APPENDIX F

ECONOMIC ANALYSIS OF THE DAIRY INDUSTRY IN KINGS COUNTY

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ECONOMIC ANALYSIS OF THE DAIRY INDUSTRY IN KINGS COUNTY

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1. INTRODUCTION

PURPOSE OF THE STUDY

This report presents a discussion of the economic implications of growth in the dairy industry in Kings County. Funded through a State Community Development Block Grant (CDBG) Planning and Technical Assistance grant, the study is part of an effort by Kings County to develop a dairy element of the general plan that will provide a policy framework for addressing the economic and environmental requirements of this important industry. The analysis is based on a survey of dairies in Kings County and a projection of the economic multiplier effects of the dairy and milk processing industry in the county.

The overall goals of the general plan element and this study are to define the physical and economic carrying capacity of the dairy industry and to resolve the environmental issues necessary to ensure that continued growth in the industry meets Kings County standards. This study primarily contributes information about the economic characteristics of the industry in terms of the jobs and income that it generates. It also describes the short-term projections of growth by a sample of existing dairies along with the opportunities and constraints that dairies see for further industrial development in Kings County.

DAIRY INDUSTRY TRENDS

As is true in much of the food processing industry, milk production has seen steady and significant growth in productivity over the past forty years. Since 1959, the volume of milk production per cow has increased 117 percent, 18 percent since 1989. California is among the national leaders in this trend. Milk production per cow in our state was 17 percent above the national average in 1999. This has been the result of increasing herd sizes per dairy, up 44 percent since 1989, and more efficient barn designs and techniques for milking the cows as well as improvements in feed and care of the animals. Since 1959, the number of dairy farms in California has decreased 79 percent but milk production has increased 279 percent. California produces 19 percent of total US milk production.

Kings County has 125,000 cows, about eight percent of the total California herd. By comparison, Tulare County is the leading dairy county in the state, with about double the number of cows and milk production of Kings County. Tulare County also has seven of the ten milk processing facilities in the four-county South Valley region (Tulare, Kings, Fresno, Kern), although Leprino's announced expansion in Lemoore will significantly increase processing capacity in Kings County.

Milk processing is an important component of the industry, since only about 20 percent of milk is consumed in fluid form. Most is made into cheese (38 percent), followed by butter and condensed dry milk (32 percent) frozen deserts (five percent) and creams and cultured products including sour cream and cottage cheese (five percent). Fifty cheese producers in California create 130 varieties of cheese. This is a significant part of the overall trend toward more consumer demand for specialty foods that is driving much of the food processing industry to higher value-added products. California also produces 40 percent of the US consumption of ice cream.

Kings and Tulare counties have been leading the trend in productivity improvements. Tulare has the largest herd sizes per dairy in the state and in Kings county employment ranges from 80 to 90 cows per job, compared to 53 cows per job statewide. With the continued reduction in the number of dairies in Southern California, Kings County can expect increased new dairy development for the foreseeable future.

The study begins with a description of the results of the dairy survey in Kings County and then discusses countywide economic characteristics and projections for the industry.

2. DAIRY INDUSTRY SURVEY RESULTS

This chapter includes the dairy industry survey conducted in Kings County for this report. A mailed business survey was sent to all 149 of Kings County's dairies. The survey asked the dairies to describe themselves, and sought to add useful information to the impact analysis. The Tulare County Environmental Health Department, which regulates dairies in both Tulare and Kings counties, provided the listing of dairies.

Thirty-four of the 149 dairies responded, or about 23 percent of those sent surveys. Three weeks after mailing, over 100 phone calls were made to those who had not responded, which helped to generate a higher response rate. The response rate is typical of this type of survey, and as the analysis below demonstrates, the respondents are fairly representative of the industry as a whole in Kings County. Although not all of the respondents provided information for every question in the survey, the survey permits us to draw several useful conclusions about dairies, dairy operations, and the issues of concern dairy operators have. Mostly, as we shall see, the survey results confirm other information found within the Dairy Element.

The survey respondents represent 298 full-time and 13 part-time jobs (among 32 of the respondents), which translates to approximately one job per 90 milk cows. Total dairy employment in the county is estimated to be about 1,558, as discussed in the next section of the report. Accounting for the dairy proprietors themselves plus their reported employees, the survey respondents appear to represent a proportional amount of industry employment. This conclusion is reinforced by the fact that a selection of both large and small dairies in the county responded to the survey. The respondents reported an aggregate herd size of 26,635 milk cows, which is about 21 percent of the estimated total herd in Kings County of 124,557. The responding dairies occupy 1,589 acres, not including crop land they use. This represents one-third of the 4,756 estimated dairy land in the County. About 63 percent of the respondent dairies were started in 1978 or earlier. It is estimated that about 55 percent of all dairies in the county were started before 1979.

The following discussion highlights the finding from the survey. The complete results are provided in Appendix A, along with the survey instrument.

Facility Investments

The dairies were first asked what investments they have made, or are planning to make, in expanding their facilities, improving productivity, replacing equipment or responding to regulatory requirements. More than 80 percent of the respondent reported making such investments in 1999. The largest category of expenditure was $5 million in facility expansions reported by six of the respondents. Five also reported making productivity improvements for a

total of $1.6 million. Nine dairies said they had spent an average of $65,000 to upgrade equipment and six had spent an average of $50,000 on regulatory compliance.

