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The Impact of the Dairy Industry in the Southern Ogallala Region

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The dairy industry in the Southern Ogallala Region has grown rapidly in recent years. Population, economic, and environmental pressures have forced dairy owners from across the U.S. to find alternative production areas for their operations. This region is well suited for the industry, providing irrigated land for silage production with relatively less expensive land prices than many other dairy producing areas of the country.

The landscape of the region is changing with the growing presence of dairies. A primary staple of dairy rations is silage, which due to its bulky nature and moisture content, must be grown locally. This is prompting a change from traditional crops grown such as corn, sorghum, and wheat for grain to silage from these same crops or alfalfa hay. Dairies also commonly practice double cropping where two or more crops are produced on the same land in the same season.

Dairies are boosting the regional economy and creating jobs through the labor intensive nature of the business. A typical 3,000 head dairy requires 30 to 37 employees. Complementary industries, such as Southwest Cheese, Hilmar Cheese, and Pacific Cheese, have also been established in the region, providing even more employment opportunities.

The dairy industry's growing demand for water has local leaders concerned about scarce water resources. Dairies use water directly for drinking and facility maintenance, and indirectly to grow forage and grain for feeding cattle. The Ogallala Aquifer is the main source of water in the region and is declining rapidly as withdrawals largely exceed recharge. Local groundwater authorities are continually developing efforts to conserve water for future generations. In this study, the dairy industry is evaluated in terms of water use relative to their contribution to the regional economy.



Study Area

The High Plains is a semiarid region and depends on the Ogallala Aquifer for water. The aquifer stretches from the Dakotas to the southern plains of Texas and comprises approximately 174,000 square miles. The aquifer averages 200 feet of saturated thickness, ranging from less than one foot to 1,300 feet depending on the location. The Southern Ogallala Region is defined in this study as the 97,000 square miles of the aquifer from the northern border of Kansas to just north of the Midland-Odessa area of Texas (Fig. 1).

The region consists of 19.7 million acres of cropland and more than 6.4 million acres enrolled in the Conservation Reserve Program (CRP); the rest is pastureland. Of the cropland, 7.3 million acres are irrigated and 12.4 million acres are dryland, (Fig. 2).

The primary irrigated crops are:

- corn—2.8 million acres
- cotton—1.8 million acres
- wheat—1.7 million acres
- sorghum—0.3 million acres

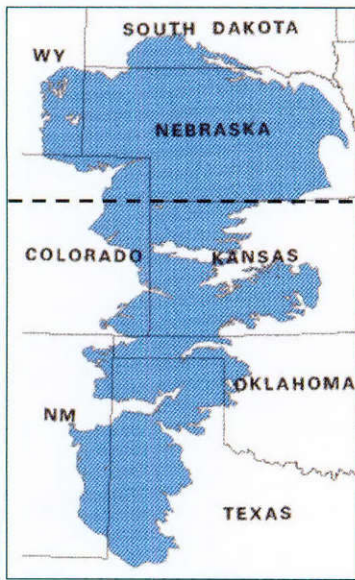


Figure 1. Southern Ogallala Region (shaded area below dashed line).

Other irrigated crops include alfalfa and silage crops grown to support the livestock industry.

Dryland crop acreage in the study area stood at 12.4 million acres in 2010, down significantly from the high of 15.1 million acres in 1982. The decrease can be traced directly to the implementation of the CRP, which retired millions of acres from production.

Major dryland crops are:

- wheat—7.4 million acres
- cotton—2.0 million acres
- corn—1.6 million acres
- sorghum—1.5 million acres

Wheat has decreased from a high of 10.6 million acres in 1983, however, still dominates dryland production, accounting for 59 percent of acreage. Dryland corn production was basically non-existent 20 years ago but reached 1.6 million acres in 2010 due to improved varieties, management, and profitability.

Sparse population, availability of feed grains, and favorable environmental conditions have made the region a popular place for confined livestock

operations (CLOs). Cattle feedlots first appeared in the 1960s and grew steadily until inventories stabilized over the last decade. In 2010, cattle on feed topped 4.9 million head. The swine industry had 338,000 head in 1989 and grew rapidly in the 1990s. The number of hogs in the region was 3.4 million in 2010.

Dairy operations are relocating because of increased population, more stringent environmental regulations, and escalating land prices. The same conditions that attracted feedlots and swine operations now draw dairies and associated businesses to the study region.

