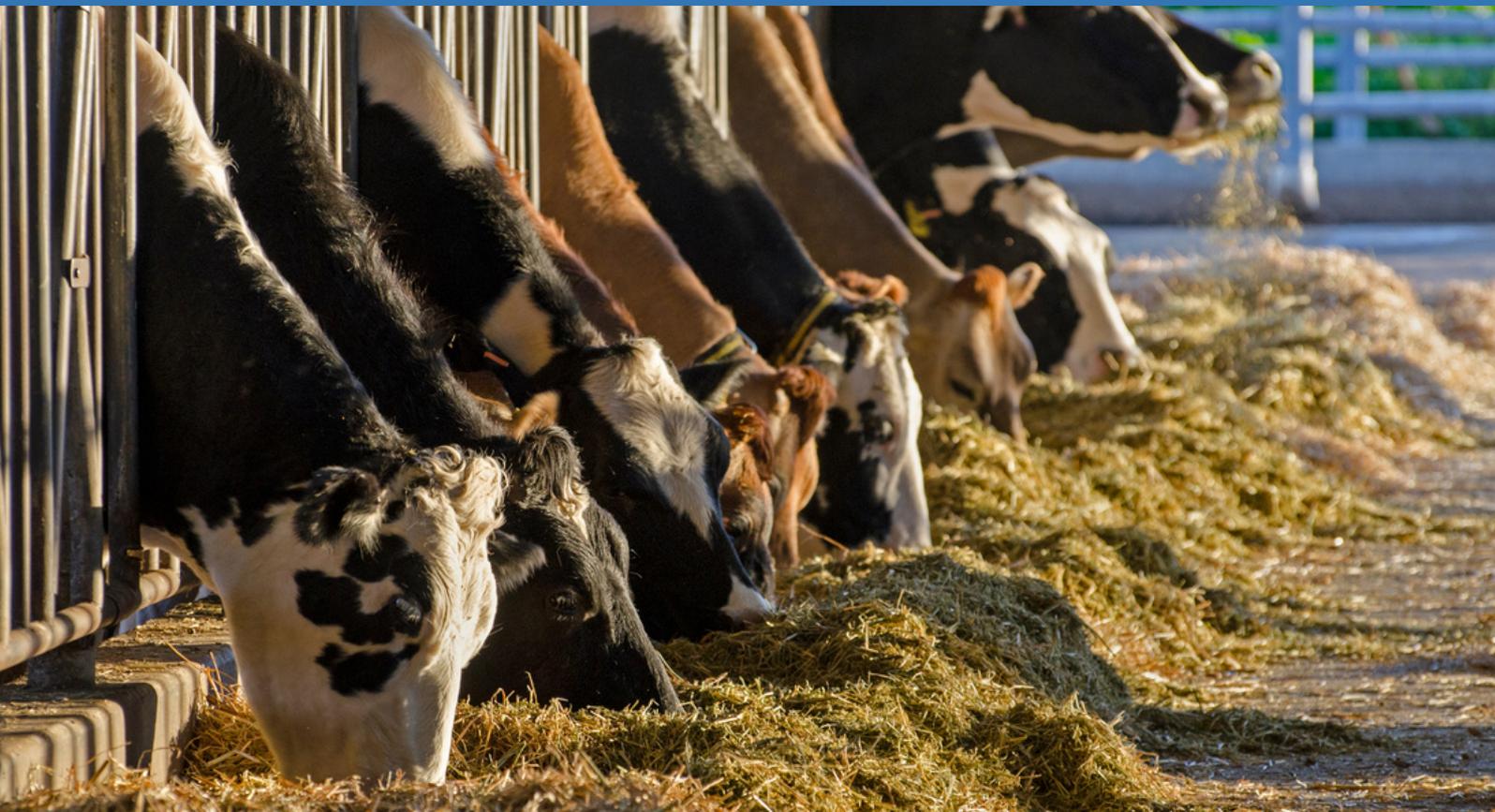


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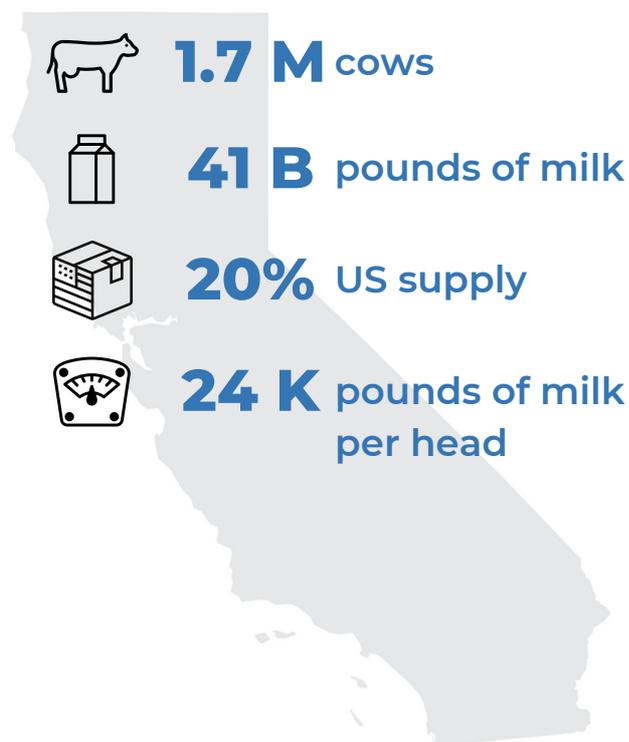
Economic Impacts of SGMA on San Joaquin Valley Dairies and Beef Cattle



Overview

California is the leading dairy producing state with over 1.7 million cows producing over 41 billion pounds of fluid milk, accounting for around one-fifth of the U.S. supply. Operating in one of the most environmentally progressive states, California dairies are constantly improving efficiency in both production and nutrient management. As a result, productivity per cow has been steadily increasing with current yield averaging 24,000 pounds of milk per head. Increasing productivity has kept California as the number one dairy state even as the total dairy herd size has decreased over the past several decades.

California Dairy at a Glance



Inputs are carefully managed in an efficient cycle on the dairy. Irrigation water is blended and applied to provide nutrients for feed crops, which are in turn harvested and fed to the cows that then generate manure that is applied to the crops. Cow rations come from crops grown at the dairy, imported concentrates, and byproducts (waste) from several other crops.

Dairy cows are an important input to the California beef cattle industry. Cull cows from dairies are processed for beef and calves are sold off of the dairy for beef. Most dairy calves sold for beef processing are sent out of the San Joaquin Valley for rearing. This is likely to continue as the cost of local feed increases.

The outlook for the California dairy industry is driven by higher input costs. One of the most pressing issues facing the industries is water scarcity and water quality management. Dairy Cares and the California Cattle Council commissioned this study to quantify likely changes in response to one of the most important changes in water management, the Sustainable Groundwater Management Act.

The Executive Summary is comprised of the following sections:

