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College of Agricultural and Environmental Sciences

A Cost Analysis for a Poultry Compost Manufacturing Facility

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The Center for Agribusiness and Economic Development



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Executive Summary

The University of Georgia's Center for Agribusiness and Economic Development (CAED), was commissioned by the South West Georgia Cooperative Development Center to determine the costs associated with the production of poultry litter compost in Baker County, Georgia. The following is a summary of the study results.

A breakeven analysis was performed for a composting operation that produces fifty-five tons of compost daily. Estimates for the raw product were made based on current transportation charges and f.o.b. raw product prices. A sensitivity analysis was also performed on the operations to determine how changes in the prices of inputs and interest rates changed the breakeven price.

The most significant results are shown in the following two tables. The results in Table 1 show that \$46.95 is the breakeven price per ton when the facility is operating at 100% capacity. It is important to note that processing facilities rarely start off operating at 100%. For that reason, the table also shows the breakeven prices per ton for 50% and 75% capacity.

Table 1. Break Even Price for Poultry Compost – Three Levels of Efficiency	
50 % Capacity	\$68.65/ Ton
75 % Capacity	\$54.18/ Ton
100 % Capacity	\$46.95/ Ton

In addition to the capacity, the next most significant factor in determining breakeven price for the compost operation is the cost of the inputs. The most expensive of the two major inputs for this operation is poultry litter. It is possible at the current time to be able to purchase litter in the area for around \$10 per ton. However, the cost of transporting it to the compost site can be expensive depending on how far it has to be transported. Five dollars was used as the transportation cost

per ton. Other factors, such as government regulation can also have an impact on how much litter costs. It was assumed for this analysis that \$15.00 was the maximum that would have to be paid for litter transported to the compost site. Table 2 shows the impact of a reduction in poultry litter price on the breakeven price. There is a significant drop of over \$12 per ton when the price of litter drops to five dollars.

Table 2. Break Even Price for Poultry Compost – Three Levels of Poultry Litter Cost	
\$5.00/ Ton	\$34.20
\$10.00/Ton	\$40.57
\$15.00/Ton	\$46.95

These breakeven estimates are based on assumptions related to both how feedstocks are converted into compost and how much the equipment and feedstocks cost. Some of the costs associated with building the compost facility are not included in this analysis due to the individual owner being able to have this work done at a very low cost. This individual did not want to include these costs in this analysis. The breakeven price of \$46.95 is an estimate that should be viewed as a relatively safe estimate even though some of the costs are not included. It is also important to remember that the conversion rate of tons to cubic yards will also be very important in determining the price that needs to be charged for the final product.

Financial Evaluation

Due to a limited amount of information about potential markets for the Poultry Litter Composting Operation in Baker County a very broad financial evaluation is being presented. The evaluation attempts to present some general directions of start-up, variable and operating costs for some given scenarios. It also provides a general indication of the market requirements (sales) for operating at a break-even level. The general format for this evaluation was developed through a computerized spreadsheet and revisions can be made to better model potential outcomes as more and better information becomes available.

General Financial Numbers in Poultry Litter Composting

There is potential in this marketplace to have a wide range of wholesale prices depending on the quality of compost as well as the density. Some firms that sell products similar to this one, market their product by the ton and some market it by volume or cubic yard. For this reason this analysis will be based on weight as opposed to volume since it is generally accepted that one ton of feedstock will convert over six months time to one half ton of poultry litter compost. However, due to the range of moisture contents that the finished compost product could have, this could translate into a range of 800 to 1200 pounds per cubic yard.

Additional assumptions were also necessary in order for a break even price to be established. The first of these assumptions was the size of the operation. This is determined in this case in part by the number of chicken houses in the region that would have available feedstock for the composting operation. For this operation that size was determined to be approximately 110 tons of feedstock being converted to compost per day. This converts to about 20,000 tons of poultry litter compost annually. According to the Georgia Farm Gate 2003 statistics, Baker County and the five surrounding counties have 366 poultry houses in them. An estimated range of 125 tons to 150 tons of chicken litter can be obtained annually from each house, giving the operation potentially half of what it needs for the nitrogen component of the production process. The owner has also stated that his family has over 50 chicken houses in the area as well and that should supply close to what the facility needs annually. At the current time it is expected that chicken litter will cost around \$15.00 delivered to compost farm. The carbon source for the composting operation will come from cotton gin trash, which can currently be obtained for free, however, one must pay to have it loaded and hauled to the composting site. It is expected that this input will cost somewhere between \$6.00 and \$8.00 per ton delivered. Additional costs associated with processing poultry compost include labor, storage, equipment, and fuel.