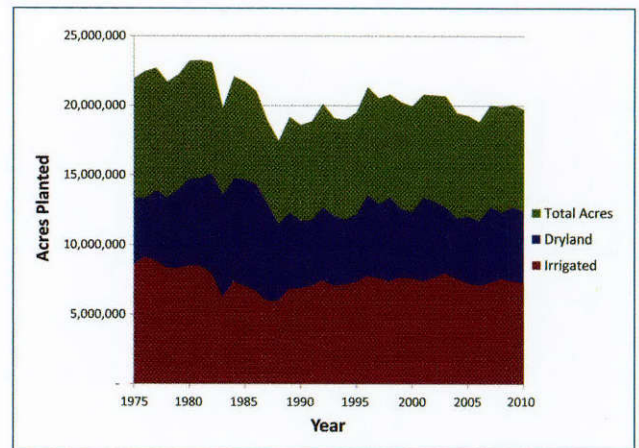


Figure 2. Southern Ogallala Region irrigated and dryland crop acres, 1975-2010.

Source: National Agricultural Statistics Service

Dairy cows in the Southern Ogallala Region increased more than eleven-fold, from 41,500 head in 1990 to a high of 466,000 head in 2009. The growth in the region's dairy industry coincides with cheese manufacturing plants built in Clovis, NM in 2005 and Dalhart, TX in 2007. Inventories declined in 2009 due to low milk prices and profitability. In 2010, inventory stood at 453,200 head (Fig. 3). The industry recovered in 2011 based on milk production data. Recently completed expansions of Southwest Cheese and Hilmar Cheese plants, as well as planned future developments, suggest the dairy industry will resume growth in the near future.

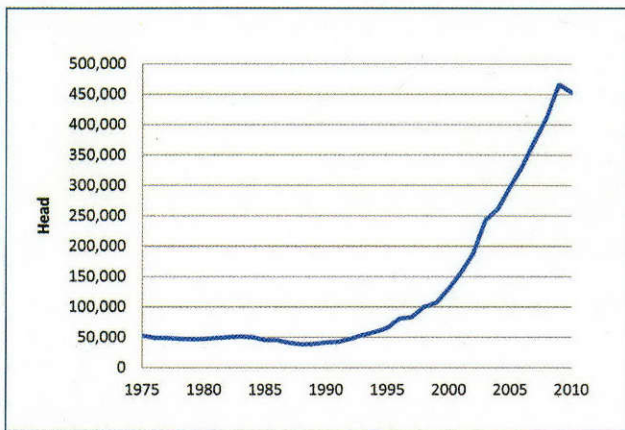


Figure 3. Southern Ogallala Region dairy cow inventory, 1975-2010.

Source: National Agricultural Statistics Service

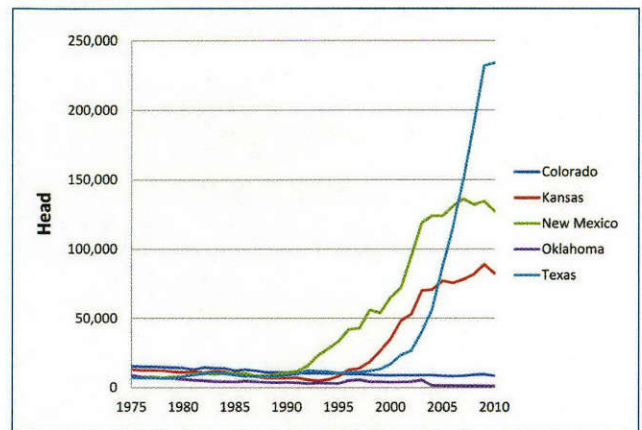


Figure 4. Southern Ogallala Region dairy cow inventory by state, 1975-2010.

Source: National Agricultural Statistics Service

The region's dairy industry growth has been geographically uneven. From 1975 to 2010, dairy inventories in Colorado and Oklahoma experienced virtually no growth (Fig. 4). However, in late 2011 a new cheese factory was built just north of the study region in Greely, CO which could lead to an expansion of dairies.

The greatest increase in dairy cow numbers occurred in the Texas High Plains from 2000 to 2010 when inventory rose from 16,800 to 234,000



head. This was directly linked to the opening of two cheese manufacturing plants. Both plants completed expansions in 2010 which implies further inventory growth in the near future.

Water Use in the Dairy Industry

The dairy industry's growing demand for water has local leaders concerned about the future of the Ogallala Aquifer. Dairies use water *directly* for drinking and facility maintenance, and *indirectly* to grow forage and grain for feeding cattle. Agricultural production is affected by the type of use since a portion of the water requirements will come from existing supplies.

In balance, the amount of water dairies use directly has to be offset by an equivalent decrease in the amount of water used for irrigation. This decrease is partially achieved when acreage is converted from irrigated production to a dairy facility used to house cattle, store feed, and harvest milk.

