

THE POTENTIAL FOR GROWTH IN THE CALIFORNIA DAIRY/FORAGE INDUSTRY AND IMPLICATIONS OF THE 2002 FARM BILL.

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ABSTRACT/INTRODUCTION

As we enter the new millennium, and a new Farm Bill is debated in Congress among other important Congressional business, including an all-important economic stimulus for a teetering economy, many producers are wondering how the alfalfa industry will fare in the next decade or so.

While the alfalfa industry has experienced quite volatile markets in the last decade due to many aspects of the health of agriculture in general, many of the decisions alfalfa producers make rest on the growth and sustainability of the dairy industry to which it sells most of its product. The relationship between the alfalfa industry and the dairy industry is a symbiotic one. The dairy industries welfare depends heavily on the health of the alfalfa industry, and the health of the alfalfa industry depends, to a large extent, on the welfare of the dairy industry.

This paper explores briefly the potential for growth in the California dairy industry, and the implications of growth for the alfalfa industry. In addition we take a brief look at the possibilities of what will come out of the 2002 Farm Bill, and how that will affect the fortunes of the dairy industry, and, in turn, the fortunes of the alfalfa industry. We first take a quick look at the phenomenal growth of the California dairy industry within the context of the U.S. dairy industry. Then we examine some aspects of the potential for further growth of the dairy industry, and some of the factors that may mitigate growth. Finally, we take a brief look at the development of the 2002 Farm Bill.

U.S. AND CALIFORNIA TRENDS IN MILK PRODUCTION.

Milk production in the United States has increased over time in response to increases in both population and income. As table 1 shows, from 1950 to 2000 milk production in the U.S. increased by 44 percent, even while the number of milk cows declined, because milk production per cow increased rapidly. Since 1950, milk production per cow increased by 243 percent, while the number of milk cows decreased by 58 percent. Over the same time period, California milk production increased by 438 percent, milk production per cow increased 175 percent, and milk cow numbers increased by 96 percent.

Milk is produced and processed in every state, with more than half of total U.S. milk production since 1980 produced in five states: California, Wisconsin, New York, Pennsylvania, and Minnesota. Table 2 shows the percentage of milk produced in the top five milk-producing states from 1950 to 2000. Wisconsin dairy farmers produced more milk than any other state for about eighty years. California dairy farmers produced the fourth largest amount of milk in 1960, but moved past Wisconsin in milk production to become the largest milk producing state by 1994. Since surpassing Wisconsin, California milk production has continued to grow and in 2000 accounted for almost 20 percent of total U.S. milk production.

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Table 1. Milk Cows and Production of Milk in the U.S. and California

Year	Milk Cows (1,000 head)		Milk Per Cow (pounds)		Total Milk Production (million pounds)	
	U.S.	California	U.S.	California	U.S.	California
1950	21,944	777	5,314	7,710	116,602	5,991
1960	17,515	824	7,029	9,800	123,109	8,075
1970	12,000	755	9,751	12,384	117,007	9,350
1980	10,799	896	11,891	15,153	128,406	13,577
1985	10,981	1,041	13,024	16,102	143,012	16,672
1990	10,127	1,135	14,642	18,461	148,313	20,953
1995	9,466	1,294	16,405	19,573	155,292	25,327
2000	9,210	1,523	18,204	21,169	167,658	32,240

Source: U.S. figures from National Agricultural Statistics Service--*Milk and Milk Cow Series*. California figures from *California Dairy Information Bulletin*, December issues, and *California Dairy Industry Statistics*, annual issues.