- [Overview](#)
- [Industry Trends and Outlook](#)
- [Sustainable Groundwater Management](#)
- [Other Policies and Regulatory Costs](#)
- [Economic Analysis Overview](#)
- [Dairy and Beef Cattle Economic Impacts](#)
- [Economic Impact Summary](#)

New groundwater management in California will affect the state's \$29B dairy and beef industry. This report begins to quantify its impact.

Industry Trends and Outlook

Recent industry trends include:

- Milk production per cow is increasing due to increasing efficiency (Figure 1a).
- Returns vary with fluctuations in market conditions (Figure 1b), increasing production costs due to regulation, feed and energy prices, and efficiency investments.
- In recent years, beef cow and steer inventories have increased slightly as dairy cow inventories have leveled off (Figure 1c).
- Heifer replacement rates are stable despite herd size changes.
- National beef prices are up over last year and well above the 5-year average.

The future industry outlook includes:

- Costs and productivity will continue to rise.
- Other policies and regulations will interact with SGMA and affect future growth of the industry. These impacts were not analyzed in this initial study.
- Water supply from the Colorado River has been cut and may be cut further. This will cut feed production and increase feed costs for California dairies.
- Warmer, drier climate conditions and a shift to more rain and less snowpack is expected to limit surface water supplies for agriculture in the future.
- Waste Discharge Requirements are likely to be tightened, increasing production costs for some dairies. These impacts were not evaluated.
- SB 1383 set a target of 40% methane reduction below 2013 levels. Anaerobic digesters and similar investments offer opportunities to manage emissions through highly effective voluntary incentive programs.

Figure 1a: Milk Production Per Cow

Milk production per cow is steadily increasing due to more efficient dairies.

