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Taylor, Gary, "The Regional Impact of Adding Additional Dairy Cows and Facilities to the I-29 Corridor of South Dakota" (2003).
Economics Commentator. Paper 433.
http://openprairie.sdstate.edu/econ_comm/433

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ECONOMICS COMMENTATOR

South Dakota State University

No. 442

October 1, 2003



The Regional Impact of Adding Additional Dairy Cows and Facilities to the I-29 Corridor of South Dakota

by

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The I-29 corridor of South Dakota has been identified by state officials as an area where they would like to increase dairy production. This study provides an assessment of the economic impacts of adding both cows and housing/milking facilities to eastern South Dakota.

Input-Output analysis using the IMPLAN Pro modeling software is used to analyze the economic and employment effects of adding dairy facilities to eastern South Dakota. Total dollar effects the new facilities will generate and the number of additional jobs that would be added will be estimated for each study area. Because IMPLAN analyzes the changes to a defined area, the results obtained are specific to that area and would be different for any other areas of the state or region. The IMPLAN database consists of 21 economic and demographic variables for 528 different sectors of the economy in all 3000 counties in the U.S. This information is then used to develop an input-output model for the study area in question, which may be as small as a single county or as large as the entire country. Multipliers are then developed from this information to estimate the potential impacts of the economic change being analyzed on total output, employment, labor income, and other property income.

Three geographic areas and four different sized dairy facilities are analyzed. In order to be consistent with other agricultural data, the study areas are similar to the current crop reporting areas used by the South Dakota Agricultural Statistics Service. Two of the areas are the same as the crop reporting regions and in the Northeast area three additional counties were added. The three areas used in this analysis were the Southeast region, including the counties of Bon

Homme, Charles Mix, Clay, Douglas, Hutchinson, Lincoln, Turner, Union, Yankton; East Central region which includes the counties of Brookings, Davison, Hanson, Kingsbury, Lake, McCook, Minnehaha, Miner, Moody, Sanborn; and the Northeast region, including the counties of Clark, Codington, Day, Deuel, Grant, Hamlin, Marshall, Roberts. Beadle, Brown, and Spink counties were also included in the Northeast area. The analyses are based on four different sizes of dairy production units, 100 cows, 300 cows, 1000 cows, and 2500 cows. For each facility size in each geographic area the economic impacts of both the initial construction and the ongoing production are evaluated.

It should be noted that for the construction phase this would be a one-time stimulus. Impacts of the construction and production phases of this analysis consist of the direct, indirect, and induced effects. Direct effects are the changes that we can observe in the industry itself, caused by the additional economic activity as a result of the expansion in local dairy production. Indirect effects are the impacts in related industries (business to business transactions). Indirect effects would be seen in industries such as feed and grain, animal health products, etc. Induced effects indicate the additional economic activity generated by household spending as a result of additional income earned in the region.

Initial Construction Phase

For each of the four sizes of dairy production units, a per cow estimate of construction costs was obtained. This per cow cost was then used to calculate the total cost of each of the four facility sizes. It was assumed that as herd size increased, the level of technology employed would also increase. This accounts for the higher investment per cow as facility size increases. The investment per cow for the 100 head facility was estimated to be \$3280/hd, \$3800/hd for the 300 cow operation, and \$3971/hd for the 1000 and 2500 cow operation. These initial investments include the costs of buildings and equipment but not the cost of the cows and are based on numbers from the University of Wisconsin Center for Dairy Profitability (Johnson).

Dollars spent on new construction will flow through the area in which the facilities are built. The initial expenditures will circulate through the economy, stimulating additional purchases in related industries, increasing employment, and enhancing income.

Economic Impact of Construction-Northeast Area (2001 dollars)

	Direct	Indirect	Induced	Total
100 cows	329,598	63,629	64,158	457,385
300 cows	1,145,553	221,150	222,986	1,589,689
1000 cows	3,990,343	770,340	776,735	5,537,418
2500 cows	9,975,857	1,925,450	1,945,253	13,846,560

The direct effects are the changes that would be observed in the farm construction and dairy equipment industries. The indirect effects are those that would be observed in related industries. The induced effects are those changes in household spending that come about from the increased economic activity in the area. The multiplier effect that we can observe in this extra spending for the area is 1.39. This means that each \$1 spent on construction (direct) in the NE region will spur an additional \$.39 of economic activity (indirect and induced) in the area. This ratio is calculated by dividing the total impacts by the direct impact.

