The University of Georgia

Center for Agribusiness and Economic Development

College of Agricultural and Environmental Sciences

The Economic Impact of Large Scale Dairies in Southwest Georgia

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Economic Impact Analysis of Dairy Production in Southern Georgia

Executive Summary

Increased dairy farm production in southern Georgia has potential to increase economic activity throughout the region, as well as all of Georgia. In addition to creating general business activity in support of dairy operations, feed input requirements create demand for agricultural products. Analyses for each of four regions in southern Georgia show with $3.598 million in total sales a dairy farm produces an average of another $3.559 million in annual economic activity within each region resulting in an average $7.157 million total output impact. Employment in the agricultural sector is impacted as crop farms satisfy increased demand from feeding livestock.

State impacts of a dairy farm in southern Georgia include $4.266 million in indirect economic activity for a total state output impact of $7.864 million. Although the agricultural sector receives the greatest benefits of dairy production, other sectors have significant sales and employment increases as a result of dairy production. Fluid milk manufacturing is an enterprise separate from production that has a state level impact of $9.807 million for each dairy farm with 1000 milk cows.

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Economic Impact Analysis of Dairy Production in Southern Georgia

Impact analysis evaluates the effects, or economic benefits, of an enterprise on major industrial sectors of the economy. This analysis measures economic impacts of a potential dairy farm due to economic activity associated with construction, production, and fluid milk manufacturing in four regions of southern Georgia. Dairy production is a component of regional agricultural economies throughout Georgia. Regions in southern Georgia have potential for increased dairy production, and four regions with abundant sources of cattle feed are selected for impact analysis.

IMPLAN is an economic input-output modeling program applied for impact estimation. IMPLAN can interpret effects of a new enterprise in a number of ways including output (sales), labor income (employee compensation and proprietary income), employment (jobs), and tax revenue. An IMPLAN model can be constructed for the economy of a single county, multi-county, or state region. In general, input-output models work by separating the economy into various sectors, such as agriculture, construction, manufacturing, trade, services, and so forth. The model then captures how a change in one industry changes output, labor 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 of a new enterprise (i.e. construction or operations).
- *Indirect effects* are changes in other industries caused by the direct effect of a new 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 (MIG).

The state of Georgia has designated 12 state service delivery regions *(SDR)* in order to foster regional collaboration in economic development (CAED 2004b). This study includes *SDRs* 8, 9, 10, and 11. These regions have large agricultural economies with resources to provide cattle feed from within each region. The appendix shows counties within each region and acreage for corn and hay production (CAED 2004a).

Economic Impacts of Dairy Farm Construction

Economic impact analysis of a new enterprise begins with evaluation of expenditures related to construction of facilities. Construction expenditures for milk production include the purchase and installation of facilities and associated equipment, such as barns, milking parlor, feeding and watering systems, and waste management equipment. Land acquisition is not included because it is a capital transfer and does not cause additional economic activity.

Construction impacts end when the dairy farm is complete and production begins. Costs of a dairy farm with 1000 milk cows are estimated as $3.065 million. Costs include $2.755 million for buildings and facilities, $35,000 for a watering system, and $274,520 for a waste management system.

Estimated dairy farm construction impacts from output, labor income, employment, as well as state and local taxes for each region are presented in Table 1. Labor income is earnings of workers impacted by the construction activity. Employment includes both full time and part time jobs.

