgia, USDA and industry to determine the economic feasibility of such operations.

The proposed business would be a feed conversion venture requiring a metal building, concrete pad, mixing equipment, hauling equipment, office building, and by-product and feed storage. Cotton by-product derived from the cotton ginning process and peanut by-product derived from cleaning and handling of farmer stock peanuts would be mixed in a large capacity tub feed mixer and then marketed to be fed to cattle. The feed mix would replace current feed mixes that utilize medium quality hay and comparable feed supplements of corn, cottonseed and soymeal. Supplemental feeding is a common practice in South Georgia when pasture grazing runs out in the last half of the year. Use of the by-product feed mix is projected from late summer to beginning of winter when fall-planted grazing becomes available.

The CAED examined taking the cotton gin by-product, often called "gin trash" and mixing it with the peanut by-product. A sample of the by-product feed mix was submitted to the University of Georgia and feed analysis results indicated the by-product mix to be comparable to medium quality hay. The economic feasibility of mixing by-products was conducted to determine profitability. The expected annual production for the proposed venture is 4000 tons of feed per year allowing for a reasonable feeding season (6 months beginning in July through December). The market study is based upon the commitment of the owner-members to purchase 2900 tons of feed (72.5% of the production) at $40 per ton above the feed ingredient prices.

The business model examined involves 3000 tons of feed mixed during the peak season for cow-calf and stocker operations and 1000 tons mixed during the "off" season for stocker operations. The owners represent 2% of the total cattle in the local area consisting of Tift, Berrien, Colquitt, Cook, Irwin, Turner and Worth Counties. It is reasonable to expect the 1100 tons of feed produced and not purchased by the owners can be marketed in this region. It is our finding that for a charge of $40 per ton to mix the cotton and peanut by-products with whole cottonseed, the feed operation would be profitable. Any additional feed ingredients, such as corn, added to the by-product mix would be charged at cost in addition to the $40 per ton mixing fee.

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Introduction

Supplemental feeding is a common practice in South Georgia when pasture grazing runs out in the last half of the year. Inputs for supplemental rations can include by-products from ginning cotton and handling farmer stock peanuts as roughage. Removal of the cotton and peanut by-products is currently a cost to the company. Several factors must be considered including the nutritional and economical value of the ration and the potential market. A group of producers in Southwest Georgia have an interest in a cotton gin and peanut buying point. Several of the producer/members also have cattle operations. The group of producers was interested in the economic feasibility of such a venture and asked the Center for Agribusiness and Economic Development to conduct the study through application with the Georgia Cooperative Development Center.

The overall goal of the project is to reduce a significant cost element of the cotton ginning process and create a profit center by converting waste byproducts into processed cattle feed. As a result, income to member-owners will increase. Area cattle producers will also benefit from a low cost, readily available feed source. A summary of the tasks to be completed for this project to process the byproducts into cattle feed include collection of the byproducts, mixing them into a consistent feed product, and transportation of the product to the end user. Additional tasks include maintaining an office for transactions related to this project and market expansion to area non-member cattle producers.

Product Detail

Different rations were considered and each would require varying amounts of input and nutritional requirements vary depending on the needs of the cattle. The base ration to be produced at this facility would be 75% cotton byproduct ("gin trash"), 12.5% peanut by-product (peanut hulls), and 12.5% whole cotton seed (WCS). Other rations examined include corn as a supplement for protein and energy. The rations are compared to a traditional stocker ration that includes peanut hay instead of cotton and peanut by-products for stockers. The composition of five different rations is defined in Table 1.

Ration cost is calculated for the components of each ration. Gin trash and peanut hulls are assigned a cost of $3 per ton. Whole cotton seed is estimated to cost $70 per ton. The cost of corn grain is estimated at $2.42 per bushel or $86.43 per ton. The corn price is based upon an 8-year average price for corn in Georgia. Two rations were considered for dry cows—one with corn and one without. The ration cost not including corn is estimated at $11.38 per ton. When supplemented with corn, the ration cost increases to $23.89 per ton. The ration targeted for lactating cows is estimated to cost $34.73 per ton. The stocker ration to be produced year-round is estimated to cost $51.41 per ton. The cotton and peanut by-products can be a substitute for peanut hay which the producers named as the traditional stocker ration. The traditional stocker ration consisting of peanut hay is estimated to cost $72.10 per ton.

