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# The University of Georgia

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**Center for Agribusiness and Economic Development**

**College of Agricultural and Environmental Sciences**

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## **Economic Impacts of an Ethanol Plant in Mitchell County**

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## **Economic Impacts of an Ethanol Plant in Mitchell County**

### **Executive Summary**

Construction and operation of an ethanol plant in rural southwestern Georgia has the potential to create economic benefits throughout the region and the entire state of Georgia. Financial data for construction of the plant, as well as annual operating revenues and expenses are provided by officials of a plant proposed for location in Camilla, GA. Construction of a \$124.8 million ethanol plant in Mitchell County is projected to involve 530 jobs. Plant construction leads to \$39.0 million of output related to construction. This output involves an additional 351 jobs throughout the state. Labor income totals \$32.8 million of income for 882 proprietors and employees in Georgia during the fifteen month construction period.

Operation of the ethanol plant creates annual sales of \$195.6 million in Mitchell County. This creates \$17.3 million in additional economic activity that totals \$212.9 million in Mitchell County as inputs and supplies are utilized during production. Employees and proprietors in Mitchell County earn income of \$7.6 million for 290 full-time and part-time jobs. \$2.5 million in income is earned by 77 employees in production, and \$5.1 million is earned in 214 jobs that are impacted by production. Local governments in Mitchell County collect \$468,801 in annual tax revenues due to production of ethanol.

Output totals \$198.0 million in the southwestern region of Georgia. Proprietors and employees in southwestern Georgia earn \$13.2 million per year due to ethanol production. Indirect impacts involve 383 jobs and income earnings are \$10.5 million. Local governments in southwestern Georgia collect \$772,489 in annual tax revenues due to production at the ethanol plant.

The ethanol plant in Mitchell County stimulates economic output that totals \$266.6 million to the Georgia economy. Employees and proprietors in Georgia earn \$22.8 million for employment in 549 full-time and part-time jobs. Besides the \$2.7 million earned by 86 employees directly involved in production, \$20.1 million of income is earned by 462 proprietors and employees in Georgia who are impacted by plant operations. The state of Georgia collects \$2.3 million annually in state taxes due to operation of the ethanol plant in Mitchell County. Utilization of corn produced in Georgia as feedstock has potential to increase economic output by up to \$189.7 million.

## **Economic Impacts of an Ethanol Plant in Mitchell County**

Construction and operation of an ethanol plant in rural southwestern Georgia has the potential to create economic benefits throughout the region and the entire state of Georgia. This report estimates economic impacts caused by a plant operating in Camilla, Georgia. Financial data for construction of the plant, as well as annual operating revenues and expenses are provided by officials of the proposed plant. The authors of this impact analysis have neither verified data supplied for this research nor conducted a feasibility analysis of the proposed ethanol plant.

Impacts due to construction of the ethanol plant are one-time benefits occurring within the fifteen month period of construction. Total construction costs are \$124.8 million and include facilities and operating equipment, rail road track and rolling stock, office equipment and computers, water treatment and fire protection systems, and an administrative building. Ethanol production impacts occur annually and derive from operating inputs utilized. Total revenue is the direct output of the operation and is projected as \$174.8 million. The ethanol plant plans to use corn from Georgia as supplies are available. Carbon dioxide is a by-product of ethanol production that is converted into a liquid form (LCO<sub>2</sub>) and then into dry ice. Officials of the proposed ethanol plant state that carbon dioxide will lead to sales of \$17.4 million from LCO<sub>2</sub> production and \$5.8 million from production of dry ice. Manufacturing costs data for LCO<sub>2</sub> and dry ice production are supplied by ethanol plant officials. Reported impacts in this report include ethanol, LCO<sub>2</sub>, and dry ice production.

### **Input-Output Models and Economic Impact Analysis**

Economic impacts are estimated with input-output models that separate the economy into various sectors, such as agriculture, construction, manufacturing, trade, and services. The input-output model then calculates how a change in one industry changes output, income, and employment in other industries. These changes, or impacts, are expressed in terms of direct, indirect, and induced effects. Direct effects represent the initial impact on the economy of some feature (i.e. construction or operations) of an enterprise. Indirect effects are changes in other industries caused by direct effects of an enterprise. Induced effects are changes in household spending due to changes in economic activity generated by both direct and indirect effects. Thus, the total economic impact is the sum of direct, indirect, and induced effects. Input-output analysis can interpret the effects of an enterprise in a number of ways including output (sales), labor income (employee compensation and proprietary income), employment (jobs), and tax revenue.