Projected investments of these dairies were somewhat lower for the current year. The highest expenditure category was productivity improvements for about $2.2 million.

Over the following four years, the dairies expect to spend a total of about $5.3 million, mostly on additional productivity improvements. It is likely these expenditures reflect continuing technological improvements in the industry, as well as increased competition requiring increasingly efficient operations.

Growth Prognosis

Fifty-six percent of the respondents expect the industry to grow more slowly over the next two to three years compared to the past three years. Thirty-one percent expect the pace of growth to remain about the same and only six percent see the industry accelerating its growth pattern in the near future.

The herd size for the respondent group (32 dairies) included 26,538 milk cows in 1999. Twenty-nine of the respondents indicated that their herd size is up to 26,635 in 2000. Fifteen of the dairies, with a 2000 herd size of 20,505, or 77 percent of the total milk cows in the sample, projected their herd size to grow by 2,189 cows by 2004, an 11 percent increase. On an annual basis, this represents about a 2.6 percent growth rate.

The survey asked for the dairies' reasons for increasing or not increasing their herd sizes. The most often cited reason for increasing the herd was the need to increase efficiency, followed by the favorable price of milk. Six of the respondents (19 percent) said they have excess barn capacity and five (16 percent) cited the fact that technological improvements now make it possible for them to operate larger herds.

Relatively few of the respondents indicated they were not planning to increase their herd, and among these the most common reasons were the physical limitations of their plant, the lack of land for manure or water disposal, and the price of milk. On this latter point, eight dairies cited the price of milk as a reason to expand, while five used it as a reason not to.

Cooperative Affiliation and Milk Production

More than half of the respondents are part of California Dairies, Inc. and another six (19 percent) are with the Dairyman's Division of Land o' Lakes. Forty-seven percent send their milk to a local processor, amounting to 1,178,250 pounds per day.

For the current year, thirty of the respondents disclosed that they expect to produce nearly 421 million pounds of milk per year. On average, this is up about 10 to 11 percent over the reported production levels in 1999.

Twenty-four of the respondents reported on the percent of their capacity they are currently using. Ten reported being at 100 percent and another ten are at 80 percent or greater. Those responding to this question indicated they could add a total of 3,677 cows without needing a physical plant expansion.

Operations

Nearly half of the respondents operate on 20 acres or less, while about nine percent have 100 acres or more.

Nearly 60 percent spread dry manure on their own crop land and half sell excess manure to other farmers.

Seventeen of the respondents own land that they irrigate with water generated by the dairy, but two of these also lease land for this purpose. Sixty-three percent of the respondents only lease land to dispose of dairy water. Nine percent reported selling excess water to other farmers and three percent reported buying such water.

Three quarters of the respondents grow their feed on land adjacent to the dairy and 19 percent grow feed on non-adjacent lands they own. However, 66 percent also report buying feed from other farmers.

In terms of factors that are most important for the daily operation of the business, market conditions and feed costs were judged "critical" most often by the respondents. Regulatory compliance was judged "very important" by 47 percent, while interest rates were cited as "important" by 44 percent. These rankings were generally consistent with the findings of which factors are most difficult for dairies to control, with the exception of feed costs which dairies control through their own production.

Conclusion

The dairy industry experienced higher than average milk prices for the past two years. In 1998, this was due in part to poor climatic conditions that held down milk production, but in 1999 weather was good and many dairies enjoyed healthy financial conditions that allowed them to pay down debt, add employees and make investments in better equipment and facilities.[1] As

[1] California Department of Food and Agriculture, *Dairy Marketing Branch, California Cost of Milk Production Annual Summary 1999*. Sacramento, n.d.

1999 closed, milk prices dropped and are expected to remain closer to historical averages during the current year. In this context, it is understandable that a majority of survey respondents expect the industry to grow more slowly than it has in the past several years. However, the level of anticipated investment in productivity improvements is notable and the projected growth rate in milk cows for the next three years (2.6 percent) exceeds the average for the period from 1988 to 2000 (2.3 percent). The projected increase in milk production of nearly 11 percent over 1999 is also notable. Historically, milk production values per cow have risen about 1.8 percent per year on an inflation-adjusted basis. Finally, the ability of the County to address the environmental issues associated with dairy industry expansion will be very helpful based on the indication by two-thirds of the survey respondents that regulatory compliance is either "critical" or "very important" for the daily operations of their businesses.

3. KINGS COUNTY'S ECONOMIC BASE

In 1998, Kings County had a total of about 26,500 private sector wage and salary jobs.[2] This represents an 18 percent employment increase since 1991 (Table 1). About one-third of the county private sector employment base is in agricultural production, which includes dairy farms. The county produces another 1,650 jobs in food processing industries. Clearly, these food and fiber industries represent the strength of Kings County's overall employment base. Other growing industries that are part of Kings County's primary employment base include rubber/plastics manufacturing, gas and electrical utilities, and health services.