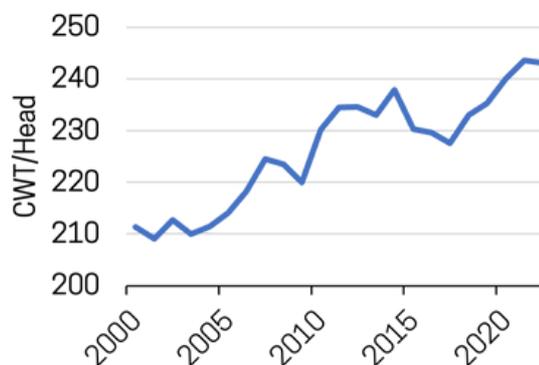


Figure 1b: Milk Prices

National milk prices are above this time last year and well above the 5-year average.

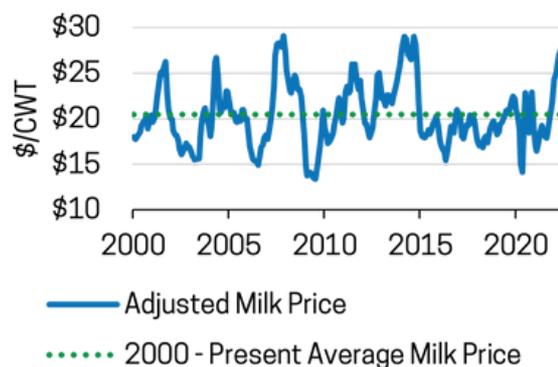
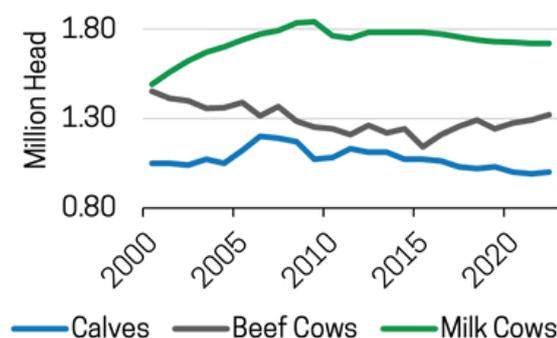


Figure 1c: Beef Cow & Steer and Dairy Cow Inventories

In recent years, beef cow and steer inventories have been increasing slightly as dairy cow inventories have leveled off.



Sustainable Groundwater Management

The Sustainable Groundwater Management Act of 2014 (SGMA) is a set of laws (AB 1739, AB 1319, SB 1168) passed in 2014 that mandate sustainable groundwater use in California. Sustainability is defined locally to meet the requirements of SGMA. Local Groundwater Sustainability Agencies (GSA) within each subbasin have developed Groundwater Sustainability Plans (GSPs) to achieve sustainability by 2040 (or 2042). SGMA will provide a range of sustainability benefits over time, but it will impact industries such as dairy that have relied on groundwater use in critically overdrafted basins.

What does SGMA mean for the dairy and beef cattle industries?

GSPs specify projects and management actions to achieve sustainability. GSAs are planning a combination of projects to increase water supply and demand management actions to limit pumping.

- Projects to increase water supply and recharge will increase the cost of water to farmers.
- Demand management programs include allocations and land fallowing that limit the amount of groundwater that can be pumped.

Dairy Industry Impacts

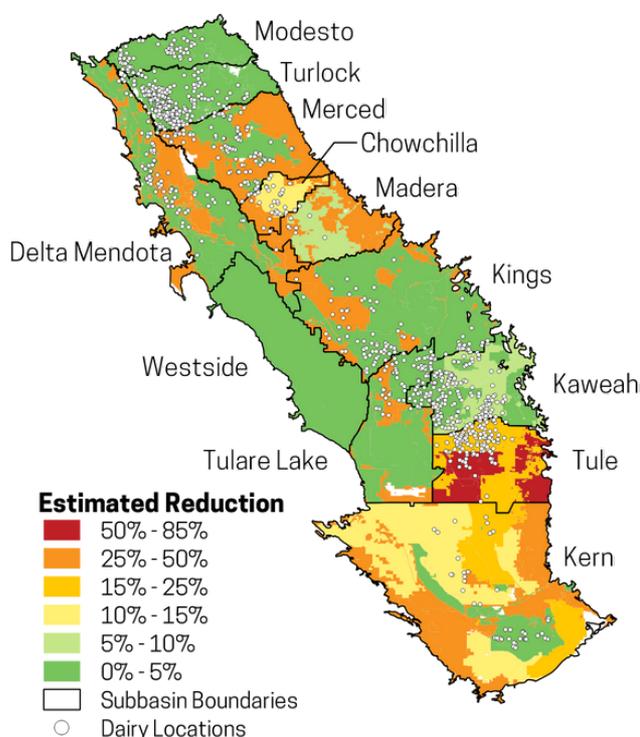
- Limited water supply affects nutrient management on the farm by reducing acreage available to apply manure.
- Water-related costs will increase to pay for projects and reduce pumping.
- Limited water supplies reduce feed production, reduce total milk production, increase production costs, and cause financial losses for farmers and other businesses.
- Dairies will contract gradually between now and 2040; the remaining farms will be those that are more efficient.