The feed rations in Table 1 represent the ingredient cost of the feed mix. The company would need to charge a fee in addition to the ingredient cost to cover the cost associated with mixing the ration, i.e. labor, equipment and other capital costs.

Table 1. Feed Rations

Ingredient	$/ton	Component % of Ration	# in Ration	Ration Cost
Dry Cow Ration without Corn				
Gin Trash	$3	75%	1500	$2.25
Whole Cotton Seed	$70	12.50%	250	$8.75
Peanut Hulls	$3	12.50%	250	$0.38
Total		100%	2000	$11.38
Dry Cow Ration with Corn				
Gin Trash	$3	60%	1200	$1.80
Whole Cotton Seed	$70	12.50%	250	$8.75
Peanut Hulls	$3	12.50%	250	$0.38
Corn	$86.43	15%	300	$12.96
Total		100%	2000	$23.89
Lactating Cow Ration				
Gin Trash	$3	50%	1000	$1.50
Whole Cotton Seed	$70	10%	200	$7.00
Peanut Hulls	$3	10%	200	$0.30
Corn	$86.43	30%	600	$25.93
Total		100%	2000	$34.73
Stocker Ration				
Gin Trash	$3	30%	600	$0.90
Whole Cotton Seed	$70	10%	200	$7.00
Peanut Hulls	$3	10%	200	$0.30
Corn	$86.43	50%	1000	$43.21
Total		100%	2000	$51.41
Traditional Stocker Ration (Peanut Hay instead of Cotton & Peanut By-Products)				
Peanut Hay	$3	48%	960	$28.80
Whole Cotton Seed	$70	10%	200	$7.00
Corn	$86.43	42%	840	$36.30
Total		100%	2000	$72.10

Ration Supply

Both the cotton gin and the peanut facility operated by the producer group generate large volumes of byproducts or waste on an annual basis. The by-products are generated during harvest season running from late September thru December. The waste product from the cotton gin is commonly referred to as "gin trash." It consists of stems, leaves, cottonseed and fiber. The peanut waste product consists of peanut hulls, stems, leaves, and crushed peanuts. The gin byproduct produced is estimated to be 300 pounds for each bale of cotton ginned. For peanuts the byproduct produced is estimated to be 200 pounds per ton of peanuts handled through the facility. In 2005 the company ginned approximately 10,000 bales of cotton and handled 5,000 tons of peanuts. Disposal of huge volumes of byproduct has been extremely expensive. Disposal is estimated to cost as high as $32.50 per ton. The company incurred disposal costs of gin trash from the 2005 season totaling $48,747. Environmental regulations will not allow the by-products to be simply stockpiled. Therefore, most gins transport the waste to fields and spread it onto the fields as a soil additive. The company has been exploring the conversion of these cotton and peanut byproducts to cow feed for sale to farmer-members as well as other cattle producers.

The feed conversion model developed for economic analysis assumes the cow ration will be fed for 180 days a year. The stocker ration is assumed to be supplied and fed 365 days a year. Thus, storage is required for production throughout the year. The farmer-members estimate that they will utilize 3% of the cattle body weight in supplemental feed per day. Assuming cows weigh 1200 lbs/head, 36 lbs of ration per day would be utilized for cows. Stockers weighing 400 lbs would utilize 2 lbs of ration per day. The current cattle herd for the members consists of 510 cows or replacement heifers and 600 stockers. The total member use of the feed mix would be 826.2 tons of the dry cow ration, 826.2 tons of the lactating cow ration and 1314 tons of the stocker feed ration.

Market for the Product—Ration Demand

A major consideration in the potential viability of this venture is whether a potential market exists for the product. The potential customer base for the feed product is enormous. The cattle herd within the surrounding seven counties of the project site exceeds 80,000 according to the 2005 Edition of the Georgia Agricultural Facts published by the Georgia Agricultural Statistics Service. According the company, numerous cattle producers have requested the cattle feed product. Using a smaller target area consisting of Tift, Berrien, Colquitt and Worth counties, the total potential local market is 57,300 cattle comprised of 29,550 cows and replacement heifers and 27,750 stockers as shown in Table 2. The smaller area is targeted to minimize transportation costs. The initial customer base for the cattle feed product to be produced by the company will be the six farmer-members who are cattle producers. The total head of cattle owned by members is 510 cows or replacement heifers and 600 head of stockers. Member cattle represent less than 2% of the estimated cattle in the targeted local market. Therefore, it appears significant market potential exists for an alternative feed mix that is competitive in price and quality to capture part of the supplemental feed market share.