Table 2. Milk Production in Top 5 States as Percent of U.S. Total Milk Production

State	1950	1960	1970	1980	1990	1995	2000
	(percent of U.S. milk production)						
Wisconsin	12.7	14.4	15.8	17.4	16.5	14.8	13.8
California	5.1	6.5	8.1	10.6	14.1	16.3	19.2
New York	7.6	8.3	8.8	8.5	7.5	7.5	7.1
Pennsylvania	4.8	5.6	6.1	6.6	6.7	6.8	6.7
Minnesota	6.9	8.3	8.2	7.4	6.8	6.1	5.7
Total 5 States	37.1	43.1	47	50.5	51.6	51.5	52.5
	(million pounds)						
U.S. Total	116,602	123,109	117,007	128,406	148,313	155,425	167,658

Source: National Agricultural Statistics Service--*Milk and Milk Cow Series*.

Consolidation of milk production onto fewer, larger farms has occurred in every state and region of the U.S., resulting in a 90 percent decline in the number of milk cow operations in the U.S. from 1965 to 2000. Table 3 documents the declining numbers of milk-producing farms during this period. Wisconsin farms with milk cows decreased by 61,000, or 72 percent, from 1965 to 1997. Meanwhile, California dairy farm numbers decreased by 8,500, or 75 percent, in the same 32-year period.

Table 3. Number of Dairy Operations

State	1965	1970	1980	1985	1990	1995	2000
(thousands)							
Wisconsin	86	64	45	41	33	28	21
California	11.3	7.2	5.6	5.2	4.5	3.3	2.4
New York	39	28	19	16.5	13	10	8.1
Pennsylvania	42	30	22	21	15.5	11.8	10.7
Minnesota	72	46	27	23	15.5	12	9.3
U.S.	1,107.7	647.9	334.2	271.9	193.8	139.7	116.4

Source: USDA/NASS--*Milk and Milk Cow Series*. These figures represent "Operations with milk cows."

As the number of dairy operations decreased, average herd size increased. Table 4 displays the increasing average herd size in the United States, as well as in California and Wisconsin, since 1959. According to the 1997 Census of Agriculture, the average herd size in Wisconsin was 59 cows, whereas the average herd size in California was 530 cows (the average California dairy herd size is much larger if only commercial dairies are counted). The difference in size between the average U.S. or Wisconsin dairy herd and the average California herd has been increasing in both absolute and relative terms.

Table 4. Average Herd Size: U.S., California and Wisconsin

Year	U.S.	California	Wisconsin
1959	9	39	20
1964	13	63	24
1969	20	98	28
1974	26	134	33
1978	33	173	37
1982	39	204	42
1987	50	295	47
1992	61	400	50
1997	78	530	59

Source: *Census of Agriculture*, USDA, various years.

Average milk production per cow in California is over 21,000 pounds compared to a national average of about 18,000 pounds. Only Washington and New Mexico cows have occasionally produced more milk per cow on average.

FACTORS OF DAIRY INDUSTRY GROWTH

Many factors have contributed to the phenomenal growth of California's dairy industry. While a detailed model explaining the evolution of the dairy industry is beyond the scope of this paper, there are some obvious factors that explain much of the robust growth of the California dairy industry. These include climate, complementary crop production, geographical isolation, continued population growth and continued advances in technological innovation.

Climate

California agriculture operates in an almost ideal climate with an abundance of natural resources. One advantage of this climate is that dairy cattle can be housed with little or no shelter. Indeed, California dairy farmers domestically pioneered the now common technologies of the milking parlor and dry-lot housing and/or free-stall barns. Dry-lots or simple shade barns represent a cost advantage over the more elaborate, and thus expensive, housing often used in colder regions. However, recent advances in animal husbandry have led to the adoption of open barns with retractable curtains in colder climates, and this advance partially mitigates the cost advantage that warmer climates, such as California, have enjoyed. The low humidity, especially during peak production times is also advantageous, for it is primarily humidity rather than heat that stresses cows, resulting in decreased milk production. Simple sunshades and inexpensive water-misters are all that cows require during California summers.