Economic impacts result from a multiplier effect that begins with expenditures of an enterprise stimulating business to business spending, personal income, employment, and tax revenue. IMPLAN models include a regional purchase coefficient (*RPC*) for each impact variable that represents percentage of demand that is satisfied by production within an impact area. Enterprises vary in their multiplier effects due to differing expenditure levels, *RPC*'s, and sectors in which their expenditures are directed. Impact analysis involves quantification of spending levels and proper allocation to impacted sectors.

Output impacts are a measure of economic activity that results from enterprise expenditures in a specific industrial sector. Output is equivalent to sales, and this multiplier offers insights into

how initial economic activity in one sector leads to sales in other sectors. Personal income impacts measure purchasing power that is created due to the output impacts. This impact provides the best measure of how standards of living are affected for residents in the impact area.

An enterprise involves a specified number of employees that is determined by the technology of the enterprise. Employment multipliers indicate the effect on employment resulting from the enterprise initiating economic activity. IMPLAN indirect and induced employment includes both full-time and part-time jobs without any distinction. Jobs calculated within an IMPLAN industrial sector are not limited to whole numbers and fractional amounts represent additional hours worked without an additional employee. With no measure of hours involved in employment impacts, IMPLAN summations for industrial sectors which include fractional employment represent both jobs and job equivalents. Since employment may result from some employees working additional hours in existing jobs, instead of terming indirect and induced employment impacts as “creating” jobs, a more accurate term is “involving” jobs.

This report includes impact results for a state model, a regional model, and a county model. Each model is independent of the others and a model for a smaller geographical area should not be regarded as a subset of a model representing a larger area. Employment and average annual wages and benefits are determined by labor productivity and average annual earnings in sectors that are unique for each model. The state of Georgia has designated 12 state service delivery regions (*SDR*) in order to foster regional collaboration in economic development. This study includes the fourteen counties of *SDR* 10, with Mitchell County centrally located in this region of southwestern Georgia.

### Construction Impacts

One-time construction impacts for Georgia are presented in *Table 1*. Direct output of \$50.6 million is less than total construction costs because many construction items involve economic activity outside the impact area of Georgia. Direct output during the fifteen month period leads to additional output that totals \$89.7 million. This output generates income of \$32.8 million for proprietors and employees. A total of 882 full-time and part-time jobs are involved in construction, and total labor income averages \$37,193 in wages and benefits. Georgia realizes \$2.4 million in state tax revenue, while local governments throughout the state receive \$1.7 million during the construction period. *Appendix 1* shows the distribution of output, income, and employment in the major industrial sectors.

Table 1. Plant Construction: One-time Economic Benefits to Georgia

	Direct Effect	Indirect Effect	Induced Effect	Total Effect
Output (\$)	50,631,924	18,016,921	21,034,568	89,683,413
Labor Income (\$)	19,229,628	6,516,319	7,057,905	32,803,852
Employment	530	144	207	882
State Taxes (\$)				2,427,501
Local Taxes (\$)				1,743,917

## Operation Impacts

Annual benefits accrue in the state economy each year the plant is in production. Reported impacts in this section do not include potential impacts from utilizing Georgia corn production as a feedstock. Impacts due to Georgia corn production are reported in the following section. Impacts for Georgia presented in *Table 2* indicate that the \$198.0 million in direct sales of ethanol, LCO<sub>2</sub>, and dry ice production leads to an additional \$68.7 in output for a total output impact of \$266.6 million. Total direct income for production and administrative employees is \$2.7 million for 86 employees. Additional income of \$20.1 million for impacted proprietors and employees results in \$22.8 million of income due to operation of the ethanol plant. Total labor income averages \$47,517 for 549 full-time and part-time jobs. State tax revenues generated are \$2.3 million and local tax revenues are \$2.0 million. In addition to local tax revenues reported in *Table 2*, Mitchell County officials state that \$1.5 million will be collected annually in property taxes on the ethanol facility. Reported tax revenues in this report do not include any sales tax on output sold as a finished product by the operations. The distribution of output, income, and employment among the major industrial sectors is presented in *Appendix 2*.