The amount of water dairies use indirectly within the region depends on the type of feed produced. Indirect water required for silage will come from within the region because it must be produced relatively close to where it will be used. On the other hand, there is not enough grain produced in

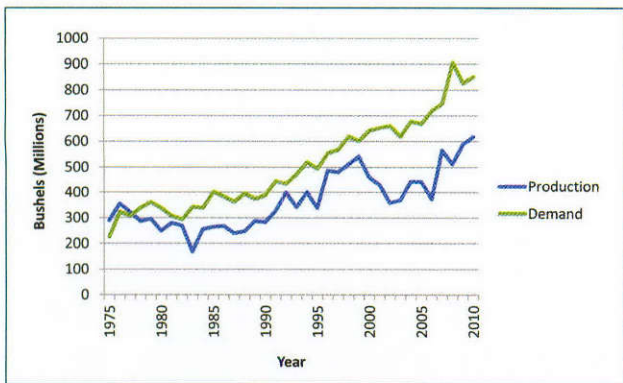


Figure 5. Southern Ogallala Region feed grain production and demand from confined livestock operations, 1975-2010.

the region to meet demands. Thus, imports from other parts of the country are necessary.

The region has been grain deficit (using more than it produces) since the late 1970s because of the development of the fed-beef industry and later swine operations (Fig. 5). Irrigated grain acreage to support these industries peaked from the 1970s through the mid-1980s, but has fallen steadily as the aquifer depletes (Fig. 2). At the same time, better technologies and management have enabled production to more than double. However, the increase has not been enough to satisfy the demand for grains in livestock rations.



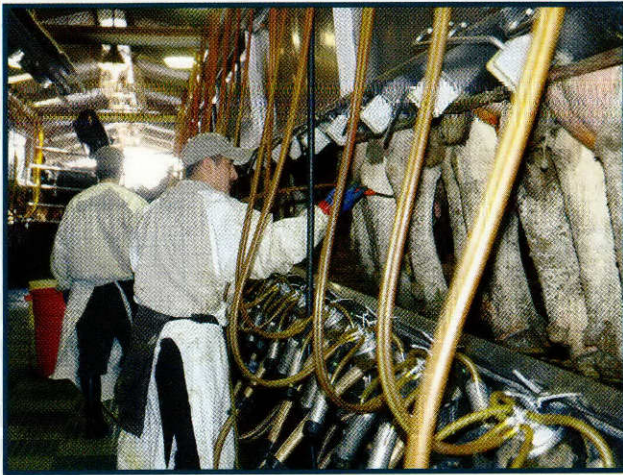
Growing dairy needs and the recent development of the ethanol industry have required imports averaging 35 percent of feed grain needs over the last decade. This suggests that any additional indirect water required by the dairy industry through feed grains will have to be offset by decreases in existing agricultural operations or increases in imports rather than more pumping from the aquifer. In this study, the potential draw on the aquifer from indirect water use by dairy operations in the study region is estimated assuming that all feed required comes from irrigated acreage within the study area.

Direct water use

The amount of water that a dairy uses for drinking, cleaning, and maintenance varies by facility type and composition of the herd (whether replacement animals are grown or purchased). Industry specialists estimate the average direct water use for each dairy cow in the Texas High Plains is 55 gallons per day. This figure is assumed to be typical across the entire study region.

The *direct water* use from 1975 to 2010 is illustrated in Figure 6. Direct water use was less than 3,250 acre-feet in 1975 and remained relatively stable for 20 years, reaching 4,000 acre-feet in 1995.





Thereafter, rapid growth in inventories increased water usage in Kansas and New Mexico and later Texas. In 2010, direct water use was approximately 28,000 acre-feet.

The amount of direct water that dairies use affects the rest of the agricultural sector in the region. In general, water that dairies use is offset by a decrease in irrigated acreage. Irrigated water use varies considerably across the region and by crop. An average of 15 acre-inches (or 1.25 acre-feet) per acre was assumed in this study to illustrate the impact of direct water use by dairies on irrigated acreage.

Table 1. Estimated direct water use and displaced irrigated crop acreage by dairy operations in the study area, 2010.

State	Dairy Inventory (hd)	Direct Dairy Water Use (ac-ft) ^a	Displaced Crop Acreage ^b
Colorado	8,600	530	424
Kansas	82,300	5,070	4,056
New Mexico	127,200	7,837	6,269
Oklahoma	1,100	68	54
Texas	234,000	14,416	11,533
Total	453,200	27,921	22,337

^aAssumes 55 gallons/day/dairy cow unit

^bAssumes 15 ac-in applied per acre

The estimated reduction in irrigated acreage is shown in Table 1. A total of 22,337 irrigated acres would need to be taken out of production to offset the direct dairy water requirements in 2010. The reduction represents 0.3 percent of the 7.3 million irrigated acres in the region. Texas was estimated to have the largest reduction of irrigated acreage (11,533 acres) followed by New Mexico (6,269 acres) and Kansas (4,056 acres). The actual site of the dairy, typically used previously as irrigated cropland, would offset a portion of this acreage. An average 3,000-head production facility requires approximately 160 acres.