Complementary Crops

The California climate also contributes to the production of high quality alfalfa, and agricultural commodities whose by-products help to minimize the costs of milk production. The ability to grow high quality alfalfa in California results from the controlled nature of alfalfa production afforded by irrigation. While most other regions of the U.S. rely on rain to grow alfalfa, it generally does not rain in the Central and Imperial Valleys of California from May through October. However, a lack of winter precipitation in can create droughts, which result in a limited amount of water available for alfalfa and other crops.

More than 250 crops are produced by almost 78,000 farms on 7.8 million acres of harvested cropland in California, including more than half the U.S. output of fruits, nuts, and vegetables (Carter & Goldman, 1997). The dairy industry realizes an indirect benefit from this plethora of crops, and their by-products, serving as a residual market for those that do not make the grade, or for some other reason are not sold in their primary market. These by-products include but are not limited to cottonseed, almond hulls, and citrus pulp that often represent cost-effective alternatives to conventional feeds. To obtain these feed products, dairy farmers in other states and regions must pay added transportation costs.

Geographic Isolation

California is geographically isolated relative to other historical U.S. population and milk production centers, and this limits the amount of milk that flows into, or out of, the state. The Rocky and Sierra Nevada Mountain Ranges are a major obstacle to moving raw milk either east or west; the vast expanse of sparsely settled land to the east of California adds considerably to the costs of transporting milk. Thus, California has always had to assure itself of sufficient in-state processing capacity. In fact, the ultimate limit to California milk production is determined by the amount of processing capacity in-state. With the remarkable population growth in California in recent years, both production and processing capacity have increased without direct competition from outside states. While technology and population growth in surrounding states have changed in recent years, the infrastructure and efficiency of the California dairy industry were already in place to meet these challenges.

Population Explosion

California has a large and diverse population that provides some unique marketing opportunities for milk and dairy products as well as a diverse pool of labor for the industry. That a significant percentage of U.S. milk production has moved west and south over the past several decades is not surprising, for milk is heavy and perishable, and its production has parallels with population growth.

More than one in ten Americans now reside in California, and for much of the 1970s and 1980s, its population grew at twice the rate of the U.S. This population explosion had two principal effects on the size and structure of the dairy industry. First, it provided an ever-increasing demand for dairy products and thus an impetus for aggregate industry growth. Second, the growth of urban areas resulted in a fiscal windfall to dairy farmers who, because fluid milk is highly perishable, traditionally were located close to cities. These population effects generated wealth, in the form of land equity, available for the latest production technologies and for increases in herd size. Farms in southern California (e.g. the Chino Valley) that supplied milk to Los Angeles were able to sell land for high-priced urban uses and then relocate their dairies in the south Central Valley. These moves often resulted in significant increases in farm size and milk production because the wealth gained from land sales was reinvested to both take advantage of the latest production technology and avoid taxes. Related effects are discussed with respect to technology below.

Table 5. California and U.S. Population: 1850 to 1990

	California		U.S.	
	Population	Growth rate	Population	Growth rate
1850	92,597		23,191,876	
1860	379,994	31	31,443,321	3.6
1870	560,247	4.7	38,558,371	2.3
1880	864,694	5.4	50,189,209	3.0
1890	1,213,398	4.0	62,979,766	2.5
1900	1,485,053	2.2	76,212,168	2.1
1910	2,377,549	6.0	92,228,496	2.1
1920	3,426,861	4.4	106,021,537	1.5
1930	5,677,251	6.6	123,202,624	1.6
1940	6,907,387	2.2	132,164,569	0.7
1950	10,586,223	5.3	151,325,798	1.4
1960	15,717,204	4.8	179,323,175	1.9
1970	19,971,069	2.7	203,302,031	1.3
1980	23,667,764	1.9	226,542,199	1.1
1990	29,760,021	2.6	248,709,873	0.9
1998	33,494,000	1.6	272,874,781	1.2

Source: U.S. Census Bureau

Investment Timing and Technology Adoption

Where California started with respect to natural resources and when it started with respect to production technology are significant factors in explaining the size, structure, and efficiency of the California dairy industry today – especially relative to other states and regions. There is an economic concept termed ‘asset fixity’ that captures the essence of this advantage by explaining why investment and disinvestment by dairy farms may be discrete and asymmetric.