Table 1. Dairy Construction: One Time Impact, by *SDR*

	Direct Effect	Indirect Effect	Induced Effect	Total Effect
		SDR 8		
Output	$3,064,520	$595,703	$881,365	$4,541,588
Labor Income	$1,334,572	$217,672	$287,182	$1,839,426
Employment	45	4	6	55
State/Local Tax				$146,194
		SDR 9		
Output	$3,064,520	$439,183	$727,109	$4,230,811
Labor Income	$1,321,637	$158,141	$230,392	$1,710,169
Employment	45	2	5	52
State/Local Tax				$135,506
		SDR 10		
Output	$3,064,520	$669,767	$976,173	$4,710,461
Labor Income	$1,324,273	$260,274	$322,210	$1,906,757
Employment	45	5	7	57
State/Local Tax				$160,216
		SDR 11		
Output	$3,064,520	$548,326	$844,991	$4,457,837
Labor Income	$1,294,813	$196,265	$274,056	$1,765,134
Employment	46	5	6	57
State/Local Tax				$142,883

Direct output effects of construction are costs of construction, $3.065 million. This total represents construction costs of all buildings and the purchase and installation of dairy operational equipment. Direct effects for construction in each *SDR* are identical as construction costs are assumed equal in each region.

The infusion of $3.065 million in each *SDR* generates indirect effects averaging $563,245. Indirect effects represent business-to-business purchases between construction firms and their supplying, or supporting, firms (i.e., purchasing building materials, surveying services, etc.). Labor income averages $1.805 million among regions. This leads to induced spending that

averages $857,410 in sales as construction personnel and impacted employees spend their income on consumer products and services. Total economic impact ranges from $4.231 million to $4.720 million dollars.

The construction project is estimated to generate a minimum of 52 jobs throughout the regions with typically 45 jobs directly related to construction. Total employment represents full and part time jobs which are either indirect or induced impacts. Jobs from induced employment are greater than jobs due to indirect business activity in each region. Economic activity from dairy farm construction has an impact on state and local tax revenues averaging $146,200.

Table 2 illustrates economic impacts of construction on all major industrial sectors in each *SDR*. This table shows sector breakouts of output, labor income, and employment reported previously for each sector. Building the dairy farm is a construction activity, and output, labor income, and employment impacts are greatest in this sector. A broad category of services has the second largest impacts in each category. Trade, both wholesale and retail are significantly impacted by dairy farm construction.

Table 2. Dairy Construction: One Time Impact to Major Sectors, by *SDR*

	SDR 8			*SDR* 9		
Sector	Output	Labor Income	Employment	Output	Labor Income	Employment
Agriculture	$15,076	$5,013	0	$23,363	$6,229	0
MU[1]	$21,974	$4,635	0	$49,423	$10,544	0
Construction	$3,076,260	$1,339,284	45	$3,077,014	$1,326,623	45
Manufacturing	$92,161	$20,326	0	$88,538	$17,491	0
Trans., Wrhous.	$68,780	$27,013	0	$83,368	$31,380	0
Trade	$251,958	$109,596	3	$245,025	$107,314	3
FIRE[2]	$317,781	$73,575	1	$125,816	$29,798	0
Services	$535,726	$253,406	6	$378,918	$174,701	4
Government	$161,873	$6,578	0	$159,345	$6,089	0
Total	$4,541,588	$1,839,426	55	$4,230,811	$1,710,169	52
	SDR 10			*SDR* 11		
Agriculture	$18,556	$6,115	0	$21,818	$6,551	0
MU[1]	$23,543	$6,049	0	$22,390	$4,865	0
Construction	$3,076,717	$1,329,117	45	$3,070,674	$1,297,013	46
Manufacturing	$152,063	$28,107	0	$141,356	$27,428	0
Trans., Wrhous.	$97,845	$37,604	1	$105,947	$40,146	1
Trade	$324,097	$138,676	5	$258,425	$113,413	4
FIRE[2]	$218,049	$52,199	0	$194,931	$46,033	0
Services	$609,425	$300,773	6	$479,590	$224,765	6
Government	$190,166	$8,117	0	$162,706	$4,920	0
Total	$4,710,461	$1,906,757	57	$4,457,837	$1,765,134	57

[1]Mining & Util.

[2]Fin., Ins. & R.E.