TABLE 1
WAGE AND SALARY EMPLOYMENT BY INDUSTRY GROUP
KINGS COUNTY, 1991 TO 1998

Industry Description	1991 Employment	1998 Employment
TOTAL EMPLOYMENT [a]	22,480	26,528
AGRICULTURE, FORESTRY, FISHING	6,121	9,048
Dairy Production	n/a	925
MINING	61	3
CONSTRUCTION	903	930
MANUFACTURING	3,322	3,359
Food Processing	1,443	1,650
Dairy Processing	200	286
TRANSPORTATION AND PUBLIC UTILITIES	768	818
WHOLESALE TRADE	767	987
RETAIL TRADE	6,116	5,563
FINANCE, INSURANCE, AND REAL ESTATE	650	695
SERVICES	3,743	5,125

[a] Does not include self-employed proprietors.
Source: ADE, data from MIG ES202 county database

In addition to these base industries, Kings County also has a number of emerging industries as well. These industries have shown recent employment growth, but have yet to assemble into a high concentration of employment that drives the county's economy. These emerging industries

[2] Data from Minnesota IMPLAN Group ES202 employment database.

GROWING INDUSTRIES AND CONCENTRATIONS OF EMPLOYMENT
KINGS COUNTY, 1991 TO 1998

	NON-GROWING INDUSTRIES		GROWING INDUSTRIES	
01	Agricultural production—crops	07	Agricultural services	HIGH EMPLOYMENT CONCENTRATION
		16	Heavy construction, except building	
		20	Food and kindred products	
		22	Textile mill products	
		30	Rubber and misc. plastics products	
		46	Pipelines, except natural gas	
		49	Electric, gas, and sanitary services	
		52	Building materials & garden supplies	
		53	General merchandise stores	
		54	Food stores	
		55	Automotive dealers & service stations	
		79	Amusement & recreation services	
		80	Health services	
13	Oil and gas extraction	17	Special trade contractors	LOW EMPLOYMENT CONCENTRATION
15	General contractors and operative builders	24	Lumber and wood products	
23	Apparel and other textile products	32	Stone, clay, and glass products	
25	Furniture and fixtures	36	Electronic & other electric equipment	
27	Printing and publishing	38	Instruments and related products	
28	Chemicals and allied products	47	Transportation services	
34	Fabricated metal products	48	Communication	
35	Industrial machinery and equipment	50	Wholesale trade—durable goods	
37	Transportation equipment	51	Wholesale trade—nondurable goods	
39	Miscellaneous manufacturing industries	58	Eating and drinking places	
41	Local and interurban passenger transit	61	Nondepository institutions	
42	Trucking and warehousing	62	Security and commodity brokers	
45	Transportation by air	64	Insurance agents, brokers, & service	
56	Apparel and accessory stores	65	Real estate	
57	Furniture and homefurnishings stores	72	Personal services	
59	Miscellaneous retail	73	Business services	
60	Depository institutions	75	Auto repair, services, and parking	
63	Insurance carriers	78	Motion pictures	
67	Holding and other investment offices	83	Social services	
70	Hotels and other lodging places			
76	Miscellaneous repair services			
82	Educational services			
86	Membership organizations			
87	Engineering & management services			

Source: ADE, data from MIG ES202 county employment database

include wholesale distribution, wood products, stone/glass/clay products, electronics, instruments, transportation services, and business services.

INDUSTRY OUTPUT AND INCOME

The 1998 total industry output, or the sales value of goods and services, for all private sector industries in Kings County is estimated to total about $2.3 billion (Table 2).[3] Calculated from an employment base of 26,500 jobs, this works out to about $88,200 of industrial output per job. The most productive industry groups in the county are agriculture and manufacturing, each of which accounted for over $725 million of industrial output.

Of the total industry output, dairy production accounted for about $302 million in 1998.[4] Also in 1998, dairy processing industries accounted for about $139 million. Even though dairy production accounted for about 3.5 percent of the private sector wage-and-salary employment in Kings County, dairy farm production generates 13 percent of the output. Accordingly, dairy processing industries generate about one percent of the jobs, but they account for six percent of the total private sector industrial output in Kings County.

Employee compensation accounts for about $552 million, or about 24 percent, of the total industrial output in Kings County. The industry groups accounting for over $100 million in payroll are agriculture, manufacturing, and services.

In 1998, dairy farm production accounted for about $19 million in payroll, while the processing industries accounted for about $12 million. The dairy production employment accounts for 3.5 percent of the countywide total employment and 3.4 percent of the payroll. For dairy processing industries, the payroll accounts for two percent of the countywide total, while dairy processing generates about one percent of the jobs. This indicates that the processing jobs have high employee incomes compared to the rest of Kings County.

Components of Industrial Output for Dairy Production and Processing Industries

As mentioned previously, two broad components make up industrial output: value added and commodity inputs. Commodity inputs consist of the goods and services that an industry needs to purchase in order to operate. For dairy production, examples of inputs include agricultural services, farm machinery, and feed. In addition, the dairy production and

[3] Industry output derived from data in the IMPLAN input-output model. The estimated outputs are calculated based on the average output per employee for each industry sector. Industry output represents the sum of total commodity inputs (cost of goods sold) and total value added. Value added includes labor income, property income, and indirect business taxes.

[4] The 1998 dairy production figure is reported at $321 million in the Kings County Crop Report, and is adjusted to 1999 dollars using the producer price index.