Employment from the Construction Phase-Northeast Area (number of employees)

	Direct	Indirect	Induced	Total
100 cows	3.1	1.0	1.1	5.2
300 cows	10.7	3.4	4.0	18.1
1000 cows	37.4	11.8	13.8	62.9
2500 cows	93.4	29.5	34.4	157.3

It should be noted that for the construction phase both the economic and employment impacts are onetime events. These effects will conclude with the construction phase economic impacts of the project.

Economic Impact of Construction Phase-East Central Area (2001 dollars)

	Direct	Indirect	Induced	Total
100 cows	329,598	75,307	83,889	488,794
300 cows	1,145,552	261,737	291,566	1,698,855
1000 cows	3,990,343	911,717	1,015,681	5,917,681
2500 cows	9,975,857	2,279,193	2,540,045	14,795,095

The multiplier for the East Central region is slightly higher than for the Northeast, 1.48. This is due to the

higher population, greater presence of manufacturing, and higher employment, relative to the Northeast region.

Employment from the Construction Phase-East Central Area (number of employees)

	Direct	Indirect	Induced	Total
100 cows	2.9	1.0	1.3	5.2
300 cows	10	3.6	4.5	18.1
1000 cows	34.8	12.5	15.8	63.1
2500 cows	87	31.2	39.4	157.6

A comparison between the employment results of the Northeast and East Central areas shows that the total impact of the dairy expansion projects are very similar, although the employment impact differs slightly between these two regions. This is a result of the similarity in both the types of industries that exist in the two regions and the current employment levels.

Economic Impact of the Construction Phase-Southeast Area (2001 dollars)

	Direct	Indirect	Induced	Total
100 cows	329,598	47,779	47,364	424,741
300 cows	1,145,553	166,060	164,616	1,476,229
1000 cows	3,990,343	578,446	573,414	5,142,203
2500 cows	9,975,857	1,445,940	1,434,376	12,856,173

The multiplier for this area is the lowest of the three regions, 1.3. The relatively low multiplier is due to the fact that among the three regions, the Southeast has the smallest population, fewest number of industries, and lowest employment numbers. The relatively small multiplier reflects the fact that there are relatively more leakages from this area, more money spent outside the region, and fewer economic opportunities in the area.

Employment from the Construction Phase-Southeast Area (number of employees)

	Direct	Indirect	Induced	Total
100 cows	3	.7	.8	4.5
300 cows	10.6	2.6	2.9	16.1
1000 cows	36.9	8.9	10.1	55.9
2500 cows	92.1	22.3	25.1	139.5

The employment effects are similar to the total economic effects in the region. With fewer employable people in the area, firms from outside the area are used, lessening the employment impact on the area.

Sustained Operation Phase

To calculate the regional economic impact of the sustained operation of these new dairy facilities, we assume that all of the operations are at 100% capacity and production on the first day of operation. Another assumption is that the production level used for all operations is 20,000 lbs./cow/year. This is approximately 4000 lbs./cow above the current South Dakota state average. With new, modern facilities and improved management, this production level is currently being achieved on many South Dakota farms. Finally, the value of all outputs (milk, calves, cull cows, other income) is combined, resulting in a composite output price of \$15.23/cwt. This price is the nine year average for the upper Midwest area obtained from Minnesota Agricultural Statistics 2000. The economic and employment figures for each region are presented in table form below. All results are in nominal 2001 dollars.

Economic Impact of the Operation Phase-Northeast Area (2001 dollars)

	Direct	Indirect	Induced	Total
100 cows	304,600	79,311	55,368	439,279
300 cows	913,802	237,931	166,104	1,317,837
1000 cows	3,046,006	793,103	553,680	4,392,789
2500 cows	7,615,015	1,982,758	1,384,199	10,981,962

The table above summarizes the annual economic impacts to be expected from each operation size. The multiplier for this sustained economic activity is 1.44. That is, an additional \$.44 of economic activity is stimulated in the area by each \$1 of direct sales from the dairy operation.

