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Estimated Economic Impact of Colorado Dairies

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Introduction

The economic impact of dairies on 5 Northeastern Colorado counties is estimated.³ Dairy producers in these counties for which data are available represented more than 86% (1,391,570,774 / 1,616,882,074 milk-lbs or \$202,473,600 / \$235,256,341 in sales) of total estimated Colorado dairy production in 1999. Estimated impacts include economic activity in the dairy industry (direct impacts), activity in industries that provide goods and services to dairy farms (indirect impacts), activity associated with the expenditure of income earned in the direct and indirect activities (induced impacts), and economic returns to the primary factors of production (e.g., land, labor, and capital) (value-added impacts). Total impacts are reported in terms of sales, earnings, and employment. Calculations are based upon 1999 sales data⁴ and the IMPLAN regional input-output economic analysis program, which is based upon 1996 calculations.

Direct, indirect, induced, value-added and total economic impacts

The agricultural sector generally, and the dairy industry specifically, represents a “basic” industry to Northeastern Colorado. Basic industries provide new income to a locality by selling (exporting) goods and services to people outside of the locality. Dairy product sales and the local jobs and income directly responsible for the production of dairy products sold represent the direct impact of the industry on the locality.

The dairy industry also generates indirect impacts on Northeastern Colorado as the revenues from external sales of dairy products are respent in the local economy. The indirect impact of the dairy industry on local economies includes purchases of a variety of agricultural inputs and professional services in the process of producing milk. Indirect effects represent additional economic activity in the local economy driven by dairy product sales outside of the region. These effects appear as jobs and income in local industries serving the dairy industry (e.g., veterinarians, feed suppliers, implement suppliers, trucking and transport).

"Northeastern Colorado produces nine-tenths of all dairy products in the state."

"The total economic impact of Northeastern Colorado dairies was about \$400 million and 3,000 jobs in 1999."



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⁴ Colorado Dairy User Group: 1996 Break-even analysis, 1997 Financial Review, and 1999 Production data provided by Bill Wailes and Arlan K Marrs for use in these calculations.

In addition to the direct and indirect impacts of the production and sales of dairy products outside of the region, the dairy industry is responsible for induced economic impacts in the form of the local goods and service purchased by people using the salaries and wages earned contributing to the productivity of the dairy industry. These induced expenditures translate into jobs and income for retailers, bank tellers, grocery store clerks, restaurant employees, and gas station attendants and so on.

Output effects are the effects driven by the sales of dairy products outside of the region (exports). Employment effects are the jobs created by the direct, indirect and induced effects of the sale of dairy products. Export sales also contribute to the value of the dairy farm and result in economic returns to the owner of the farm, his employees, and to the community in the form of business and property taxes. These are the valued-added portion of the total output impacts of dairy production. An estimate of the total economic impact of the dairy industry on the communities in which it is located can be derived as the sum of its direct, indirect and induced impacts implied by export sales and intra-regional value-added.

Local economic impact multipliers

The term “multiplier” is used to refer to the total amount of economic activity or impact generated by a dollar of export sales. Multipliers are commonly expressed in terms of local sales, income, jobs, or value-added generated per dollar of export sales.

Output or sales multipliers provide a measure of total sales in the local economy per dollar of external (export) sales. The output multiplier for dairy products is 1.95 indicating that \$1.95 total sales takes place in the locality of production for each dollar of sales outside of the region. Analogously, employment multipliers indicate the number of local jobs generated per million dollars of external sales. The dairy industry directly or indirectly generates 14.9 jobs for each million dollars of sales in dairy products. Of the total export sales multiplier, the value-added multiplier indicates the total returns to the primary factors of dairy production in the region for each dollar of dairy sales outside of the region. The total value-added multiplier for the Northeastern Colorado dairy industry is 0.72 or an impact of 0.72 cents in local earnings (private and governmental) for each dollar of dairy product export sales. Direct, indirect, induced, multipliers are reported for employment, output and value-added impacts on the local economy. Direct, indirect and induced multipliers have been explained above (Table 1).

Calculated economic impact of dairies on NE Colorado communities

Table 2 indicates that 1999 sales of \$202,473,600 worth of dairy products provided the equivalent of almost \$400 million in total impact, of which \$150 million would be in value-added, and more than 3 thousand jobs in 1999 to Northeastern Colorado communities. Just over 1/3 of the total benefits accrue directly to those in business of producing dairy products and a just under 1/3 of the benefits are captured by different sectors of the communities in which these businesses operate. Only about 17% of the workers employed due to the production of dairy products draw their wages directly from dairy operations. The remaining 2,500 employees work processing dairy products or providing goods and services to dairy operations or their employees (Table 2).

By means of illustration, we explore the estimated economic impact of an average Northeast Colorado dairy (Table 3). Using 1997 production averages and 1999 prices, an average Northeast Colorado dairyman would have generated \$1,841,099 in total milk sales and about twice that amount in total economic impact in 1999. Each mature cow in the herd would have generated about \$6,410 in total economic impact. The dairyman is calculated to have directly employed 5 people and created the economic activity necessary to employ an additional 23 people (Table 3).

Table 4 catalogues the top 25 industries impacted by dairy production in Northeastern Colorado in terms of monetary and employment effects. Logically, regional dairy products sales have the greatest impact on the dairy farm products industry (\$203 million). Outside of dairy production, wholesale trade, motorized freight services, and real estate industries benefit the most from the dairy industry in total dollar terms (\$26, \$12 and \$11 million, respectively). In terms of jobs created, the dairy exports from the region generate almost 300 jobs in the wholesale trade industry and 250 in agricultural services including milk processing and veterinarian services, for example (Table 4).