Beef Cattle Industry Impacts

- A contracting dairy industry results in fewer calves and cull cows for beef production.
- Limited water supplies reduce irrigated pasture and other grain and forage production in California for cow-calf and feeder operations.
- This study did not quantify additional cattle industry impacts on irrigated pasture, grain, and grazing land.

Figure 2: Impact of SGMA & Dairy Locations

The figure illustrates the reduction in total water as a result of SGMA and locations of dairies. Dairies in water stressed areas will be most affected by SGMA.



Other Policies and Regulatory Costs

Environmental stewardship is a top priority for California. The dairy industry is continuing to invest in new technologies and management to improve its environmental footprint. In addition to new groundwater regulations, California dairies have been pressed to meet changing state regulations on water and air quality and worker health, safety, and wage related policy. Substantial capital investments and changes in production practices have led to a more efficient and environmentally sustainable industry but have come at a cost.

Waste Management Plan (WMP)

Dairies must manage waste in compliance with Waste Discharge Requirements General Order No. R5-2013-0122 to prevent adverse impacts to water quality.

- Typical Practices: Freestall flush systems, slurry ponds, corral scrape, composting, solid separation systems, anaerobic digesters.
- Interaction with Other Regulations: Some practices require more water than others. Different systems have the ability to reduce methane emissions. There are capital-labor trade offs among practices.

Nutrient Management Plan (NMP)

Dairies must budget and manage nutrients applied to the land to prevent adverse impacts to surface water and groundwater quality.

- Typical Practices: Application of manure and processed wastewater on crops at no more than 1.4 times expected crop nutrient uptake.
- Interaction with Other Regulations: SGMA may decrease farmed acreage or shift typical crops grown which could create a surplus of manure that will need to be exported off farm. Limits to application rates in sensitive areas could also create a surplus of manure.

Conservation Management Plan (CMP)

Conservation management practices reduce emission of air pollutants, one CMP must be selected for each identified CMP category.

- Typical Practices: Watering dirt roads, freestall barns, sprinklers on open corrals.
- Interaction with Other Regulations: Many practices require a significant amount of water. Freestall barns need additional capital to incorporate solid separation to reduce methane emissions. SGMA will increase the amount of fallowed land potentially increasing PM10.

Methane Emission Reductions (SB 1383)

The 2030 target for the dairy and livestock sectors is a reduction of 40 percent below 2013 levels.

- Typical Practices: Herd attrition, separate solids, anaerobic digesters.
- Interaction with Other Regulations: SGMA may help meet SB 1383 by reducing herd size. Total water use and methane emissions is impacted by the implemented waste management plan.