TABLE 2
PRIVATE SECTOR EMPLOYMENT, PAYROLL, AND INDUSTRY OUTPUT
KINGS COUNTY, 1998

Industry Description	1998 Employment	Percent of Employment	1998 Payroll	Percent of Payroll	Estimated Industry Output	Percent of Output
TOTAL EMPLOYMENT	26,528	100.0%	$551,873,014	100.0%	$2,340,911,074	100.0%
AGRICULTURE	9,048	34.1%	$146,147,395	26.5%	$780,710,336	33.4%
Dairy Production	925	3.5%	$18,742,608	3.4%	$302,253,552	12.9%
MINING	3	0.0%	$30,080	0.0%	$551,700	0.0%
CONSTRUCTION	930	3.5%	$27,815,202	5.0%	$77,958,845	3.3%
MANUFACTURING	3,359	12.7%	$107,436,728	19.5%	$727,981,022	31.1%
Dairy Processing	286	1.1%	$11,583,864	2.1%	$138,944,945	5.9%
TRANSPORTATION AND PUBLIC UTILITIES	818	3.1%	$26,851,128	4.9%	$146,128,451	6.2%
WHOLESALE TRADE	987	3.7%	$29,486,652	5.3%	$44,938,150	1.9%
RETAIL TRADE	5,563	21.0%	$87,211,808	15.8%	$253,283,614	10.8%
FINANCE, INSURANCE, AND REAL ESTATE	695	2.6%	$16,201,517	2.9%	$36,942,350	1.6%
SERVICES	5,125	19.3%	$110,692,504	20.1%	$272,416,607	11.6%

Source: ADE, data from MIG ES202 county database, Kings County Crop Report, and the IMPLAN input-output model.

Note: Industry output represents estimates calculated from the average output per employee for each industry group. This calculation was done independently from the payroll, which comes directly from the ES202 database of wage and salary employment. Payroll only accounts for wage and salary income, and does not include proprietor income and property income. The output for dairy production was adjusted to the producer price index.

processing industries in Kings County can either procure necessary commodity inputs locally or they may need to import their inputs from outside the county if the commodities are unavailable or insufficiently supplied by local industries.

As implied by the name, value added refers to the amount of value that the activities of a particular industry add to their commodity inputs. Value added consists of employee income, proprietary income from self-employment, property income, and indirect business taxes. For dairy processing, one major commodity input is milk, and the transformation of this commodity into a finished product such as cheese represents the value that dairy processing industries add to the commodity.

Kings County's dairy production output in 1998 totaled approximately $302 million, and about $225 million of this output comes from the total commodity inputs purchased by the industry (Table 3). The majority of the inputs into the dairy production industry, worth about $168 million, come from outside of Kings County. This implies that many of the major commodities

purchased by the local dairy production industry are not currently produced in Kings County. The remainder of the output in dairy production comes from value added. The 1998 wage and salary income for dairy production totals about $19 million, while self-employment income comes out to $36 million. Agricultural industries in general have a very high proportion of self-employment, and the dairy production sector in Kings County follows this pattern.

TABLE 3
COMPONENTS OF INDUSTRIAL OUTPUT FOR DAIRY PRODUCTION AND PROCESSING INDUSTRIES IN KINGS COUNTY, 1998

Components of Industrial Output	Dairy Production	Dairy Processing
VALUE ADDED		
Employee Income (Wage and Salary)	$18,742,608	$11,583,864
Income From Self-Employment	$35,554,648	$362,402
Other Value Added	$23,142,010	$12,423,410
COMMODITY INPUTS		
Local Inputs	$56,764,326	$65,765,520
Other Inputs	$168,049,960	$48,809,749
TOTAL INDUSTRIAL OUTPUT	$302,253,552	$138,944,945

Source: ADE, data from Kings County, ES202 county employment database, and IMPLAN input-output model

Notes: Wage and salary income come from the ES202 database, while self-employment income and other value added (property income and indirect business taxes) are derived from data in the input-output model.

Local inputs consist of commodity purchases made by Kings County dairy production and processing industries that come from other Kings County industries. Other inputs are any commodity purchases that come from anywhere outside of Kings County, and can include overseas imports.

For the dairy processing industries, the amount of output that comes from commodity inputs is substantially higher. This is because dairy processing is more of a mechanized manufacturing industry that requires substantial investment in facilities. In addition, the primary inputs into dairy processing come from dairy farms, as well as other dairy processors. Of the total dairy processing output of $139 million, commodity inputs make up $115 million of the total. Unlike dairy farms, which need to import the majority of their commodity inputs from outside of Kings County, about 57 percent of the commodities purchased by Kings County dairy processors are supplied by local industries. Much of this is due to the prevalence of local dairy production in Kings County, which supplies 74 percent of the milk and primary dairy commodities consumed

by the dairy processing industries.[5] The remainder of the output comes from value added, and in this case the dairy processing industries also have very different characteristics from dairy farm production. As with most manufacturing industries, the workforce in dairy processing consists almost entirely of wage and salary employees with minimal self-employment. The 1998 employee income in Kings County dairy processing industries totals about $11.6 million, while the self-employment income comes out to less than $0.4 million.

[5] Data comes from the IMPLAN input-output model.