Table 2. Cattle in Potential Target Local Market, 2005.

County	Cows& Replacement Heifers	Stockers	Total
Tift	5,380	3,920	9,300
Berrien	4,400	6,600	11,000
Colquitt	12,970	12,030	25,000
Worth	6,800	5,200	12,000
Total	**29,550**	**27,750**	**57,300**

Source: Georgia Agricultural Statistics Service.

Capital Costs

This venture would require capital investment consisting of land, a metal building, feed mixing equipment, and an office with office supplies. Capital costs are detailed in Table 3. Construction of a metal building for feedstock storage and handling is estimated to cost $142,037. Equipment requirements include an 110 HP tractor, a 10,800 lb tub mixer, a skid steer loader, a semi-truck , a conveyor, a walking floor trailer, a ¾ ton pickup truck and 10 feeder wagons. Total equipment capital costs are estimated at $266,750. Additional costs include $5,000 of office supplies, furniture and equipment. The site for the feed conversion facility will require four acres of land valued at $5,000 per acre. The total investment is estimated to be $433,787.

Table 3. Capital Costs

	Capital Costs			Salvage	Years		Total
Building and Improvements	Number	$/unit	Total	Value	Of Life	Depreciation	Depreciation
80Wx150Lx 20H Metal Building	1	$ 112,500	$ 112,500	30000	20	4125	4125
Concrete Pad	259	$ 85.00	$ 22,037	0	20	4	1102
Piping	1	$ 7,500	$ 7,500	1500	15	400	400
Total Building			$ 142,037	$ 31,500			$ 5,627

Equipment	Number	$/unit	Total	Salvage Value	Years Of Life	Depreciation	Total Depreciation
10,800 lb Tub Mixer	1	$ 32,500	$ 32,500	6500	10	2600	2600
110 HP Tractor	1	$ 72,000	$ 72,000	14400	14	4114	4114
Skid Steer Loader	1	$ 26,250	$ 26,250	5000	14	1518	1518
Conveyer	1	$ 10,000	$ 10,000	2000	10	800	800
Feeder Wagon	10	$ 5,000	$ 50,000	1000	8	500	5000
Semi-Truck	1	$ 26,000	$ 26,000	5200	8	2600	2600
Walking Floor Trailer	1	$ 25,000	$ 25,000	5000	8	2500	2500
3/4 ton Pickup Truck	1	$ 25,000	$ 25,000	6000	8	2375	2375
Total Equipment			$ 266,750	$ 45,100			$ 21,507

Table 3. Capital Costs continued.

Office	Number	$/unit	Total				
Supplies & Furniture	1	3000	3000	600	10	240	240
Computer	1	2000	2000	400	5	320	320
Total Office			$ 5,000.00	$ 1,000.00			$ 560.00
	Acres	$/acre	Total				
Land	4	5000	$20,000	5000	30	0	0

TOTAL CAPITAL COSTS	
Land	$ 20,000
Building and Improvements	$ 142,037
Equipment	$ 266,750
Office Supplies, Furniture	$ 5,000
Total	$ 433,787

Straight line depreciation is used to estimate depreciation on fixed assets. The total annual depreciation for buildings and improvements, equipment and office furniture and equipment is estimated at $27,694. Long-term financing is assumed to be needed in order to establish the feed conversion venture. The total capital borrowed is estimated at $385,000 to be borrowed at 8% for 10 years. The land, office and pickup truck would be contributed by the company. The total loan payment in year one is calculated to be $57,376.

Labor Requirements

The workload is defined as two distinct times—peak (July through December) and non-peak (January through June) seasons each consisting of 25 weeks. During the peak season, the feed mix operation would run 6 days a week mixing 4 loads or 20 tons per day. For the non-peak season operations would only run 2 days a week mixing 4 loads or 20 tons per day. It is estimated it will take 1.5 hours to mix a load of the feed mix ration. A typical workday is defined as 8 hours. Therefore, to mix the 3000 tons during the peak season would require 1200 total hours of labor and non-peak 1000 tons would require 400 hours of labor.