Though a rigorous dynamic explanation of dairy industry structural evolution is beyond the scope of this paper, it is worth noting that the dairy industry is relatively ‘young’ in California. Dairy production technology has not been stagnant in any recent time period and California dairy production increases corresponded with adoption of the current dominant production technology set. Regions with less temperate climates are rapidly adopting similar production technologies (i.e. parlors and free-stall barns) in recent years. However, adopting this technology during initial growth is different than changing technologies from an older set of production assets as it gives California the early adopter advantage on the ‘technology treadmill’.

Asset fixity with adjustment costs may explain capital movement, or lack of movement, over time. Adjustment costs are the costs associated with changing the capital stock such as the facilities and equipment needed on a modern dairy farm. Asset fixity occurs when returns to current use are higher than the salvage value of an asset, but current returns are not sufficient to make expansion profitable (Johnson, 1956). This asset fixity may partially explain the continued preponderance of stanchion barn use in the Midwest and Northeast United States. The opportunity costs of using these older, smaller facilities are low, but the current use is still higher than the salvage value, which is close to zero. The opportunity costs that may fix an asset in its current use range from opportunity costs between enterprises on a given farm to opportunity costs in other industries in a region.

When asset returns, salvage values, and acquisition prices differ across individuals or regions, as they have in California relative to other parts of the United States, growth rates and firm sizes differ. For example, new dairy farms are able to organize production according to current facilities and equipment acquisition prices and the expected path of prices, without regard to the past pattern of prices. Entering dairy farmers have the potential advantage of being more flexible in their choice of technology, scale of operation, and timing of entry. In contrast, the active dairy farmer has investment capital already sunk on the farm, and only the decisions on future investments or on currently reversible investments can be treated the way an entering farmer can treat the whole package. Because of sunk costs, and perhaps because of capital constraints and inertia as well, the tendency will be for active farmers to move slowly in changing technology than if previous investments could be easily reversed.

POTENTIAL FOR GROWTH IN THE CALIFORNIA DAIRY INDUSTRY.

Many of the factors that contribute to California’s potential for growth in the future are the same factors that have contributed to its growth in the past. These include climate, complementary crop production, geographical isolation, continued population growth and continued advances in technological innovation, as well as a unique milk marketing policy.

Of the above factors mentioned, climate, availability of complementary crops and geographical

isolation can be considered to be relatively constant in the next two decades. These factors will continue to contribute to the growth of the California dairy industry. In addition, little can be said about continued advances in technological innovation.

Technology will continue to be a powerful force in future dairy production, enabling dairymen to maintain or increase production in the face of regulatory and other constraints. Important advances are expected in biotechnology, information systems and robotics. In biotechnology and robotics, as well as more conventional developments in such as feed efficiency and dairy drainage systems, the role of publicly-funded research and extension has been crucial to the California dairy industry. To a large extent, the states higher rates of increased dairy productivity result from educational programs by the University of California and other institutions such as Cal-Poly, San Luis Obispo and California State University-Fresno. Unfortunately, both funding and scientist-years of effort for dairy research and extension have remained static or declined in recent years, with significant downturns in the mid-1980's and early 1990's.

One of the most significant factors in the growth of the California dairy industry has been the tremendous growth in the size and diversity of the population. California's population is currently 34 million, and recent projections forecast population growth to 40 million by 2010, and 46 million by 2020. To meet the demands of this increasing population assuming similar consumption habits of it's current population, milk production will have to expand from its current 32 billion lbs to about 40 billion lbs in 2010, and about 45 billion lbs in 2020, all other things remaining equal.

Much of the state's current growth is from immigration, particularly from Mexico and Southeast Asia. As a result, California's population diversity is increasing even faster than its growth. As reported in Table 6, by the year 2020, California's Hispanic population is expected to grow to 39% of the population, while Asians will grow to 14%.