**Table 2. Ethanol, LCO<sub>2</sub>, and Dry Ice Production: Annual Economic Benefits to Georgia**

	Direct Effect	Indirect Effect	Induced Effect	Total Effect
Output (\$)	197,985,612	55,761,583	12,894,732	266,641,927
Labor Income (\$)	2,698,130	15,768,048	4,326,677	22,792,855
Employment	86	335	127	549
State Taxes (\$)				2,305,711
Local Taxes (\$)				2,024,171

Annual benefits accrue in the regional economy each year the plant is in production. *Table 3* shows annual benefits to *SDR 10* located in southwestern Georgia. Results indicate that the \$190.8 million of direct sales leads to an additional \$38.2 in output for a total output impact of \$236.2 million. Total direct income for production and administrative employees is \$2.7 million for 86 employees. Additional income of \$10.5 million for impacted proprietors and employees results in \$13.2 million of income due to operation of the ethanol plant. Total labor income averages \$28,190 for 469 full-time and part-time jobs. State tax revenues generated from economic activity in southwestern Georgia are \$976,206 and local tax revenues are \$772,489. In addition to local tax revenues reported in *Table 3*, Mitchell County officials state that \$1.5 million will be collected annually in property taxes on the ethanol facility. Tax revenues do not include any sales tax on output sold as a finished product by the operation. The distribution of output, income, and employment among the major industrial sectors is presented in *Appendix 3*.

Table 3. Ethanol, LCO2, and Dry Ice Production: Annual Economic Benefits to SW Georgia

	Direct Effect	Indirect Effect	Induced Effect	Total Effect
Output (\$)	197,985,612	32,797,215	5,437,244	236,220,070
Labor Income (\$)	2,698,130	8,737,383	1,785,466	13,220,979
Employment	86	315	68	469
State Taxes (\$)				976,206
Local Taxes (\$)				772,489

Annual benefits accrue in the Mitchell county economy each year the plant is in production. Direct output is less than output for Georgia and southwestern Georgia because dry ice production includes output from two plants, one of which is located outside of Mitchell County. *Table 4* indicates that the \$195.6 million of direct sales leads to an additional \$17.3 in output for a total output impact of \$212.9 million. Total direct income for production and administrative employees is \$2.5 million for 77 employees. Additional income of \$5.1 million for impacted proprietors and employees results in \$7.6 million of income due to operation of the ethanol plant. Total labor income averages \$26,204 for 290 full-time and part-time jobs in Mitchell County. State tax revenues generated from economic activity in Mitchell County are \$554,882 and local tax revenues are \$468,801. In addition to local tax revenues reported in *Table 4*, Mitchell County officials state that \$1.5 million will be collected annually in property taxes on the ethanol facility. Tax revenues do not include any sales tax on output sold as a finished product by the operation. The distribution of output, income, and employment among the major industrial sectors is presented in *Appendix 4*.

Table 4. Ethanol, LCO2, and Dry Ice Production: Annual Economic Benefits to Mitchell County

	Direct Effect	Indirect Effect	Induced Effect	Total Effect
Output (\$)	195,612,072	15,741,325	1,580,523	212,933,921
Labor Income (\$)	2,503,984	4,642,642	452,474	7,599,100
Employment	77	193	21	290
State Taxes (\$)				554,882
Local Taxes (\$)				468,801

### Impacts of Georgia Corn as Feedstock

Utilization of corn produced in Georgia as an ethanol feedstock would increase output, employment, labor income and taxes above levels reported in *Tables 2-4*. Officials of the proposed ethanol plant state that original construction costs include handling and storage capacity for 1.1 million bushels of corn, and plans call for increasing capacity by an additional 1.5 million bushels. Annual feedstock needs of the ethanol plant entail corn valued at \$105.2 million. State economic impacts for 100% of feedstock produced by Georgia corn producers are presented in *Table 5*. Results in *Table 5* are only valid for circumstances in which corn production beyond current levels consists of new agricultural land going into production that is

presently idle. Corn acreage that replaces acreage currently in other agricultural production such as cotton and peanuts generates economic impacts only at the expense of lost impacts due to displaced production.