The labor requirement for this venture will include mixing labor and hauling labor. Hours and wage assumptions are given in Table 4. For mixing, a skid steer loader operator and a tub mixer operator will be needed for 1600 hours a year at a wage rate of $9 per hour. One employee will be needed to haul peanut hulls for mixing for 800 hours a year at $7 per hour. Hauling labor would be required to haul the mixed feed. A semi-truck driver would be needed 1600 hours per year at a cost of $10 per hour. The venture would also include leasing feed wagons out to producers with the purchase of the feed mix. An employee will deliver these wagons for a total of 1200 hours per year at a rate of $9 per hour. Total hourly labor would be $61,200. Clerical and bookkeeping duties

would also be required. The study assumed annual expense of $10,000 to cover these costs. Management is assumed to be provided by current management of the company.

Table 4. Labor Requirements and Cost.

Labor Requirements

	Number	Hours	$/Hr	Total
Skid Steer Loader	1	1600	9	$14,400
Tub-Mixer	1	1600	9	$14,400
Peanut Hulls Hauling	1	800	7	$5,600
Total Mixing Labor				$34,400
Semi-Truck Driver	1	1600	10	$16,000
Feed Wagon Delivery	1	1200	9	$10,800
Total Hauling Labor				$26,800
Total Hired Labor				$61,200

	Number	Salary	Total
Manager & Sales	0	$25,000	$0
Clerical & Bookkeeper	1	$10,000	$10,000
Total Administrative			$10,000

Financial Statements

The beginning date for mixing of rations in 2006 is assumed to begin in September with a month lag time between delivery of product and payment received. Thus, a shorter peak season of 4 months is estimated. Income would be generated from the sale of the feed mix ration, leasing of the feed wagons and fees charged for hauling the ration. Variable costs in addition to the labor discussed earlier include the feedstock for the rations, fuel, oil, repairs and maintenance, payroll taxes, liability insurance, utilities, communication and professional fees. In 2006, a total of 1,560 tons of cow and 552 tons of stocker ration would be mixed. In 2007, the cow ration would total 2,340 tons and stocker ration would total 1,660 tons. In 2008, it is expected that revenues increase by 10% and expenses increase by 3%.

Table 5 shows the pro-forma income statement summarized for the first three years of operation, 2006 through 2008. Income received is shown as coming from the sale of three types of rations, dry cow, lactating cow, and stocker. Other income is derived from the lease of feed wagons and a hauling charge. The price for each ration is charged based on $40 per ton mixing fee plus the cost of feedstock, i.e. gin trash, cottonseed, peanut hulls, and corn. The $40 per ton mixing fee is the fee necessary to cover the variable and fixed costs of the feed conversion operation as estimated by this study. Thus, the breakeven mixing fee is $40 per ton.

By beginning the feed mixing operation in September of 2006, a net loss of $44,114 is incurred for the fiscal year of January to December. After a full season of operation in 2007, the feed conversion operation becomes profitable. Year three of operation in 2008

is assumed to increase revenue by 10% due to increased business and/or increased price charged for mixing. Expenses are assumed to increase 3% in year three also. The profit from the third year of operation is estimated to reach over $35,000 given similar or same capacity of the operation.

Table 5. Proforma Income Statement, 2006-2008.

	Annual 2006	Annual 2007	Annual 2008
Income			
Dry Cow Feed Ration	$ 30,093	$ 60,186	$ 66,204
Lactating Cow Feed Ration	$ 43,772	$ 87,545	$ 96,299
Stocker Feed Ration	$ 37,868	$ 151,473	$ 166,621
Feed Wagon Lease	$ 5,000	$ 10,000	$ 10,000
Semi Hauling Charge	$ 3,728	$ 14,913	$ 14,913
TOTAL INCOME	$ 120,462	$ 324,117	$ 354,037
Variable Expenses			
Feedstock			
Cotton Gin Byproduct	$ 3,507	$ 5,884	$ 6,061
Peanut Hulls	$ 716	$ 1,288	$ 1,326
Whole Cottonseed	$ 16,701	$ 30,050	$ 30,952
Corn	$ 45,841	$ 101,981	$ 105,041
Fuel & Oil	$ 6,986	$ 11,629	$ 11,978
Repairs & Maintenance	$ 3,992	$ 6,786	$ 6,989
Labor		$ -	$ -
Mixing Labor	$ 17,200	$ 34,400	$ 35,432
Delivery Labor	$ 13,400	$ 26,800	$ 27,604
Administrative	$ 5,000	$ 10,000	$ 10,300
Payroll Taxes & Wrk Comp	$ 6,052	$ 12,104	$ 12,467
Liability Insurance	$ 3,625	$ 7,250	$ 7,468
Utilities	$ 250	$ 500	$ 515
Phone, fax, internet	$ 250	$ 500	$ 515
Professional fees	$ 4,250	$ 2,500	$ 2,575
TOTAL VARIABLE	$ 127,769	$ 251,672	$ 259,222
Fixed Expenses			
Taxes & Insurance	$ 3,012	$ 5,164	$ 5,319
Depreciation	$ 16,155	$ 27,694	$ 27,694
Interest on Investment	$ 17,669	$ 28,606	$ 26,328
TOTAL FIXED	$ 36,836	$ 61,464	$ 59,340
TOTAL EXPENSES	$ 164,605	$ 313,136	$ 318,563
PROFIT	$ (44,143)	$ 10,981	$ 35,474