Employment from the Operation Phase-Northeast Area (number of employees)

	Direct	Indirect	Induced	Total
100 cows	1.9	0.9	1.0	3.8
300 cows	5.6	2.7	2.9	11.2
1000 cows	18.6	9.1	9.8	37.5
2500 cows	46.4	22.8	24.5	93.7

A comparison of the construction and operation tables indicates that the ongoing operation provides fewer jobs than the initial construction phase. However, these jobs are permanent changes in the economy, whereas the construction jobs were temporary.

Economic Impact of the Operation Phase-East Central Area (2001 dollars)

	Direct	Indirect	Induced	Total
100 cows	304,600	81,875	66,536	453,011
300 cows	913,802	245,625	199,608	1,359,035
1000 cows	3,046,006	818,751	665,362	4,530,119
2500 cows	7,615,015	2,046,877	1,663,404	11,325,296

The multiplier for this area is 1.49, slightly higher than the one found for the Northeast area. This is the result of the higher levels of population and employment, a larger number of industries, and greater incomes in this area.

Employment from the Operation Phase-East Central Area (number of employees)

	Direct	Indirect	Induced	Total
100 cows	1.9	0.8	1.0	3.7
300 cows	5.6	2.5	3.1	11.2
1000 cows	18.6	8.3	10.3	37.1
2500 cows	46.4	20.6	25.8	92.8

The table indicates that there is also slightly less employment generated in the East Central area, about one full time person for a 2500 cow facility, compared to the Northeast area.

Economic Impact from the Operation Phase-Southeast Area (2001 dollars)

	Direct	Indirect	Induced	Total
100 cows	304,600	58,927	38,120	401,647
300 cows	913,802	176,782	114,362	1,204,946
1000 cows	3,046,006	589,272	381,209	4,016,487
2500 cows	7,615,015	1,473,181	953,021	10,041,271

The Southeast region has the lowest multiplier, 1.32. In addition, it also has the lowest employment impact among the three regions. This implies that there are severe "leakages" in the area, that is, a lot of money is spent outside the area and many employees commute into the area, as compared to the other two study regions.

Employment from the Operation Phase-Southeast Area (number of employees)

	Direct	Indirect	Induced	Total
100 cows	1.9	0.7	0.7	3.2
300 cows	5.6	2.1	2.0	9.7
1000 cows	18.5	6.9	6.7	32.1
2500 cows	46.4	17.2	16.7	80.3

The employment numbers in the table above reflect the same situation as was observed in the construction phase. With fewer industries and employees in the area, more firms outside the area are used to supply the needed goods and services. This results in fewer people being hired in the area of study.

As stated earlier, the results of this study are specific to the geographic areas analyzed and are based on a specific, but realistic, set of assumptions. Different areas and different assumptions will yield different results. Further, the estimated impacts of the various sizes of dairy expansions should only be used as guidelines when looking at investment and economic development opportunities.

Concluding Remarks

Adding additional cows and facilities results in positive economic and employment impacts for each region of the study. Even though the multipliers for each area were not exceptionally high, they are about in the middle of the range of the multipliers for other industries in the area. In the Northeast area of this study the range varied from a low of 1.12 to a high of 2.16, in the East Central area the range was 1.14 to 2.26, and in the Southeast the range was 1.09 to 2.02. In all three areas the lowest multiplier was in the pipeline industry. In both the Northeast and Southeast the highest multiplier was in the meatpacking industry. Soybean processing was the highest in the East Central area with a multiplier of 2.26. These dairy multipliers are similar to other agricultural livestock enterprises. For example, cattle feedlots in the three areas have a range of multipliers from 1.43 to 1.58. Swine enterprises range from 1.48

to 1.60. These results may also be compared to a similar study conducted in northwest Ohio (Thraen and St-Pierre). This study produced a multiplier for the construction phase of 1.72 and 1.77 for the sustained operation phase. These results reinforce the idea of carefully evaluating the potential profitability of investments and maintaining realistic planning assumptions in the process.

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