4. DAIRY INDUSTRY PROJECTIONS

Under existing land use capacities, the estimated maximum holding capacity for dairy farming in Kings County is approximately 369,400 dairy cows, which represents nearly a three-fold increase from the current herd size of 124,700. For the past twelve years from 1988 to 2000, the milk cow herds have grown at an average annual rate of about 2.3 percent. Accounting for the year-to-year variation in the herd size[6], the ten-year growth trend projects a herd size of about 156,900 by 2010, and a herd size of about 197,400 by 2020. At this rate of growth, Kings County is projected to reach the maximum herd capacity around 2047. The following sections discuss the employment, output and income implications of this growth.

DAIRY PRODUCTION INDUSTRY

Employment

The local dairy production industry is estimated to have increased its employment base by over 300 jobs between 1995 and 2000, which represents an annual growth rate over four percent during this time period.[7]

TABLE 4
EMPLOYMENT (INCLUDING PROPRIETORS) AND HERD SIZE TRENDS IN DAIRY PRODUCTION
KINGS COUNTY, 1995 TO BUILDOUT

Dairy Production Industry Trends	Employment (Including Self-Empl.)	Dairy Cow Herd Size (Head)
1995	1,226	101,530
1998	1,336	106,845
2000 (Estimated)	1,558	124,667
2010 (Projected)	1,961	156,869
2020 (Projected)	2,467	197,386
At Buildout (Projected)	4,617	369,383

Source: ADE, data from Kings County and MIG ES202 county employment database
Note: Employment totals include wage-and-salary employees and proprietors

[6] Data for the increases in Kings County dairy cow herd come from the County. The assumed 2.3 percent annual growth rate was calculated using a regression equation that accounts for the variation in the herd size during different years from 1988 to 2000.

[7] This employment estimate is based on data from the ES202 database, Kings County Dairy Industry Survey and the IMPLAN input-output model. The dairies included in the survey sample reported about 90 dairy cows per employee. The input-output model assumes that about 33 percent of the total employment comes from self-employment. The analysis assumes 80 dairy cows per worker after including self-employment.

Future employment growth in dairy production employment will track with the projected increases in dairy cow herd size. With a projected herd size of 156,900 dairy cows by 2010, the resulting employment is estimated at 1,960 jobs. By 2020, the projected herd of 197,400 head could add over 900 new dairy production jobs. At buildout, the estimated job growth resulting from the increased herd size could add over 3,000 new dairy production jobs.[8] The actual number of new jobs could be less, depending on the degree to which technological improvements lessen the number of workers required to tend the herds.

Employment Multiplier Effects

By using an input-output model, the multiplier effects on employment generated by the dairy production industry were estimated.[9] Assuming that dairy farms in Kings County have a 2000 employment base of about 1,560 jobs (including self-employment), the input-output model estimated that dairy production generates an additional 1,810 indirect jobs and 610 induced jobs (Table 5). By 2010, the multiplier effects will result in 2,660 indirect jobs and 890 induced jobs, and by 2020 the multiplier effects will result in 3,750 indirect jobs and 1,280 induced jobs. When Kings County reaches its maximum theoretical herd size, the multiplied job base could go as high as 4,620, at which time the multiplier effects of the industry will result in a total of 6,750 indirect jobs and about 3,055 induced jobs.

TABLE 5
PROJECTED EMPLOYMENT MULTIPLIERS FROM KINGS COUNTY DAIRY FARM PRODUCTION , 2000 TO BUILDOUT

Year	Direct Employment (1)	Indirect Employment (2)	Induced Employment (3)	Total
2000 (Estimated)	1,558	1,807	608	3,973
2010 (Projected)	1,961	2,659	888	5,508
2020 (Projected)	2,467	3,751	1,280	7,498
At Buildout (Projected)	4,617	6,751	3,055	14,422

Source: ADE, data from Kings County and IMPLAN input-output model

Notes: (1) Direct employment refers to the total number of dairy production jobs in Kings County for a particular year.
(2) Indirect employment refers to the jobs generated by supplier purchases made by Kings County dairy farms.
(3) Induced employment results from purchases made by dairy farm production workers.

[8] The estimated number of new jobs assumes that the balance between herd size and employment base will remain roughly the same.

[9] The input-output model used in the analysis is the IMPLAN Impro 2.0 application. The dataset in the model corresponds to the 1996 BEA input-output structural matrix.

The indirect jobs result from supplier purchases made by dairy farms. These supplier purchases are otherwise known as commodity inputs. More than half of the indirect jobs generated by dairy production are in agricultural services (Table 6). In addition to the indirect jobs in agricultural services, the Kings County dairy production industry also generates significant indirect jobs in hay production, wholesale trade, motor freight, feed grains, and maintenance.

TABLE 6
PROJECTED INDIRECT EMPLOYMENT MULTIPLIERS FROM KINGS COUNTY DAIRY FARM PRODUCTION, 2000 TO BUILDOUT

Industry	2000 Indirect Employment	2010 Indirect Employment	2020 Indirect Employment	Indirect Employment At Buildout
Total Indirect Employment	1,807	2,659	3,751	6,751
Agricultural Services	1,027	1,535	2,276	4,242
Hay and Pasture	243	362	434	451
Wholesale Trade	158	221	299	562
Motor Freight Transport and Warehousing	103	140	183	311
Maintenance and Repair Other Facilities	36	53	74	166
Feed Grains	35	53	63	66
All Other Industries	204	296	421	953

Source: ADE, data from Kings County and IMPLAN input-output model
Notes: Indirect employment refers to the jobs generated by supplier purchases made by Kings County dairy farms.