This analysis assumes that the plant size will be 55 tons of finished compost each day. Labor costs for a plant this size will be two general workers and a compost production manager. It is further assumed that the pay rate for the general workers will be \$6.00 an hour with an additional 21 percent included for benefits. The labor costs per ton of compost produced are \$3.27 per ton, which includes a salary of \$30,000 plus benefits for the compost manager. Table 3 presents the breakdown of labor costs for this compost facility.

Table 3. Labor Requirements and Costs		
Compost Manager	1	\$30,000
Workers	2	\$24,000
Maintenance	0	-
Total	3	\$54,000
	21 % in Payroll and Benefits	\$11,340
Grand Total with Payroll Taxes and Benefits Included		\$ 65,340

Equipment requirements and their respective costs are shown in Table 4. Although some of this equipment can be purchased used to save on the startup costs, it is assumed for this analysis that equipment will be purchased new. Given that sales tax in Georgia is seven percent, the grand total for equipment is \$658,050.

Table 4. Equipment Requirements				
	Units	\$/unit		Total
Turners	1	\$200,000.00	\$	200,000
Loaders	2	\$100,000.00	\$	200,000
Screeners	1	\$100,000.00	\$	100,000
Trucks Medium Dump	1	\$15,000.00	\$	15,000
Vibrating Large	1	\$100,000.00	\$	100,000
Equipment Total				\$ 615,000
Sales tax	7%		\$	43,050
Equipment Grand Total				\$ 658,050

Next the cost of the storage buildings and compost pad including land costs is shown in Table 5. Four storage barns will need to be constructed in order to house the compost once it is ready for sale. The roads and retention pond are to be built by the owner with no accounting for them in this break-even analysis. Six thousand square yards of roadway are needed and a 1.8 acre retention pond. Although only 27 acres are necessary for this operation, the owner wished to include the cost of the entire property for this analysis. That cost was \$396,000 for a little over 100 acres or \$3,500 per acre. The compost pad was to be made from crushed rock and the estimate of \$15,400 came from the owner. These compost pads can run in cost anywhere from

near zero dollars per acre depending on the soil type, drainage and elevation of the land, to \$50,000 per acre when concrete is used.

Table 5. Storage Building, Compost Pad and Land Costs					
Buildings		Units	\$/unit		
Barns		4	\$49,000.00		\$196,000
Road	Supplied by Owner	6,000			
Pond	Supplied by Owner	1.8			
Compost Pad		15.4	\$ 1000.00		\$ 15,400
Building Total					\$211,400
Land					
		Acres	\$/Acre		
Land		110	\$ 3,600.00		\$396,000
Land Total					\$396,000

Break-even Analysis

The break-even analyses presented here are based on the cost estimates given previously and a sensitivity analysis is also performed based on input price and interest rate changes. Given the very limited amount of information and production "specifics" available to conduct this analysis, five different analyses of costs were made. First, best estimates were made in the process design and assignment of costs and then costs were both increased and decreased by both 10 percent and 20 percent. In addition break-even prices were calculated for the operation when efficiency was at 50% and 75% with all other costs remaining at their estimate. The following table shows the start-up costs associated with the compost operation and the estimated break-even price for the compost operation. In addition, Table 6 also shows the assumptions associated with this analysis.

Table 6. Start-up Cost Estimates and Additional Assumptions:					
Poultry Compost					
10	tons per hour	50%	Shrink		
8	hours per day	100%	Capacity		
5	days per week	20,000	Tons Processed		
50	week per year	40,000	Tons Needed		
2,000	total hours				
Income:	Assumed %	Tons	Break Even Price	Total \$	\$/Ton
Bulk Compost	100%	20,000	\$ 46.95	\$ 939,040	\$ 46.95
Total	100%	20,000	\$ 46.95	\$ 939,040	\$ 46.95

Direct Costs:				
Feed Stocks	Tons	Cost Per Ton	Total Cost	\$/Ton Output
Poultry Litter	25,000	\$15.00	\$ 375,000	\$18.75
Cotton Gin Trash	15,000	\$8.00	120,000	6.00
Total Feed Stocks			\$ 495,000	\$ 24.75
Direct Labor:				
Total Direct Labor			\$ 65,340	\$ 3.27
Total Labor Costs			\$ 65,340	\$ 3.27
Other Direct Costs:				
		\$/Unit	Units	
Fuel		\$2.00	58,000	\$ 116,000 \$ 5.80
Repairs & Maintenance		3%	\$658,050	\$ 19,742 \$ 0.99
Interest on Working Capital (3 months expenses)		8%	\$348,041	\$ 13,922 \$ 0.70
Total of Other Direct Costs			\$ 149,663	\$ 7.48
Total Direct Cost			\$ 710,003	\$ 35.50
Fixed Costs:				
Taxes & Insurance			\$12,655	\$0.63
Depreciation - Plant Equipment			\$115,147	\$5.76
Interest on Investment - Building/Land 8%			\$48,592	\$2.43
Interest on Investment - Plant Equipment 8%			\$52,644	\$2.63
Total Fixed Costs			\$ 229,038	\$ 11.45
Total Cost			\$ 939,041	\$ 46.95
Profit/Loss			-\$0.77	\$0.00
Tons Needed for Breakeven			20,000	Tons

Table 7 shows the break-even prices required depending on the level of capacity in the operation. At 50% capacity the break-even price is a little over \$68. When the capacity increases to 75% the break-even price decreases to \$54.14. At 100% capacity and the firm producing 20,000 tons of compost annually, the break-even price is reduced to \$46.95 a ton.