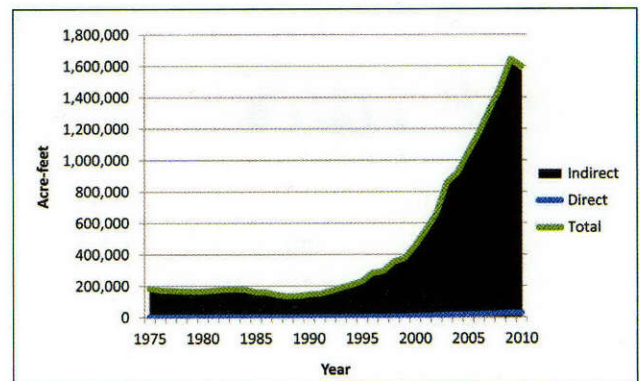


Figure 6. Southern Ogallala Region estimated direct and indirect water use by dairy cows, 1975-2010.

Indirect Water Use

Indirect water use refers to the water used to produce concentrate, silage, protein, and alfalfa for feed. To understand the potential impact of indirect water use by dairy operations the feed requirements of the industry must be estimated. An example ration for a dairy cow— factoring in a percentage of a replacement animal based on regional characteristics—is presented in Table 2.

On average, each cow requires 131 pounds (as-fed) of feed per day. The ration primarily consists of silage (92 pounds), concentrate (19 pounds), and alfalfa (10 pounds). This corresponds to a total feed requirement of nearly 24 tons yearly per cow and accounts for the forage shrink between harvest and consumption.

Table 2. Estimated feed requirements for dairy operations in the study area, 2010.

Ingredient	Dairy Cow Unit		Study Region
	Daily Ration as fed (lbs) ^a	Annual Ration as fed (tons) ^b	Feed Requirements (tons) ^c
Alfalfa	9.71	1.77	802,737
Silage	92.01	16.79	7,610,410
Concentrate	18.84	3.44	1,558,007
Cottonseed	4.89	0.89	404,355
Protein Supplement	4.61	0.84	381,019
Mineral Supplement	1.22	0.22	101,276
Total	131.28	23.96	10,857,804

^aComposite is calculated assuming 0.77 homegrown replacements per cow and shrink from harvest to consumption of forage
^bAssumes dry matter content of 90%, 35%, 86%, 90%, 89%, and 98% for alfalfa, silage, concentrate, cottonseed, protein, and minerals, respectively
^cBased on an estimated dairy cow inventory of 453,200 head in 2010

The estimated regional demand for feed based on the 2010 dairy cow inventory equals:

- 802,737 tons of alfalfa
- 7,610,410 tons of silage
- 1,558,007 tons of concentrate
- 404,355 tons of cottonseed
- 381,019 tons of protein supplement
- 101,276 tons of mineral supplement

Thus, the estimated total feed requirement for the dairy industry in 2010 was estimated to be almost 10.9 million tons (Table 2). This is an approxima-

tion, whereas actual dairy rations are determined on a least-cost basis and subject to ingredient availability.

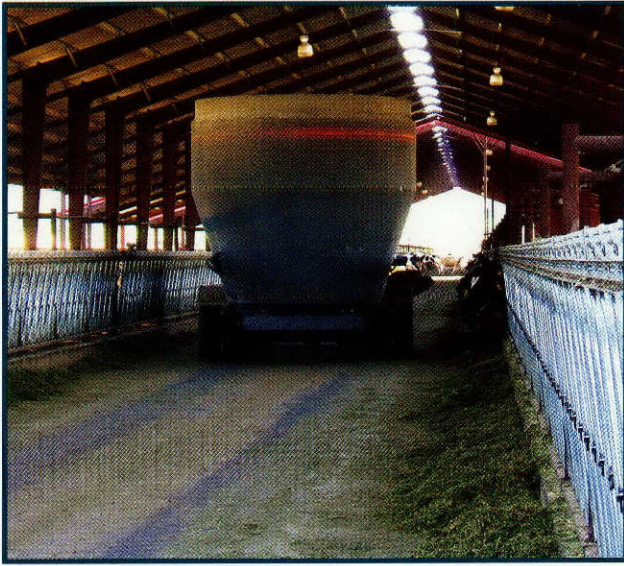
The potential draw on the aquifer from indirect water use by dairies is estimated in Table 3. In this extreme case, it is assumed that all feed required comes from irrigated acreage within the study area. Indirect water use for the primary components (alfalfa, silage, concentrate and protein) is estimated assuming corn silage is the silage used, corn grain is the concentrate and soybean meal is the protein

source. In reality, a significant portion of the concentrate is a co-product of the ethanol industry, and a variety of protein supplements are fed.