Table 1 and Table 2 demonstrate similar impacts among regions due to construction of a dairy farm. Economic activity totals at least $4.231 million in each *SDR*. A minimum of 52 full and part time jobs are due to construction activity. State and local tax revenues increase by more than $135,000 in each region.

Economic Impacts of Operating a Dairy Farm in Southern Georgia

Operation of a dairy farm leads to annual economic impacts which are due to purchasing of direct inputs and paying incomes to employees. Greater purchases and salaries paid within an *SDR* lead to greater impacts. The model dairy farm has 1000 milk cows with an average lactation period of 13.3 months. This calculates to 902 cows of the 1000 total cows are producing milk at any time. Producing cows yield 20,500 lbs. per year which results in an average production of 18,496 lbs. from total milk cows (rolling herd average). Selling milk at $18.00/cwt. returns $3,329,323 in milk sales, and selling cull cows leads to total revenue of $3,597,111.

Estimated crop inputs per year for feed are 5,105 tons of corn for grain, 10,258 tons of silage, and 1,495 tons of hay. Applying assumed yields provides an estimate of acreage requirements for supplying the dairy farm. Corn yield of 150 bushels/acre leads to 1,215 corn acres. Silage yield of 20 tons/acre indicates 513 acres, and hay yield of 2.5 tons/acre results in 598 acres. Acreages listed in the Appendix by county in each *SDR* indicate that southern Georgia has sufficient capacity to supply feed inputs to the dairy industry.

Table 3 shows the direct costs, employee compensation, and property income for applying an input/output model to a proposed dairy farm. Employee compensation includes benefits and wages, and the total of $548,700 is for 16 employees. Other property income includes capital payments, interest paid, as well as net returns to the farm (MIG). With net returns included in other property income, all items listed in Table 3 are equal to total output value for the farm.

Total revenue of $3,597,811 is dairy farm output and total input costs in Table 3 represent the first round of impacts due to production. This leads to subsequent rounds of indirect spending that are caused by the dairy farm purchasing inputs in Table 3. IMPLAN includes a regional purchase coefficient *(RPC)* for each industrial sector corresponding to input costs. An *RPC* represents percentage of demand in each *SDR* that is satisfied by production within the *SDR*. An assumption of the model is that increasing the number of dairy farms will provide markets for crop production within an *SDR* and *RPCs* are set to 100 percent for grain, silage, and hay.

Table 4 shows output, labor income, employment, and tax impacts due to dairy production in each *SDR*. Output value of $3.598 million in each *SDR* creates additional economic activity that leads to total output impacts ranging from $6.666 million to $7.370 million for an average of $7.157 million. Indirect effects caused by business to business spending average $2.913 million among *SDRs.* Labor income increases by more than one million dollars in each region. Employment in 3 regions is similar, but *SDR 9* employs more workers

than other regions, even though total labor income is less than other regions. State and local tax revenues increase by more than $150,000 in each *SDR*.

Output multipliers for dairy production are calculated as total output effect divided by the output (value of sales) of the dairy. Total output effects average $7.157 million among the regions. With sales value equal in each region, 1.99 is the average output multiplier. Thus, every dollar in sales by the dairy farm generates almost another dollar ($0.99) of economic activity within an *SDR*.

Impacts among major industrial sectors in Table 5 indicate that while agriculture receives the greatest benefit, other sectors are significantly impacted by operation of a dairy farm. Output in the service sector averages $549,163 per *SDR*. Labor income averages $240,526 with 7 to 10 service sector employees in each *SDR*. Average income for full and part time jobs in services is $26,725.