Summary and Conclusions

This study based a new feed conversion venture on expected annual production of 4,000 tons of feed per year. The market feasibility is based on the commitment of the farmer-members of the company to purchase 72.5% of the feed mix production at $40 per ton above the feedstock price (cost of the feed ingredients). Based on the expressed demand by area cattle producers to the company for the by-product feed mix, it is reasonable to expect that the 1,100 tons produced above members need will be marketed to local cattle producers and surrounding counties. The owners represent only 2% of the total cattle in this region. It is our finding that for a charge of $40 per ton to mix the by-products, the feed operation would be profitable. Any additional feed ingredients, such as corn, added to the by-product mix would be charged at cost in addition to the $40 per ton mixing fee. Standing on it's own, the venture will at least breakeven at a $40 per ton mixing fee. Considering that the disposal cost of the cotton and gin trash can range from $20 to $35 per ton, the company would be adding value their by-product even if they had to charge less than the $40 mixing fee.

Farmer's Feed Conversion, Inc

Pro-Forma Income Statement

	Peak Season (Jul - Dec)	Non-Peak Season (Jan - Jun)
Weeks per Year	25	25
Days per Week	6	2
Loads per Day	4	4
Tons Mixed per Day	20	20
Total Tons Mixed	3000	1000
Hours per Load	1.5	1.5
Hours per Day	8.0	8.0
Total Hours	1200	400

	Tons
Total Feed Mixed	4000
Owners Cow	1652
Owners Stocker	1314
Custom Cow	691
Custom Stocker	343

Income		Quantity		Price	$ Total	$/Ton
Dry Cow Feed Ration	tons	1172	$	51.38	$60,186	
Lactating Cow Feed Ration	tons	1172	$	74.73	$87,545	
Stocker Feed Ration	tons	1657	$	91.41	$151,473	
Feed Wagon Lease		10	$	1,000.00	$10,000	
Semi Hauling Charge	tons	1657	$	9.00	$14,913	
TOTAL INCOME					$324,117	$81.03

Variable Expenses		Quantity	Price	$ Total	$/Ton
Feedstock					
Cotton Gin Byproduct	tons	1961.48	$3.00	$5,884	$1.47
Peanut Hulls	tons	429.29	$3.00	$1,288	$0.32
Whole Cottonseed	tons	429.29	$70.00	$30,050	$7.51
Corn	tons	1179.95	$86.43	$101,981	$25.50
Fuel & Oil	gal	5814	$2.00	$11,629	$2.91
Repairs & Maintenance				$6,653	$1.66
Labor					
Mixing Labor				$34,400	$8.60
Delivery Labor				$26,800	$6.70
Administrative				$10,000	$2.50
Payroll Taxes & Wrk Comp				$12,104	$3.03
Liability Insurance				$7,250	$1.81
Utilities				$500	$0.13
Phone, fax, internet				$500	$0.13
Professional fees				$2,500	$0.63
TOTAL VARIABLE				$251,539	$62.88

Fixed Expenses		
Taxes & Insurance	$ 5,164	$1.29
Depreciation	$ 27,694	$6.92
Interest on Investment	$ 20,655	$5.16
TOTAL FIXED	$53,513	$13.38

TOTAL EXPENSES	$305,052	$76.26
PROFIT	$19,064.35	$4.77

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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