Indirect water use was estimated by transforming the feed requirements into acres of production and applying the typical irrigation water use by crop. The total indirect water use was 1,570,333 acre-feet, which accounts for 98.3 percent of the total water use of the dairy industry in 2010; direct water use (27,921 acre-feet) makes up the other 1.7 percent. The estimated water use of the dairy industry from 1975–2010 mirrors the growth of inventory (Fig. 6).

Table 3. Estimated indirect water use and corresponding irrigated crop acreage required by dairy operations in the study area, 2010.

	Alfalfa	Corn Grain	Corn Silage	Soybean	Total
Feed Requirements (tons)	802,737	1,558,007	7,610,410	381,019	10,352,172
Yield/Acre (tons)	5.50	6.30	27.00	1.43	
Acreage	145,952	247,303	281,867	266,447	941,569
Irrigation Applied (ac-in per acre)	24	22	20	16	
Indirect Water (ac-ft)	291,904	453,388	469,778	355,262	1,570,333



The amount of indirect water supplied locally is dependent on the characteristics of the study area. The region is grain deficit and is facing declining water availability. Imports of corn grain, soybean meal and, to a lesser extent, alfalfa are required because there is not enough local supplies to meet livestock demand. Limited water availability results in a change in irrigated crop composition to silage which must be grown locally. These characteristics imply indirect water demands for new dairy operations in the form of feed grains have relatively little impact on the aquifer and that the primary effect is a change in crop composition.

The proportion of the region's water needed for livestock and irrigated crops which supports the dairy industry, assuming current water use efficiencies, is illustrated in Figure 7. Total water use

has been relatively constant since the early 1990's. However, the amount of water going to dairies is increasing, indicating a tradeoff between dairies and other agricultural enterprises.

Many dairies grow two or more crops on the same land in the same season (double cropping), and water use for this practice has become a major

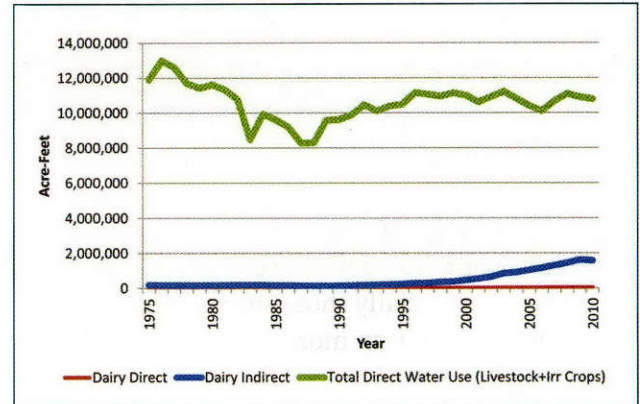


Figure 7. Southern Ogallala Region estimated direct and indirect water use by livestock and irrigated crop production in comparison to dairy water use, 1975-2010.

Table 4. Estimated water applied for irrigated grain production versus double cropped silage production.^a

	Corn Grain	Corn Silage-Wheatlage	Sorghum Grain	Sorghum Silage-Wheatlage
Primary Crop				
Acres	100	100	100	100
Irrigation Applied (ac-in per acre)	19.1	17.2	9.7	8.7
Irrigation Applied (ac-in)	1910	1720	970	870
Double Crop				
Acres		25		25
Irrigation Applied (ac-in per acre)		7		7
Irrigation Applied (ac-in)		175		175
Total Irrigation Applied (ac-in)	1910	1895	970	1045
^a Assumes a 10% water savings on silage crops and 25% of cropland is double cropped with wheatlage				

concern. Estimated water use for grain production and double cropping silage is shown in Table 4. Corn grain uses slightly more water than the double cropped corn silage—wheatlage alternative. Conversely, the double cropped sorghum silage—wheatlage uses 7.7 percent more water than sorghum grain. To lessen the impacts on the aquifer, effluent from retention ponds is dispersed on approximately 39 percent of double cropped acres. Thus, double cropping does not necessarily result in increased water pumpage from the aquifer.

The value of water rises with increased demand. Areas of the region have stopped pumping due to increased costs as the aquifer declines. However, landowners may resume pumping when the value of water rises above the cost of extraction. Other areas, especially those surrounding dairies, will also tend to pump more water because value exceeds costs.