Table 5. GA Corn Production as Feedstock: Annual Economic Benefits to Georgia

	Direct Effect	Indirect Effect	Induced Effect	Total Effect
Output (\$)	105,174,976	27,514,314	56,972,769	189,662,059
Labor Income (\$)	56,133,024	9,467,825	19,116,390	84,717,238
Employment	3,486	294	562	4,342
State Taxes (\$)				5,620,875
Local Taxes (\$)				4,104,754

Charts 1-3 show output, labor income, employment, and taxes that would be realized based on varying percentages of the total effects in Table 5. Percentages represent the level of corn production occurring as new agricultural acreage in Georgia. Impacts reported for 100% are the summation of total effects reported in Table 2 and Table 5. Impacts reported for 0% are equal to total effects reported in Table 2. Reported impacts are for the Georgia economy.

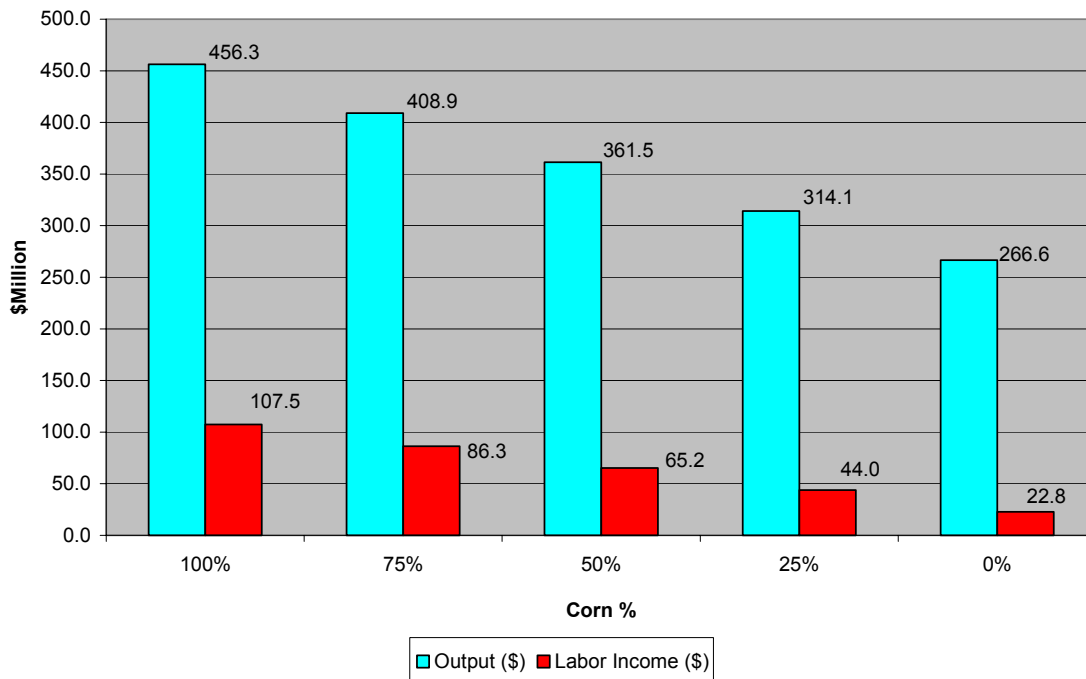
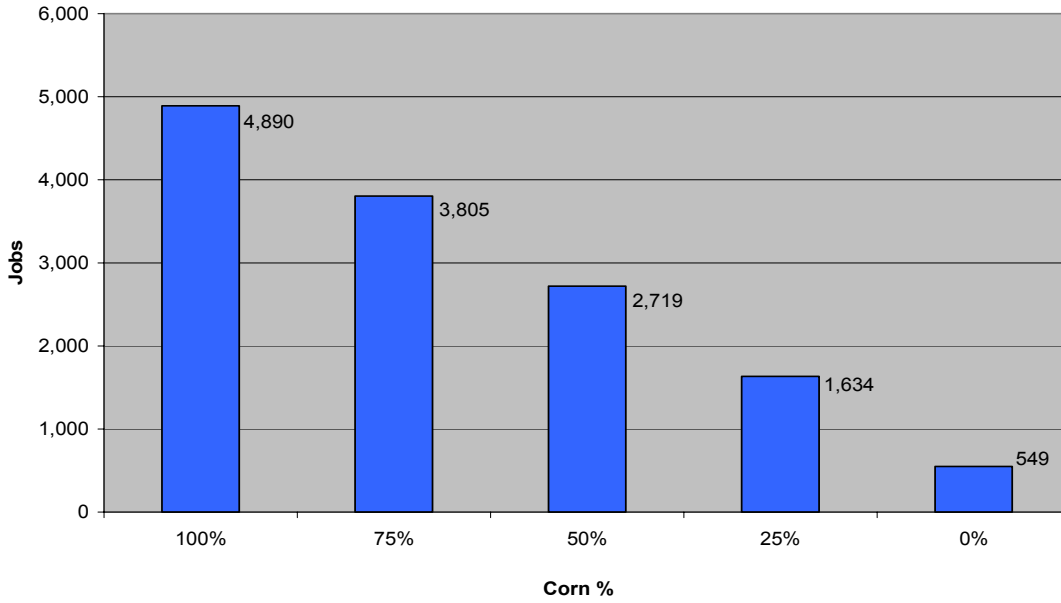