Economic Analysis Overview

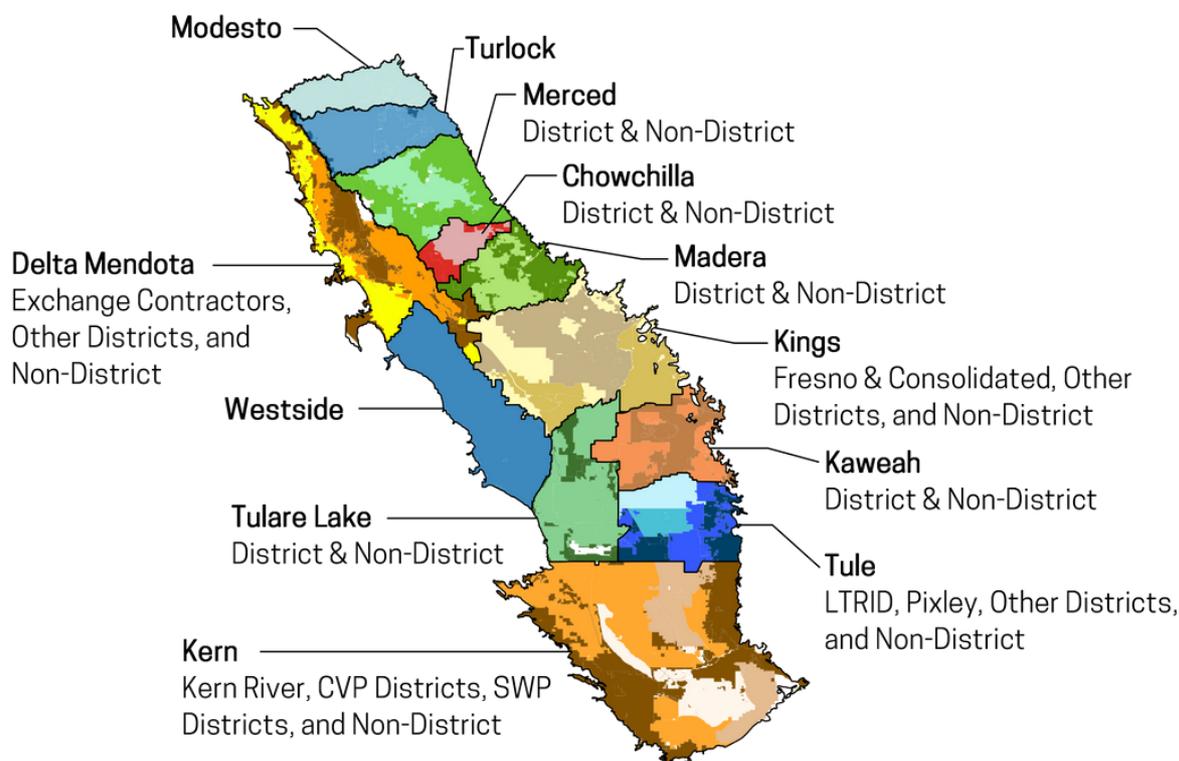
Economic impacts were quantified using a calibrated economic model of San Joaquin Valley crop, dairy, and beef cattle industries and a linked customized model to evaluate secondary impacts. The models were calibrated to GSA-level water budgets that account for planned projects, demand management, and historical water deliveries. Models use detailed enterprise budgets for baseline dairy and beef cattle production systems, costs, and returns to calibrate current market conditions for beef cattle and dairies (Figure 3). This data was developed through stakeholder interviews and supplemental published sources. The economic analysis quantified the following impacts of SGMA.

Direct Economic Impacts: The change in gross and net returns for San Joaquin Valley crops, dairies, and beef cattle.

Secondary Economic Impacts: The change in backward-linked supply chain businesses that provide inputs to these sectors and change in forward-linked businesses including beef and milk processing.

Figure 3: Modeling Regions

The figure illustrates the analysis regions. This analysis included GSA-level water budgets aggregated based on water supplies and costs. Regions reflect differences in access to and cost of groundwater, state and federal contract supplies, local water supplies, and GSP implementation.



Dairy and Beef Cattle Economic Impacts

The direct economic impact of SGMA is land fallowing due to water shortage and increasing water costs. This results in fewer crops produced, including dairy feed, and acreage on which to apply dairy manure. As dairy and crop production changes this affects businesses that provide inputs as well as forward-linked milk and beef processing sectors.

The economic impact of SGMA varies across the San Joaquin Valley (Figure 2). Impacts are greatest in regions that are fully dependent on groundwater (non-district lands) and generally tend to be greater in the Southern San Joaquin Valley where there are more dairies located in areas dependent on groundwater. Impacts also increase gradually over time because SGMA is not fully implemented until 2040. Potential energy cost savings from reduced pumping lifts and related SGMA benefits have not been quantified in this analysis.

Impacts occur gradually through 2040, with a cumulative 10% decrease in dairy herd, 7% reduction in fluid milk, and 7% change in gross output value.