In addition to indirect jobs that come from buyer-supplier relationships, employment in the dairy production industry also generates induced jobs. These jobs result from purchases made by employees. Because households make these purchases, the induced jobs are primarily generated in local-serving industries, such as retail trade, and personal and health services (Table 7).

Output Multiplier Effects

Based on the current herd size, direct industrial output for the dairy production industry in Kings County totals $352 million. For 2000, the supplier industries to the dairy production industry generate an additional $76 million in indirect outputs, as a result of supplier purchases from dairy farms. In addition, purchases made by dairy farm production employees generates an additional $38 million in induced industry output.

For future projections, ADE assumed that the production value generated by each dairy cow will increase at an annual rate of 1.8 percent. This increase follows the recent real increases in production by the Kings County herd, and accounts for year-to-year production fluctuations as

well as inflation.[10] The total increase in dairy production value adds together the production increase per cow, and projected additions to the herd.

The ten-year projection indicates that the direct industry output for dairy farm production in Kings County will increase to $530 million by 2010, with the total multiplied industry output increasing to $695 million. By 2020, the direct output is projected to increase to $797 million, with the total multiplied output going up to $1.03 billion (Table 8). At buildout, the projected direct dairy production industry output is $2.4 billion, with a total multiplied industry output of $2.9 billion.

TABLE 7
PROJECTED INDUCED EMPLOYMENT MULTIPLIERS FROM KINGS COUNTY DAIRY FARM PRODUCTION, 2000 TO BUILDOUT

Industry	2000 Induced Employment	2010 Induced Employment	2020 Induced Employment	Induced Employment At Buildout
Total Induced Employment	608	888	1,280	3,055
Eating/Drinking Places	86	127	184	454
Automotive Dealers & Service Stations	41	60	87	216
Hospitals	41	60	87	215
Miscellaneous Retail Stores	39	58	84	207
Doctors and Dentists	39	57	83	206
General Merchandise Stores	39	57	82	204
Food Stores	31	45	65	161
Nursing and Protective Care	26	38	56	138
Domestic Services	18	27	39	97
Banking	17	25	36	78
All Other Industries	231	335	477	1,080

Source: ADE, data from Kings County and IMPLAN input-output model
Notes: Induced employment refers to the jobs generated by household purchases made by Kings County dairy farm employees.

[10] Data for the increases in production per dairy cow in Kings County come from the Kings County Crop Report. These figures were adjusted to 1999 dollars using the producer price index (at the time of the analysis, PPI figures for 2000 were not available). The 1.8 percent annual growth rate was calculated using a regression equation that accounts for the variation in production during different years.

TABLE 8
PROJECTED OUTPUT MULTIPLIER EFFECTS FROM KINGS COUNTY DAIRY FARM PRODUCTION, 2000 TO BUILDOUT

Year	Direct Output (1)	Indirect Output (2)	Induced Output (3)	Total Dairy Production Industry Output
2000 (Estimated)	$352,495,008	$76,470,955	$37,597,091	$466,563,042
2010 (Projected)	$530,112,992	$110,357,739	$54,851,410	$695,322,148
2020 (Projected)	$797,230,016	$153,552,515	$78,853,507	$1,029,636,049
At Buildout (Projected)	$2,414,436,096	$295,112,072	$186,247,394	$2,895,795,688

Source: ADE, data from Kings County and IMPLAN input-output model
Notes: (1) Direct output refers to the entire industry output for dairy production in Kings County during a given year.
(2) Indirect output refers to the economic activity generated by supplier purchases made by Kings County dairy farms.
(3) Induced output results from household purchases made by dairy farm production workers.

Income Multiplier Effects

As part of the overall output, the input-output model calculated the labor income that would result from projected job growth in dairy production.[11] For the base year 2000, the nearly 4,000 direct, indirect, and induced jobs (from Table 5) generate about $106 million in total income, which includes both wage-and-salary workers and proprietors (Table 9). The direct dairy production jobs account for over half of the total income, with $63 million in 2000. In future years, the total multiplied labor income is projected to increase to $157 million by 2010 and $231 million by 2020. At buildout, the job growth is expected to generate a total multiplied labor income of $616 million, of which $434 million will result from dairy farm employment.

DAIRY PROCESSING INDUSTRIES

Employment

In 1998, dairy processing (SIC 202) accounted for 286 jobs, or about 17 percent of the total food processing employment in Kings County.[12] This represents a 40 percent increase over the 200 dairy processing jobs in 1991 and an average annual growth of about five percent. The growth rate for the dairy processing industries was also higher than the employment increase for all food processing industries in the county. The 1998 ES202 database identified a total of three

[11] Labor income includes both earnings by wage and salary employees, and self-employment income.
[12] Data from Minnesota IMPLAN Group ES202 employment database.

food processing establishments that primarily produce dairy products. Ignoring the actual size differences, this results in an average of 95 employees per dairy processing establishment.