Table 3. Input-Output Data for Dairy Production

Input	Dollars
Hauling Milk	184,962
Assessment & Fees	64,340
Vet & Medical	102,000
Dairy Supplies	103,759
Repairs	55,161
Insurance	27,929
Utilities	65,000
Insemination	32,842
Medical BST	36,800
Waste Management	15,000
Custom Hire	10,000
Miscellaneous	8,000
Grain	929,515
Silage	333,399
Hay	97,219
Minerals	63,875
By-Products	123,496
Milk Replacer	14,653
Employee Compensation	548,700
Indirect Business Taxes	3,929
Other Property Income	777,231
Output	3,597,811

Wages and benefits paid to diary farm workers, as well as number of dairy workers are equal in each region. Regions require identical crop inputs for operation of a dairy farm. However, regions have different production efficiency (output per worker), as well as different salaries per worker. Results in Table 5 indicate that *SDR* 9 has lower output per worker and lower average salaries per worker. With similar crop production technologies in each *SDR,* this implies that average crop acreages in *SDR* 9 are smaller than in the other *SDRs.* This corresponds to lower salaries in *SDR* 9 as fewer acres on each crop farm require fewer hours devoted to crop production by full and part time workers. This applies only to crops utilized by dairy production, as diversified farms produce commodities not associated with supplying feed for dairy farms.

Industrial sector impacts in Table 5 show $3.598 million in agricultural production leads to total agricultural output that averages $5.322 million among regions. Relatively high utilization of crops for feed causes large impacts in the agricultural sector. A combination of services, finance, real estate and insurance shows that agricultural production leads to economic impacts and employment in sectors not related to dairy production. Impact results are predicated upon an assumption that all crops for feed come from within a local impact area. Input-output theory implies that utilized crops are from new acreage planted in the region. A change in crop marketing from current outlets to dairy outlets does not cause net economic impacts related to crop production.

Table 4. Dairy Production: Annual Impact, by *SDR*

	Direct Effect	Indirect Effect	Induced Effect	Total Effect
		SDR 8		
Output	$3,597,811	$3,004,039	$717,757	$7,319,606
Labor Income	$902,839	$269,276	$233,898	$1,406,012
Employment	16	62	9	87
State/Local Tax				$185,821
		SDR 9		
Output	$3,597,811	$2,588,132	$479,831	$6,665,774
Labor Income	$811,126	$135,356	$152,045	$1,098,527
Employment	16	105	7	127
State/Local Tax				$152,906
		SDR 10		
Output	$3,597,811	$3,061,487	$710,830	$7,370,128
Labor Income	$891,350	$235,865	$234,649	$1,361,863
Employment	16	60	9	85
State/Local Tax				$183,202
		SDR 11		
Output	$3,597,811	$2,997,008	$676,929	$7,271,748
Labor Income	$906,408	$256,535	$219,550	$1,382,492
Employment	16	57	9	82
State/Local Tax				$178,405

Economic Impacts of Operating a Dairy Farm in Southern Georgia on the State Economy

Dairy farms operating in any region have statewide benefits that extend beyond the local impact area of an *SDR.* Regions within a state often purchase inputs from elsewhere in the state, and indirect impacts to a region are diminished by a limited capacity to provide goods and services. As the local impact area of the dairy farm depicted in Table 3 is expanded to include all of Georgia, more supporting inputs come from within the local impact area (Georgia), and the output multiplier increases.

The dairy farm represents location in any of the four southern *SDRs,* but economic impacts in Table 6 are for the state as the impact area. Total state output effects of $7.864 million are greater than any *SDR* in Table 4. Georgia has a larger capacity to support business activity than any of the regional areas, and there are fewer leakages in the state analysis. Fewer leakages result in a statewide output multiplier of 2.19 as compared to 1.99 for southern Georgia.

Comparing Table 7 to Table 5 shows that while total output impacts increase, agricultural output effects are, generally, lower in the state model than in the regional model. Since total output is higher at the state level, it follows that nonagricultural state sectors have greater impact multipliers than regional sectors.