Table 7. Break Even Price for Poultry Compost – Three Levels of Efficiency	
50 % Capacity	\$68.65/ Ton
75 % Capacity	\$54.18/ Ton
100 % Capacity	\$46.95/ Ton

Sensitivity analysis was then performed to determine the effect of the feedstock costs increasing and decreasing. These results are shown in Table 8. When feedstock costs were decreased by 20%, the breakeven price dropped to \$41.90. On the other end of the spectrum when the feedstock costs were increased by 20% the breakeven price went up to \$52.00.

Table 8. Break Even Price for Poultry Compost – Five Levels of Feedstock Costs	
Feedstock Costs Decreased 20 %	\$41.90
Feedstock Costs Decreased 10%	\$44.43
Average Feedstock Costs	\$46.95
Feedstock Costs Increased 10%	\$49.48
Feedstock Costs Increased 20%	\$52.00

Table 9 shows what happens to breakeven price with the changing price of cotton gin trash. At the current time cotton gin trash doesn't cost anything, but the transportation costs must be paid by the compost operator. These transportation costs are estimated to be between \$5.00 and \$8.00 per ton delivered to the composting operation. At \$5.00 a ton for cotton gin trash, the breakeven price was calculated to be \$44.66, and when the cost increases to \$6.00 a ton, the breakeven price increases \$0.78 to \$45.42. Breakeven price increases another \$0.77 as the cost of cotton gin trash increases to \$7.00 a ton.

Table 9. Break Even Price for Poultry Compost – Four Levels Cotton Gin Trash Cost	
\$5.00/ Ton	\$44.66
\$6.00/Ton	\$45.42
\$7.00/Ton	\$46.19
\$8.00/Ton	\$46.95

In the near future it might be the case that poultry litter becomes a free input, or at least relatively cheaper, so sensitivity analysis was also performed on what might happen to breakeven price if the price of poultry litter is reduced. Table 10 shows the effect on the breakeven price of litter price declining. The breakeven price drops significantly with each \$5.00 drop in the cost of poultry litter. At \$5.00, the breakeven price for the compost drops to \$34.20 per ton, which is more than \$12 lower than the price of \$46.95 for the \$15.00/ton cost.

Table 10. Break Even Price for Poultry Compost – Three Levels of Poultry Litter Cost	
\$5.00/ Ton	\$34.20
\$10.00/Ton	\$40.57
\$15.00/Ton	\$46.95

The final table shows the changes in breakeven price when other miscellaneous input costs are changed. In Table 11, fuel cost was set at \$2.00 a gallon originally and both increased and decreased by 10 %. These changes had a minimal effect on the breakeven price with the increase in fuel price leading to a breakeven price of \$47.54. A 50% change in maintenance costs had a similar effect to that of the change in fuel costs. The rates of interest available for agricultural loans today range from 6% to 8% and depend on a variety of factors. The breakeven price does not change significantly with increases in the rate of interest. They range from \$45.51 at a 6% rate of interest to \$46.95 when the interest rate is at 8%.

Table 11. Break Even Price for Poultry Compost – Fuel, Maintenance, and Interest Costs Varied		
Fuel Cost Decreased by 10%	\$1.80/ Gallon	\$46.36
Fuel Cost Increased by 10%	\$2.20/ Gallon	\$47.54
Maintenance Costs Decreased by 50%	1.5 % Maintenance	\$46.44
Maintenance Costs Increased by 50%	4.5% Maintenance	\$47.45
Interest Rates Decreased by 1 Point	7%	\$46.23
Interest Rates Decreased by 2 Points	6%	\$45.51

Summary

These breakeven estimates are based on assumptions related to both how feedstocks are converted into compost and how much the equipment and feedstocks cost. Some of the costs associated with building the compost facility are not included in this analysis due to the owner being able to have this work done at a very low cost. The breakeven price of \$46.95 is an estimate that should be viewed as a relatively safe estimate even though some of the costs are not included. It is also important to remember that the conversion rate of tons to cubic yards will also be very important in determining the price that needs to be charged for the final product.