TABLE 9
PROJECTED INCOME MULTIPLIER EFFECTS FROM KINGS COUNTY DAIRY FARM PRODUCTION, 2000 TO BUILDOUT

Year	Income From Direct Jobs (1)	Income From Indirect Jobs (2)	Income From Induced Jobs (3)	Total
2000 (Estimated)	$63,309,002	$28,427,237	$14,104,358	$105,840,601
2010 (Projected)	$95,210,002	$41,156,979	$20,603,088	$156,970,069
2020 (Projected)	$143,186,000	$58,138,458	$29,672,266	$230,996,727
At Buildout (Projected)	$433,644,976	$111,989,246	$70,630,373	$616,264,585

Source: ADE, data from Kings County and IMPLAN input-output model

Notes: Income includes both employee compensation and proprietor income.
(1) Income from direct jobs refers to the total income from dairy production employment in Kings County for a particular year.
(2) Income from indirect employment refers to income generated by supplier purchases made by Kings County dairy farms.
(3) Income from induced employment results from household purchases made by dairy farm production workers.

By comparison, Tulare County dairy processing industries accounted for about 1,120 jobs in 1998. However, this total represents a 34 percent decline from the 1991 employment total of nearly 1,690 jobs. The entire loss in dairy processing can likely be attributed to the closure of the Kraft cheese production plant in Tulare in 1995, which eliminated 500 jobs. This single plant closing event negated an overall pattern of growth in dairy processing. Growth in the early 1990s was also slowed by high grain prices and lower wholesale milk prices, but recent growth trends have shown improvement. In the first half of 1999 cheese production grew 11 percent over the same period in 1998.[13] Even with this recent decline, Tulare County's economic base is still more oriented towards dairy processing than Kings County. For example, Kings County has roughly four dairy production jobs for every dairy processing job, while Tulare County has closer to two dairy production jobs for every dairy processing job.

The projection for dairy processing in Kings County shows the employment in this industry increasing to about 540 through 2010 (Table 10). A more moderate projection that accounts for the lower projected statewide growth trends in the industry projects that dairy processing employment in Kings County will increase to about 420 jobs. By 2020, the overall employment base for dairy processing industries is projected to range from 570 to 930 jobs.

[13] Associated Press Newswire, 10/03/99

TABLE 10
EMPLOYMENT TRENDS IN DAIRY PROCESSING INDUSTRIES
KINGS COUNTY, 1991 TO 2020

Dairy Processing Industry Trends By Year	Employment (Jobs)
1991	200
1995	203
1998	286
2010 (High Projection)	542
2020 (High Projection)	925
2010 (Moderate Projection)	416
2020 (Moderate Projection)	568

Source: ADE, data from MIG ES202 county employment database, and EDD Labor Market Information Division

This projection is based on California Labor Market Information Division projections, and recent trends.[14]

Results from the input-output model indicate that the dairy processing industry has very high multiplier effects. Using the 1998 employment base of 286 jobs, indirect jobs generated by the industry total about 700 (Table 11). Over 300 of the indirect jobs resulting from buyer-supplier relationships with dairy processing establishments were in dairy production. By 2010, the projected new dairy processing jobs will boost the indirect employment past 1,000 jobs. By 2020, the indirect employment is projected to range from 1,400 to 2,280 jobs.

Clearly, the production and processing functions of dairy are very related. However, the relationship has a directional flow to it: dairy production supplies the dairy processing industry, but not the other way around. Other significant supplier industries to the dairy processors include agricultural services, wholesale trade, hay production, motor freight, and other dairy processing industries (Table 12).

TABLE 11
PROJECTED MULTIPLIER EMPLOYMENT FROM KINGS COUNTY DAIRY PROCESSING INDUSTRIES , 1998 TO 2020

Year	Direct Employment	Indirect Employment	Induced Employment	Total

[14] California Labor Market Information Division projections are done at both the state and county levels. The statewide projections have a time horizon of 1998 to 2008, and have considerably more detail than the county projections, which go from 1995 to 2002 and do not define industries beyond the 3-digit SIC code level. The high projection estimates the detailed growth rate for SIC 202 by using the projected county growth rate for SIC 20 and the existing proportional difference in growth rates between SIC 20 and SIC 202. The moderate projection combines the statewide projection with the county projection.

	(1)	(2)	(3)	
1998	286	704	236	1,226
2010 (Moderate Projection)	416	1,023	343	1,782
2020 (Moderate Projection)	568	1,398	468	2,434
2010 (High Projection)	542	1,335	447	2,325
2020 (High Projection)	925	2,278	763	3,966

Source: ADE, data from Kings County and IMPLAN input-output model

Notes: High projection assumes an average annual growth rate of 5.5 percent., which is close to the growth trend between 1991 and 1998. This growth rate assumes a constant relationship between the respective growth rates for food processing (SIC 20) and dairy processing (SIC 202). Moderate projection assumes an average annual growth rate of about 3.2 percent. This accounts for the lower rate of growth projected for dairy processing industries throughout the rest of California.

(1) Direct employment refers to the total number of dairy production jobs in Kings County for a particular year.

(2) Indirect employment refers to the jobs generated by supplier purchases made by Kings County dairy farms.

(3) Induced employment results from purchases made by dairy farm production workers.