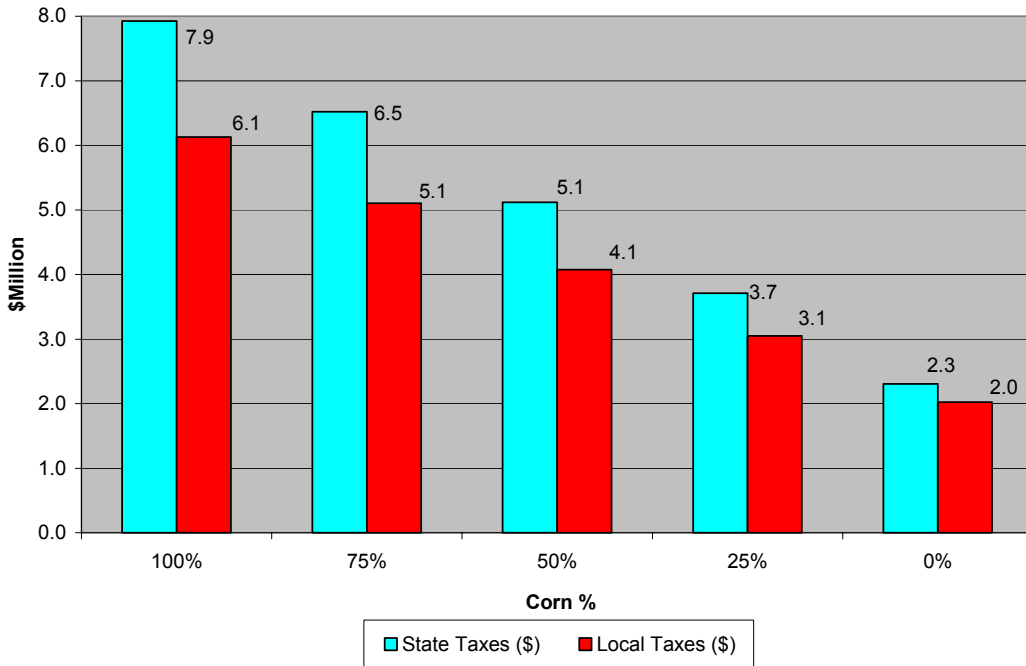


Chart 1. Output and Labor Income Impact of Ethanol, LCO2, and Dry Ice Production in GA, by Percentage of Corn Feedstock Produced in GA



**Chart 2. Employment Impact of Ethanol, LCO2, and Dry Ice Production in GA, by Percentage of Corn Feedstock Produced in GA**



**Chart 3. State Tax and Local Tax Revenue Generated Due to Ethanol, LCO2, and Dry Ice Production in GA, by Percentage of Corn Feedstock Produced in GA**

## Summary

Construction of a \$124.8 million ethanol plant in Mitchell County is projected to involve 530 jobs. Plant construction leads to \$39.0 million of output related to construction. This output involves an additional 351 jobs throughout the state. Labor income totals \$32.8 million of income for 882 proprietors and employees in Georgia during the fifteen month construction period.