Summary and conclusions

The Northeastern Colorado dairy industry commonly accounts for almost all of the dairy products produced in the state, and therefore, may be considered important regardless of its relative economic impact. In 1999 the dairy products from this 5 county

region were sold for more than \$200 million. In addition, cull cattle sales probably accounted for about \$10 million over the same period. These activities generated direct, indirect and induced effects on the Northeastern Colorado economy. These effects have been calculated and reported in terms of output impacts, value-added impacts and employment impacts by the local industries most strongly affected by this economic activity. The tool used to generate the estimates of these impacts is called a “multiplier.”

Multipliers are imperfect measures of economic impact and changes in social welfare. However, they do provide a basis from which policy related discussion might take place. In isolation, multipliers do not indicate what the opportunity cost of using scarce resources in a particular activity is; they do not indicate highest and best use. Estimates based upon multipliers will be imperfect because of leakages at each successive round of spending (due to imported purchases, taxes, fees, savings, and non-local beneficiaries), lack of consideration of such important issues as new construction and potential environmental impacts of the industry, and due to the fact that multipliers are not precisely calculated using the actual situation in the specific locality. In addition, not all economic activity should be interpreted as good economic activity. For example, if an industry provides a large indirect contribution to the hospital and medical industry, it may be that it is a dangerous and potentially undesirable profession to be used to spur economic development.

We estimate that in 1999 the dairy industry in Northeastern Colorado contributed about \$400 million dollars and 3 thousand jobs to the local economy. These are large numbers standing by themselves and an essential starting point to informed decision-making. However, if this information is to be used to inform policy decisions regarding the future of this industry and the region, we recommend that more detailed analyses of this and other important regional industries be undertaken such that the relative influence of encouraging or discouraging economic development of one type or another can be fully understood.

Table 1: Dairy multipliers for 5 NE Colorado Counties

	Total Output	Value-added	Employment
Direct	1.0000	0.1707	2.5125
Indirect	0.4286	0.2438	4.9741
Induced	0.5193	0.3057	7.4515
<i>Total</i>	<i>1.9479</i>	<i>0.7203</i>	<i>14.9382</i>

Source: IMPLAN regional input-output economic impact estimator, 1997.

Table 2: Economic Impact of Northeast Colorado Diaries

	Total Output (1999 \$)	Value-added (1999 \$)	Employment (FTE)
Direct	202,473,600	34,562,244	509
Indirect	86,780,185	49,363,064	1,007
Induced	105,144,540	61,896,180	1,509
<i>Total</i>	<i>394,398,325</i>	<i>145,841,734</i>	<i>3,025</i>

Source: 1999 sales data provided by Bill Wailes and Arlan Marrs for use in these calculations. Estimates calculated with IMPLAN regional input-output economic impact estimator, 1997.

Table 3: Economic Impact of An Average Northeast Colorado Dairy

	Total Output (1999 \$)	Value-added (1999 \$)	Employment (FTE)
Direct	1,841,099	314,276	4.63
Indirect	789,095	448,860	9.16
Induced	956,083	562,824	13.72
<i>Total</i>	<i>3,586,276</i>	<i>1,326,143</i>	<i>27.50</i>

Source: Average dairy size (585 mature cows, 126,536 cwt production) calculated based upon 1996 and 1997 regional break-even analyses conducted by Bill Wailes. 1999 mean sales price (\$14.55/cwt) provided by Bill Wailes and Arlan Marrs. Estimates calculated with IMPLAN regional input-output economic impact estimator, 1997.

Table 4: Estimated economic impact of Northeastern Colorado Dairies by industry

	Total Output	Value-added	% of Total	Jobs
Dairy farm products	202,605,815	34,586,135	51.37	506.18
Wholesale trade	26,560,487	18,307,460	6.73	283.46
Motor freight transport	12,064,997	5,051,311	3.06	121.48
Real estate	11,170,266	7,743,198	2.83	60.74
Electric services	6,290,247	5,579,767	1.59	20.25
Maintenance & repair facilities	6,118,145	3,509,677	1.55	80.99
State & local government-education	6,020,350	6,020,350	1.53	182.23
New residential structures	5,517,406	1,712,319	1.40	60.74
Agricultural services	5,328,903	3,631,364	1.35	242.97
Owner occupied dwellings	4,986,317	3,954,309	1.26	0.00
Petroleum refining	4,617,006	693,067	1.17	0.00
Railroads & related	4,452,394	2,864,596	1.13	20.25
New industrial and commercial buildings	4,346,703	1,628,495	1.10	40.49
Doctors & dentists	3,655,661	2,263,250	0.93	40.49
Banking	3,645,537	2,502,979	0.92	20.25
Feed grains	3,532,152	908,094	0.90	40.49
Telephone & telegraph apparatus	3,411,478	1,763,748	0.86	20.25
Eating & drinking	3,371,590	1,613,310	0.85	101.24
State & local government-noneducation	2,863,584	2,863,584	0.73	60.74
Electronic computers	2,840,097	963,167	0.72	0.00
Communications	2,510,673	1,605,616	0.64	0.00
Hospitals	2,504,396	1,622,623	0.63	40.49
Insurance carriers	2,468,558	1,273,964	0.63	20.25
Automotive dealers & service stations	2,271,551	1,723,050	0.58	40.49
State & local electric utilities	2,207,367	1,114,212	0.56	0.00

Source: 1999 sales data provided by Bill Wailes and Arlan Marrs for use in these calculations. Estimates calculated with IMPLAN regional input-output economic impact estimator, 1997.