Regional Economic Impacts

The dairy industry is an important component of the regional economy. Recent expansions make the industry even more significant. A computer analysis program, IMPLAN (IMPact analysis for PLANning), was used to estimate the dairy industry's economic contribution to the Southern Ogallala Region. The IMPLAN model estimates the ripple effects on economic sectors that are directly and indirectly related to the dairy industry.

Direct, indirect, and induced effects are estimated with the IMPLAN model. The *direct effects* of the dairy industry are the sales, income, and employment that are generated by operations that produce milk products. The *indirect effects* include the purchase of inputs, such as energy and transportation services, to produce and deliver milk products. *Induced effects* occur when employees of



the dairies and input suppliers use their income to buy goods and services from businesses such as grocery stores, restaurants, and department stores.

These effects are captured for three different economic measures:

- *Industry output*—the total economic activity that occurs within a region
- *Value added*—the income or wealth portion of industry output that includes employee compensation, proprietary income, other property income, and indirect business taxes
- *Employment*—the number of jobs

The dairy industry produces and processes milk for consumption. The value of milk production in 2010 was estimated at \$1.7 billion (Table 5).

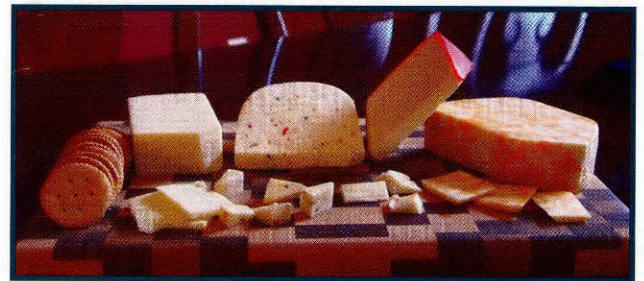
Table 5. Value of milk production and processing in the Southern Ogallala Region, 2010.

Region	Milk Production	Milk Processing	Total
Colorado	\$33,759,044	—	\$33,759,044
Kansas	\$306,952,186	\$13,389,133	\$320,341,319
New Mexico	\$498,079,196	\$705,192,618	\$1,203,271,814
Oklahoma	\$3,302,946	—	\$3,302,946
Texas	\$863,465,566	\$666,559,260	\$1,530,024,826
Total	\$1,705,558,938	\$1,385,141,011	\$3,090,699,949

Table 6. Economic contribution of the dairy industry to the Southern Ogallala Region, 2010.

	Direct	Indirect	Induced	Total
Milk Production				
Output	\$1,705,558,938	\$740,861,977	\$162,401,079	\$2,608,821,994
Value Added	\$288,759,942	\$256,616,584	\$92,821,723	\$638,198,249
Employment	5,974	3,217	1,501	10,692
Milk Processing				
Output	\$1,385,141,011	\$267,196,663	\$65,705,763	\$1,718,043,438
Value Added	\$310,886,525	\$122,079,349	\$37,549,390	\$470,515,262
Employment	867	1,224	608	2,698
Total				
Output	\$3,090,699,949	\$1,008,058,640	\$228,106,842	\$4,326,865,432
Value Added	\$599,646,467	\$378,695,933	\$130,371,113	\$1,108,713,511
Employment	6,841	4,441	2,109	13,391

Processors in the region include manufacturers of fluid milk and cheese, and one cheese packager. Plains and Gandy's in Texas along with Dairy Concepts in New Mexico and Forget-me-not Dairy in Kansas manufacture fluid milk. Cheese manufacturers include Southwest Cheese in New Mexico and Hilmar Cheese in Texas. Pacific Cheese in Amarillo, Texas is the only cheese packaging plant. The processors totaled almost \$1.4 billion of production in 2010, bringing the region's total dairy industry output to approximately \$3.1 billion.



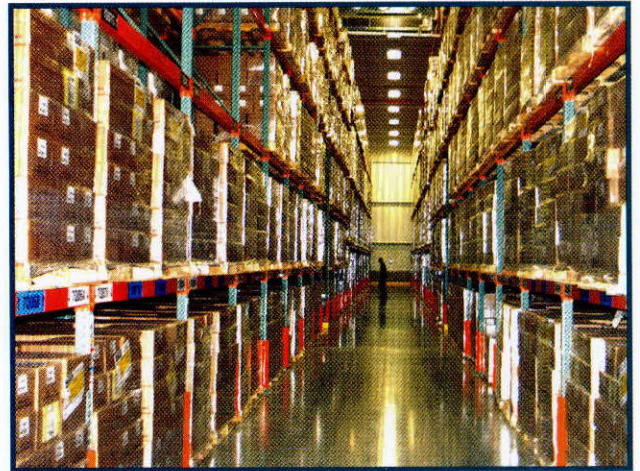
Results of the IMPLAN analysis are shown in Table 6. The direct output of the dairy industry, including milk production and processing, was \$3.1 billion in 2010. The indirect and induced effects combined for a total dairy industry impact of \$4.3 billion. Of this total, \$1.1 billion was value added or wealth generated in the economy. The dairy industry's estimated employment impact was 13,391 jobs.