The impact of SGMA occurs over time (Table 1). Estimated decrease in dairy herd is 1% by 2030 and a cumulative 10% by 2040, or 129,800 fewer cows. Milk production falls by less, with cumulative losses of 2.328 billion lbs of milk (7%) by 2040. Losses to beef cattle equal \$58 million in gross value by 2040.

Table 1: Impacts of SGMA on Key Dairy and Beef Metrics Over SGMA Implementation

Metric	Current Value	2030	2035	2040
Herd Size (million head)	1.35	1.34	1.31	1.22
Change (head)	0	-9,200	-31,600	-129,800
Percent Change	0%	-1%	-2%	-10%
Milk Production (billion lbs)	31.7	31.5	31.1	29.4
Change (billion lbs)	0	-0.223	-0.609	-2.328
Percent Change	0%	-1%	-2%	-7%
Milk Value (\$M)	\$6,981	\$6,932	\$6,847	\$6,469
Change (\$M)	\$0	-\$49	-\$134	-\$512
Percent Change	0%	-1%	-2%	-7%
Beef Value (\$M)	\$601	\$597	\$587	\$544
Change (\$M)	\$0	-\$4	-\$14	-\$58
Percent Change	0%	-1%	-2%	-10%

Economic Impact Summary

Including all secondary impacts across dairy and beef cattle sectors, the total annual output value loss at full SGMA implementation equals \$2.2 billion with 7,530 jobs lost. The study identified total fallowing of 388,000 acres, some of which are feed crops, with additional output value and job losses.

This SGMA impact analysis is the first to apply georeferenced data and detailed GSA water budgets and to analyze the link between feed crops to the value in milk production and nutrient management. The impact of SGMA on the San Joaquin Valley dairy and cattle sectors is less severe than previous studies have indicated. Dairy feed crops are not “low value” per unit water and in fact are equivalent in value to commonly cited “high value” crops such as nuts and vegetables.

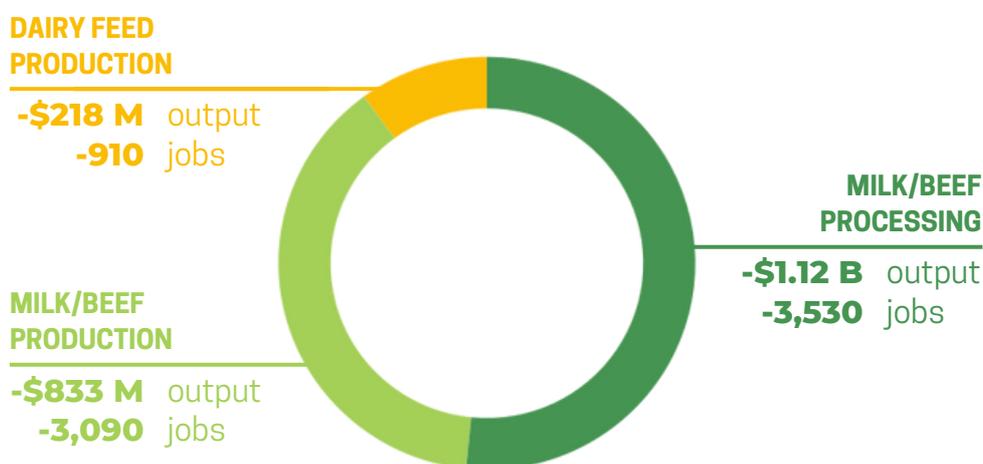
Dairy productivity continues to increase, supporting a smaller but more profitable industry in the long-run.

San Joaquin Valley dairy and beef cattle industries are adjusting to SGMA.

- Some smaller and older dairy facilities may shift from milking to young feeder operations with increased concentration in the industry.
- Dairies have moved rations away from hay to more wheat silage/straw due to water scarcity and high hay prices.
- Dairies are investing in on-farm water management to maximize farm water use and reuse.
- Dairies continue to invest in better manure management systems to reuse water and nutrients.

There are some positive changes for the industry as a result of SGMA. The dairy contraction due to market forces, SGMA, and other regulations plus adoption of alternative manure management plans and anaerobic digestors suggest that the industry may be on target to meet methane emission requirements in SB 1383. Better manure management systems have decreased dependency on synthetic fertilizers which also affects greenhouse gas emissions. Dairy productivity continues to increase, supporting a smaller but more profitable industry in the long-run.

SGMA Impacts on Total Output and Jobs



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