Table 5. Dairy Production: Annual Impact to Major Sectors, by *SDR*

	SDR 8			*SDR* 9		
Sector	Output	Labor Income	Employment	Output	Labor Income	Employment
Agriculture	$5,383,881	$800,772	67	$5,212,570	$646,981	113
MC[1]	$16,007	$6,400	0	$15,025	$5,999	0
Utilities	$55,193	$11,722	0	$119,276	$25,633	0
Manufacturing	$94,948	$20,077	0	$50,922	$9,720	0
Trans., Wrhous.	$269,879	$92,401	2	$277,517	$94,082	2
Trade	$236,099	$102,741	4	$206,677	$90,509	3
FIRE[2]	$407,408	$88,274	3	$127,716	$30,136	1
Services	$593,671	$262,118	10	$414,427	$174,851	7
Government	$262,521	$21,507	0	$241,644	$20,616	0
Total	$7,319,606	$1,406,012	87	$6,665,774	$1,098,527	127
	SDR 10			*SDR* 11		
Agriculture	$5,300,577	$711,370	65	$5,389,458	$792,032	64
MU[1]	$15,832	$6,300	0	$7,973	$2,827	0
Construction	$63,771	$15,719	0	$58,152	$12,826	0
Manufacturing	$280,959	$51,276	0	$183,408	$32,087	0
Trans., Wrhous.	$302,758	$106,250	3	$313,471	$110,269	3
Trade	$289,312	$123,649	4	$243,559	$106,905	4
FIRE[2]	$221,854	$51,846	2	$242,091	$53,404	1
Services	$616,941	$272,443	10	$571,615	$252,694	10
Government	$278,124	$23,011	0	$262,021	$19,448	0
Total	$7,370,128	$1,361,863	85	$7,271,748	$1,382,492	82

[1]Mining & Util.

[2]Fin., Ins. & R.E.

Lower agricultural output at the state level than regional levels may be caused by smaller regional purchase coefficients computed for the state model than at regional levels. This means that the agricultural sector is more concentrated at a regional level than for the state as a whole. Greater sector impacts in Table 7 for the state model than for regional models in Table 5 indicate that dairy production in an agricultural area leads to economic activity outside of agricultural areas and in industrial sectors not associated with agriculture.

Table 6. Dairy Production: Annual Impact, Georgia

	Direct Effect	Indirect Effect	Induced Effect	Total Effect
Output	$3,597,811	$3,242,111	$1,023,605	$7,863,527
Labor Income	$896,233	$316,075	$346,987	$1,559,295
Employment	16	71	11	98
State/Local Tax				$227,649

Table 7. Dairy Production: Annual Impact to Major Sectors, Georgia

	Output	Labor Income	Employment
Agriculture	$5,275,025	$705,465	75
MC[1]	$20,178	$8,975	0
Utilities	$130,422	$27,367	0
Manufacturing	$249,076	$48,176	1
Transportation, Warehousing	$322,339	$120,310	3
Trade	$378,545	$161,620	5
FIRE[2]	$478,222	$114,866	3
Services	$782,593	$362,844	11
Government	$227,126	$9,672	0
Total	$7,863,527	$1,559,295	98

[1]Mining and Construction
[2]Finance, Insurance, and Real Estate

Milk produced in Georgia may move to a fluid milk manufacturing plant for further processing in the state. As value is added to raw milk, economic impacts caused by production of the dairy farm occur in the manufacturing sector. Estimated output value of fluid milk manufactured is $6.659 million from the $3.329 million of raw milk produced. Total output value of fluid milk manufacturing does not include impacts of milk production presented in Table 6. Table 8 shows the total output impact is $9.807 million. This output generates $1.719 million of income for employees and proprietors. Total employment is 42 part-time and full-time jobs. Fluid milk processing and associated activities generate $264,722 in state and local taxes.