The economic impact of the dairy industry to the Southern Ogallala Region varies considerably by state (Fig. 8). The Texas High Plains contributes 50 percent of the economic

impacts as a result of having the largest dairy cow inventory and representation of all three processing sectors. New Mexico accounts for 39 percent of the total impact while Kansas and Colorado contribute 10 percent and one percent, respectively. The Oklahoma Panhandle has a small number of milk cows and no processors and thus, contributes only slightly. Detailed data by state are presented in the Appendix.

As the regions' leaders plan for water conservation, the economic return on different types of water use will be considered. Milk production's \$2.6 billion economic impact gauged against direct water use of 27,921 acre-feet and indirect water use of 1,570,333 acre-feet yields an estimated value of water used by dairies. Direct water use alone generates \$93,437 per acre-foot. The value when combining direct and indirect water use is \$1,632 per acre-foot. These values are relatively high compared to other industries. In assessing the economic impact of the dairy industry, note that a portion of the indirect water used comes from outside the region in the form of imported grain and not from the Ogallala Aquifer.



Summary and Conclusions

Water use in the Southern Ogallala Region has greatly exceeded the recharge rate for the past several decades, leading to a steady decline in the aquifer. Agricultural irrigation accounts for the majority of water use in the area. Recent growth in the region's dairy industry has many stakeholders questioning whether the economic benefits justify water use. This study provides information to help policymakers determine the best strategy to conserve water while maintaining the economic viability of the region.

Dairies use water directly for drinking and facility maintenance and indirectly to produce feed. Water usage can be noticeable in areas where dairies are located, however only has a minor impact on the region as a whole because of the grain deficit nature of the area and aquifer decline. A small reduction in irrigated acreage will offset the direct water use of the dairy. The local crop composition will change to include silage production. For example, the direct water use of a 3,000 head dairy would displace approximately 101 acres of irrigated corn production (22 ac-in applied per acre) and crop composition would change to include 1,867 acres of irrigated corn silage (20 ac-in applied per acre).

As dairies bring a higher value to water, a relative increase in pumping will occur. Thus, water use in

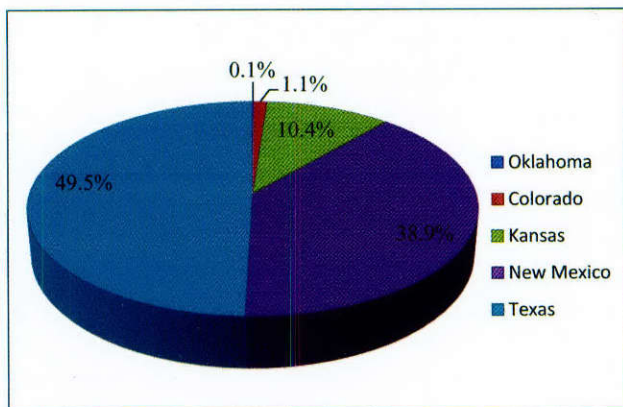


Figure 8. Percentage of total economic contribution of the dairy industry to the Southern Ogallala Region by state, 2010.

the region by dairies will be proportionally larger due to tradeoffs between dairies and other agricultural enterprises, while total water by agricultural enterprises will remain relatively constant.

The dairy industry has generated substantial economic benefits for the region. Milk producers and processors contribute \$4.3 billion in annual economic output and 13,400 jobs. Dairies in the region represent a relatively high-value use for water. They use nearly 1.6 million acre-feet and generate \$93,437 per acre-foot of direct water or \$1,632 per acre-foot of overall water use. Note that most of the indirect water use comes from outside the region in the form of imported grain and not from the Ogallala Aquifer.

Analysis suggests the dairy industry in the Southern Ogallala Region has minimal impact on water resources while increasing economic activity and employment opportunities. Expansion of dairies will shift crop composition to include forage production which could increase water use in areas where dairies are located. However, additional grain requirements will come from imports since the region is already grain deficit. Finally, adding dairies may benefit the region as the increased economic activity could help offset losses from traditional agricultural crop production shifting to dryland in response to aquifer decline.