Table 6. Percentage of California Population by Ethnic Origin, 1990-2040

	White	Hispanic	Asian/ Pacific Is. (percentage)	Black	American Indian
1990	57.2	26.0	9.2	7.0	0.6
2000	50.3	30.8	11.5	6.7	0.6
2010	44.8	34.9	13.3	6.4	0.6
2020	39.9	39.1	14.2	6.2	0.6
2030	35.1	43.5	15.0	5.8	0.6
2040	30.7	47.8	15.5	5.5	0.5

The states newer residents come with different cultures and values and have divergent food consumption patterns. For example, Hispanics drink more milk than anglos, and prefer whole milk rather than the lower fat milks preferred by whites. Asians, on the other hand, do not drink or eat much dairy product at all. These trends have varying impacts on the demand for milk and dairy products, but in general signal a continued growth in dairy production needs.

SOME MITIGATING GROWTH FACTORS

There are however a number of factors that may impact the California dairy industry's ability to grow. These include new environmental rules and regulations, water policy, and population/urban encroachment.

Environmental Laws

As public environmental awareness has developed, all forms of agriculture are being scrutinized. Given the urgency of many environmental issues and the increasing involvement of the public, it is not surprising that the highly visible dairy industry in the West has attracted attention.

In the 1970's, under the Porter-Cologne Act, California became subject to point source pollution restrictions and controls. In the early years of the law, the overextended regional boards tended to focus on chemical storage problems. But in the late 1980's and throughout the 1990's, dairy farms and their waste management systems became a top priority for scrutiny. Point and non-point source controls now affect the collection, storage and disposal of dairy wastes and regulate the amount of pollutants escaping into all water resources including estuaries, bays and the ocean. Recent changes in the many laws governing water quality in California have had profound effects on the current dairy waste management systems, and establishment of new dairy facilities in most areas of California.

Newly enacted Federal laws have also had increasingly onerous implications for dairy producers who do not abide by the rules and regulations for water and air quality.

Water Policy

Most environmental regulations on dairies have to do with water quality, but water quantity is also an issue. Water demands of a rapidly increasing population threaten agriculture's historic claims. Dairying per se is not a large user of water, but many of the agricultural industries that the dairy industry relies on for feeds are under pressure to reduce total water consumption. The chief water supply issue for dairying is the irrigation requirements for alfalfa. Dairy producers rely heavily on the high quality alfalfa that is grown in the state. Bringing alfalfa from elsewhere, except for some nearby states is an extremely costly venture. While California dairy producers have available large quantities of certain crop byproducts, which are often substituted when alfalfa prices are high, some of these by products – almond hulls and citrus pulp – are also from crops that are highly reliant on water.

Urban Competition and Encroachment

As California's urban population grows, more intense urban/rural conflicts are likely to erupt. Dairy farms are particularly vulnerable because they tend to be located relatively close to urban markets. Both human population and cow numbers are increasing fastest in the San Joaquin Valley – and so is regulatory pressure.

The availability and use of land for dairying will continue to be a contentious issue because of the expanding population, the urban/rural interface, and competing uses for the land. Dairying in the urban fringe can be costly in terms of land use zoning and taxes, as well as nuisance complaints from urban dwellers about odors, noise, dust and flies. There are also many and

varied environmental regulations that declare land unacceptable for dairy operations because of drainage problems and/or its unsuitability for waste management facilities.

THE 2002 FARM BILL

The dairy industry is one of the most highly regulated of all agricultural industries. Federal, state and local governments have all played a role to one extent or another, with the major emphasis shifting to the national level in recent years. Government intervention in the dairy industry has had a variety of goals including income redistribution, maintenance of environmental quality, price and production stability and orderly marketing. As a result, the U.S. and California dairy industries are now endowed with a complex network of rules and regulations, marketing orders, price supports, pooling arrangements and pricing mechanisms.