Table 8. Fluid Milk Manufacturing: Annual Impact, Georgia

	Direct Effect	Indirect Effect	Induced Effect	Total Effect
Output	$6,658,646	$2,056,468	$1,092,324	$9,807,438
Labor Income	$662,202	$685,722	$370,830	$1,718,755
Employment	17	14	11	42
State/Local Tax				$264,722

Summary

Increased dairy farm production in southern Georgia has potential to increase economic activity throughout the region, as well as all of Georgia. In addition to creating general business activity in support of dairy operations, feed input requirements create demand for agricultural products. Analyses for each of four regions in southern Georgia show with $3.598 million in total sales a dairy farm produces an average of another $3.559 million in annual economic activity within each region resulting in an average $7.157 million total output impact. Employment in the agricultural sector is impacted as crop farms satisfy increased demand from feeding livestock.

State impacts of a dairy farm in southern Georgia include $4.266 million in indirect economic activity for a total state output impact of $7.864 million. Although the agricultural sector receives the greatest benefits of dairy production, other sectors have significant sales and employment increases as a result of dairy production. Fluid milk manufacturing is an enterprise separate from production that has a state level impact of $9.807 million for each dairy farm with 1000 milk cows.

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Appendix. Corn and Hay Acreage, by *SDR*

		Acres				Acres	
County	*SDR*	*Corn*	*Hay*	*County*	*SDR*	*Corn*	*Hay*
ATKINSON	11	2,285	4,500	APPLING	9	6,300	7,500
BACON	11	4,100	2,600	BLECKLEY	9	1,891	3,500
BEN HILL	11	5,004	939	CANDLER	9	2,287	8,000
BERRIEN	11	5,759	5,765	DODGE	9	2,000	9,000
BRANTLEY	11	1,000	2,500	EMANUEL	9	2,262	4,408
BROOKS	11	3,300	1,700	JEFF DAVIS	9	1,654	9,325
CHARLTON	11	650	1,600	JOHNSON	9	1,078	4,599
CLINCH	11	444	470	LAURENS	9	4,912	36,183
COFFEE	11	5,031	9,500	MONTGOMERY	9	1,379	3,150
COOK	11	1,300	950	TELFAIR	9	896	7,000
ECHOLS	11	607	672	TOOMBS	9	2,194	3,700
IRWIN	11	12,539	5,000	TREUTLEN	9	446	1,550
LANIER	11	1,200	2,020	WAYNE	9	7,500	3,050
LOWNDES	11	5,000	5,000	WHEELER	9	532	2,990
PIERCE	11	13,000	10,000	WILCOX	9	2,553	5,500
TIFT	11	1,910	5,000			37,884	109,455
TURNER	11	2,429	3,070				
WARE	11	2,956	1,600	CHATTAHOOCHEE	8	0	250
		68,514	62,886	CLAY	8	338	4,000
				CRISP	8	800	5,000
BAKER	10	8,500	2,000	DOOLY	8	1,240	0
CALHOUN	10	4,568	9,500	HARRIS	8	125	3,500
COLQUITT	10	2,585	5,615	MACON	8	8,651	8,930
DECATUR	10	7,000	5,200	MARION	8	416	3,947
DOUGHERTY	10	3,411	860	MUSCOGEE	8	0	0
EARLY	10	4,369	2,108	QUITMAN	8	400	350
GRADY	10	13,764	4,165	RANDOLPH	8	4,232	5,326
LEE	10	10,257	643	SCHLEY	8	800	1,500
MILLER	10	8,017	2,500	STEWART	8	835	966
MITCHELL	10	12,147	2,150	SUMTER	8	8,923	5,500
SEMINOLE	10	7,387	5,200	TALBOT	8	90	0
TERRELL	10	8,569	800	TAYLOR	8	645	6,300
THOMAS	10	8,422	4,420	WEBSTER	8	919	974
WORTH	10	4,653	975			28,414	46,543
		103,649	46,136				

Source: *Georgia Farm Gate Value Report, 2004*

The Center for Agribusiness and 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:

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- **To provide agricultural, natural resource, and demographic data for private and public decision makers.**

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J. Scott Angle, Dean and Director