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Appendix 1. Plant Construction: One-time Economic Benefits to Major Sectors, Georgia

Sector	Output (\$)	Income (\$)	Employment
Agriculture	223,501	83,182	3
MC <sup>1</sup>	6,491,640	2,871,276	72
Utilities	1,138,000	232,656	2
Manufacturing	8,559,258	1,993,574	38
Transportation, Warehousing	1,824,910	829,797	18
Trade	6,358,220	2,821,141	75
FIRE <sup>2</sup>	5,799,267	1,543,991	33
Services	54,391,552	20,408,367	615
Government & Non NAIC's	4,897,065	2,019,868	26
Total	89,683,413	32,803,852	882

<sup>1</sup>Mining and Construction

<sup>2</sup>Finance, Insurance, and Real Estate

Appendix 2. Ethanol, LCO2, and Dry Ice Production: Annual Economic Benefits to Major Sectors, Georgia

Sector	Output (\$)	Income (\$)	Employment
Agriculture	179,330	65,519	2
MC <sup>1</sup>	540,475	181,022	4
Utilities	22,300,536	3,724,052	30
Manufacturing	204,791,878	4,183,085	105
Transportation, Warehousing	9,367,989	3,407,968	87
Trade	4,304,849	1,928,737	57
FIRE <sup>2</sup>	4,341,791	1,179,365	24
Services	18,186,479	7,995,444	237
Government & Non NAIC's	2,628,600	127,665	3
Total	266,641,927	22,792,855	549

<sup>1</sup>Mining and Construction

<sup>2</sup>Finance, Insurance, and Real Estate

Appendix 3. Ethanol, LCO2, and Dry Ice Production: Annual Economic Benefits to Major Sectors, SW Georgia

Sector	Output (\$)	Income (\$)	Employment
Agriculture	130,274	62,977	1
MC <sup>1</sup>	169,189	73,846	2
Utilities	6,572,500	731,631	17
Manufacturing	202,456,532	2,992,831	92
Transportation, Warehousing	8,622,954	2,960,973	91
Trade	2,726,059	1,223,165	50
FIRE <sup>2</sup>	1,673,616	454,389	12
Services	11,802,632	4,615,599	201
Government & Non NAIC's	2,066,314	105,567	3
Total	236,220,070	13,220,979	469

<sup>1</sup>Mining and Construction

<sup>2</sup>Finance, Insurance, and Real Estate

Appendix 4. Ethanol, LCO2, and Dry Ice Production: Annual Economic Benefits to Major Sectors, Mitchell County

Sector	Output (\$)	Income (\$)	Employment
Agriculture	81,132	40,345	1
MC <sup>1</sup>	51,299	19,402	1
Utilities	3,492,473	749,201	11
Manufacturing	195,862,978	2,551,951	79
Transportation, Warehousing	5,618,075	1,902,478	63
Trade	1,063,949	487,510	22
FIRE <sup>2</sup>	619,151	149,528	5
Services	4,744,184	1,640,425	107
Government & Non NAIC's	1,400,681	58,261	2
Total	212,933,921	7,599,100	290

<sup>1</sup>Mining and Construction

<sup>2</sup>Finance, Insurance, and Real Estate

Appendix 5. GA Corn Production as Feedstock: Annual Economic Benefits to Major Sectors, Georgia

Sector	Output (\$)	Income (\$)	Employment
Agriculture	108,870,256	59,236,592	3,641
MC <sup>1</sup>	857,862	350,203	9
Utilities	2,468,416	511,293	4
Manufacturing	10,622,369	1,652,170	31
Transportation, Warehousing	3,402,660	1,448,277	33
Trade	13,841,047	6,174,724	174
FIRE <sup>2</sup>	17,241,463	4,124,792	98
Services	24,054,424	10,776,665	343
Government & Non NAIC's	8,303,562	442,522	10
Total	189,662,059	84,717,238	4,342

<sup>1</sup>Mining and Construction

<sup>2</sup>Finance, Insurance, and Real Estate

# 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.

To find out more, visit our Web site at: <http://www.caed.uga.edu>

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**J. Scott Angle, Dean and Director**