The dairy industry is the only agricultural industry that is protected by both a price support program and milk marketing orders. These programs, along with other programs, are mostly funded by U.S. taxpayers through Congressional allocations of funds. Every 5 years, or thereabouts, the dairy industry becomes involved in a series of hearings and debates designed to justify continued expenditures in these programs. And as the Farm Bill debates heat up in both the House and the Senate, the dairy industry learns how it will be regulated and supported over the ensuing 5 years. Over the last two farm bills, and particularly as a result of the 1996 Farm Bill, the dairy industry has heard an increasingly louder call by many member of Congress to put a stop to large expenditures on agricultural programs. Mostly these calls come from members who represent large metropolitan areas, or members who are concerned about the contradictions inherent in large expenditures in the agricultural sector when GATT/WTO ministrations call for decreasing farm expenditures. Whatever the reason, Congress has been moving in a direction that indicates that at some stage in the future, almost all government support programs for agriculture will come to a halt. Thus, it is with increasing intensity that the dairy industry lobbies Congressional members to continue their programs.

Hearings and meetings over the last six months have been held to garner some consensus about what the 2002 Farm Bill might contain. On October 5, 2001, the House of Representatives approved a draft Farm Bill by a vote of 291-120. The final version of the Farm Bill draft includes the following provisions:

- Re-authorization of the dairy price support program at \$9.90 per cwt.;
- Extension of dairy promotion assessments to imported dairy products, and elimination of the sunset date of the processor promotion program;
- 80% increase in conservation funding over current programs and elimination of size restrictions on Environmental Quality Incentive Program (EQIP) program;
- Dairy Export Incentive Program (DEIP) funding and increased funding for MAP funding, both export programs used by the dairy industry;
- Authorization for a Johne's Disease program for research, testing and education;
- Stronger language to improve the mandatory dairy price and inventory reporting system.

However, shortly after this, the Administration issued a strong statement indicating that they thought that it was inappropriate to be considering a Farm Bill at the present time, since the current Farm Bill does not expire until September 30, 2002. In a remarkably blunt statement, the White House said the proposed bill would cost too much - \$170 billion; last too long - 10 years;

encourage overproduction; jeopardize foreign markets; and lavish benefits on farm operations that need them the least.

The Senate has yet to add its particular spin to the 2002 Farm Bill. From what has been coming out of the Senate lately, it looks like we will see a much leaner version of the house version coming out, and with much more emphasis on the so-called WTO/GATT legal “green-box” payments – payments to farmers and ranchers for performing environmental services.

But one thing is for sure. Whatever we are seeing now is not anything like what the final product will be.

SUMMARY AND CONCLUSIONS.

California dairy production increased enormously in recent decades. However, none of the unique dairy policies explain the huge expansion of California dairy production; other factors have likely had a far greater effect.

Favorable climate, geography, natural resources, population growth and technology have influenced the size and performance of the California dairy industry. A mild climate provided a cost advantage in facilities and contributed to the abundance of crops that provide alternative feeds. Geographic isolation meant that fluid milk requirements must be met from within. The population explosion provided both an ever-increasing market demand and urban pressure that increased land equity and encouraged herd size increases. The timing of these population and income growth factors coincided with induced innovation and technology adoption that encouraged the formation of large, productive dairy farms.

The growth in the California dairy industry is likely to continue, at least for next two decades. All of the factors that have contributed to its growth in the past are unlikely to change, including dramatic changes in agricultural policy at both the Federal and state levels. There is little doubt that the dairy industry will experience woes and challenges as well as opportunities and victories. But overall the factors that drive growth are well beyond the level of short-term ups and downs that characterize all agricultural markets. Small adversities are unlikely to affect the health of the industry. And if the dairy industry is healthy, then the alfalfa industry can grow with it. But more importantly, if the alfalfa industry is healthy, then the dairy industry can also grow with it.