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Appendix

Table A1. Economic impacts of the dairy industry in the Colorado portion of the Southern Ogallala Region, 2010.

	Direct	Indirect	Induced	Total
Milk Production				
Output	\$33,759,044	\$14,786,512	\$3,374,480	\$51,920,036
Value Added	\$5,412,933	\$5,127,557	\$1,929,195	\$12,469,685
Employment	115	64	31	210
Milk Processing				
Output	—	—	—	—
Value Added	—	—	—	—
Employment	—	—	—	—
Total				
Output	\$33,759,044	\$14,786,512	\$3,374,480	\$51,920,036
Value Added	\$5,412,933	\$5,127,557	\$1,929,195	\$12,469,685
Employment	115	64	31	210

Table A2. Economic impacts of the dairy industry in the Kansas portion of the Southern Ogallala Region, 2010.

	Direct	Indirect	Induced	Total
Milk Production				
Output	\$306,952,186	\$129,042,060	\$29,289,483	\$465,283,729
Value Added	\$62,421,904	\$44,500,997	\$16,746,878	\$123,669,779
Employment	1,042	558	271	1,870
Milk Processing				
Output	\$13,389,133	\$2,400,351	\$774,167	\$16,563,651
Value Added	\$3,967,493	\$1,158,600	\$442,999	\$5,569,092
Employment	18	12	7	37
Total				
Output	\$320,341,319	\$131,442,411	\$30,063,650	\$481,847,380
Value Added	\$66,389,397	\$45,659,597	\$17,189,877	\$129,238,871
Employment	1,060	569	278	1,907

Table A3. Economic impacts of the dairy industry in the New Mexico portion of the Southern Ogallala Region, 2010.

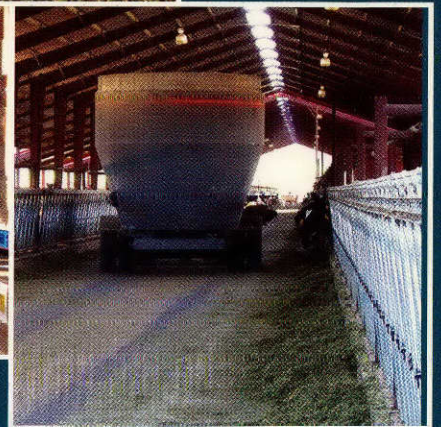
	Direct	Indirect	Induced	Total
Milk Production				
Output	\$498,079,196	\$213,446,743	\$47,238,933	\$758,764,872
Value Added	\$91,469,854	\$73,785,471	\$26,982,910	\$192,238,235
Employment	1,801	925	437	3,163
Milk Processing				
Output	\$705,192,618	\$152,144,262	\$31,712,301	\$889,049,182
Value Added	\$118,506,310	\$67,169,376	\$18,136,042	\$203,811,726
Employment	421	700	294	1,414
Total				
Output	\$1,203,271,814	\$365,591,005	\$78,951,234	\$1,647,814,054
Value Added	\$209,976,164	\$140,954,847	\$45,118,952	\$396,049,961
Employment	2,222	1,625	730	4,577

Table A4. Economic impacts of the dairy industry in the Oklahoma portion of the Southern Ogallala Region, 2010.

	Direct	Indirect	Induced	Total
Milk Production				
Output	\$3,302,946	\$1,351,263	\$302,693	\$4,956,902
Value Added	\$771,036	\$461,822	\$173,901	\$1,406,759
Employment	11	6	3	19
Milk Processing				
Output	—	—	—	—
Value Added	—	—	—	—
Employment	—	—	—	—
Total				
Output	\$3,302,946	\$1,351,263	\$302,693	\$4,956,902
Value Added	\$771,036	\$461,822	\$173,901	\$1,406,759
Employment	11	6	3	19

Table A5. Economic impacts of the dairy industry in the Texas portion of the Southern Ogallala Region, 2010.

	Direct	Indirect	Induced	Total
Milk Production				
Output	\$863,465,566	\$382,235,399	\$82,195,490	\$1,327,896,455
Value Added	\$128,684,215	\$132,740,737	\$46,988,839	\$308,413,791
Employment	3,005	1,665	760	5,430
Milk Processing				
Output	\$666,559,260	\$112,652,050	\$33,219,295	\$812,430,605
Value Added	\$188,412,722	\$53,751,373	\$18,970,349	\$261,134,444
Employment	428	513	307	1,248
Total				
Output	\$1,530,024,826	\$494,887,449	\$115,414,785	\$2,140,327,060
Value Added	\$317,096,937	\$186,492,110	\$65,959,188	\$569,548,235
Employment	3,434	2,177	1,067	6,678



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