TABLE 12
PROJECTED INDIRECT EMPLOYMENT FROM KINGS COUNTY DAIRY PROCESSING INDUSTRIES, 1998 TO 2020

Supplier Industry	1998 Indirect Employment	2010 Indirect Empl. (Moderate)	2020 Indirect Empl. (Moderate)	2010 Indirect Empl. (High)	2020 Indirect Empl. (High)
Total Indirect Employment	704	1,023	1,398	1,335	2,278
Dairy Farm Products	310	451	616	588	1,003
Agricultural, Forestry, Fishery Services	115	166	227	217	371
Wholesale Trade	64	93	128	122	208
Other Dairy Processing	35	51	70	66	114
Hay and Pasture	27	39	53	51	87
Motor Freight Transport and Warehousing	23	33	45	43	73
Banking	13	19	27	25	43
All Other Industries	33	49	66	63	108

Source: ADE, data from Kings County and IMPLAN input-output model

Note: Indirect employment refers to the jobs generated by supplier purchases made by Kings County dairy farms.

In addition, employment generated by dairy processing activities account for 236 induced jobs. By 2020, the projected dairy processing employment shows increased the induced employment to between 470 and 760 jobs (Table 13). As with the induced jobs related to dairy production,

the induced jobs from the dairy processing industry are primarily in local-serving retail and services industries.

Output Multiplier Effects

Dairy processing activities in Kings County generated a direct output total of $139 million in 1998 (Table 14). Because dairy processing activities require substantially more commodity inputs than dairy farm production, the indirect outputs reflect this higher demand with a total of $84 million. Altogether, the 1998 total multiplied dairy processing output comes out to $238 million. Under the moderate growth projection, the direct industry output is expected to increase to $202 million by 2010 and to $276 million by 2020. The projected total multiplied outputs for dairy processing should total about $346 million by 2010 and $472 million by 2020. With the high growth projection, the direct output is expected to increase to $263 million by 2010 and $450 million by 2020.

TABLE 13
PROJECTED INDUCED EMPLOYMENT FROM KINGS COUNTY DAIRY PROCESSING INDUSTRIES, 1998 TO 2020

Supplier Industry	1998 Employment	2010 Indirect Empl. (Moderate)	2020 Indirect Empl. (Moderate)	2010 Indirect Empl. (High)	2020 Indirect Empl. (High)
Total Induced Employment	236	343	468	447	763
Eating & Drinking	33	48	66	63	108
Automotive Dealers & Service Stations	16	23	31	30	51
Hospitals	16	23	31	30	51
Miscellaneous Retail	15	22	30	29	49
Doctors and Dentists	15	22	30	29	49
General Merchandise Stores	15	22	30	28	48
Food Stores	12	17	23	22	38
Nursing and Protective Care	10	15	20	19	33
Domestic Services	7	10	14	13	23
Banking	7	10	14	13	22
All Other Industries	90	131	179	171	292

Source: ADE, data from Kings County and IMPLAN input-output model

Note: Induced employment refers to the jobs generated by household purchases made by Kings County dairy farm employees.

TABLE 14
PROJECTED OUTPUT MULTIPLIER EFFECTS FROM KINGS COUNTY DAIRY PROCESSING INDUSTRIES, 2000 TO 2020

Year	Direct Output (1)	Indirect Output (2)	Induced Output (3)	Total Dairy Processing Industry Output
1998	$138,944,945	$84,088,051	$14,742,930	$237,775,925
2010 (Moderate Projection)	$201,966,401	$122,227,978	$21,429,902	$345,624,278
2020 (Moderate Projection)	$275,904,984	$166,974,840	$29,275,250	$472,155,064
2010 (High Projection)	$263,499,171	$159,466,978	$27,958,915	$450,925,069
2020 (High Projection)	$449,586,149	$272,084,867	$47,703,910	$769,374,932

Source: ADE, data from Kings County and IMPLAN input-output model

Notes: (1) Direct output refers to the entire industry output for dairy processing in Kings County during a given year.

(2) Indirect output refers to the economic activity generated by supplier purchases made by Kings County dairy processing industries.

(3) Induced output results from household purchases made by dairy processing industry workers.

Income Multiplier Effects

The direct employment (including self-employment) in the dairy processing industries generated about $12 million of labor income in 1998 (Table 15). Labor income resulting from supplier and employee household purchases added $26 million, resulting in a total multiplied labor income of $38 million when accounting for direct, indirect, and induced employment. The moderate employment growth projection shows labor income increasing to $56 million per year by 2010, and up to $76 million annually by 2020. With the high employment growth projection, the total multiplied labor income in 2010 grows to nearly $73 million per year, and by 2020 grows to about $124 million per year.

TABLE 15
PROJECTED INCOME MULTIPLIER EFFECTS FROM KINGS COUNTY DAIRY PROCESSING INDUSTRIES, 2000 TO 2020

Year	Annual Income From Direct Jobs (1)	Annual Income From Indirect Jobs (2)	Annual Income From Induced Jobs (3)	Total Labor Income
1998	$11,946,266	$21,332,646	$5,143,432	$38,422,346
2010 (Moderate Projection)	$17,364,751	$31,008,524	$7,476,347	$55,849,623
2020 (Moderate Projection)	$23,721,873	$42,360,544	$10,213,388	$76,295,804
2010 (High Projection)	$22,655,241	$40,455,839	$9,754,153	$72,865,231
2020 (High Projection)	$38,654,702	$69,026,344	$16,642,679	$124,323,726

Source: ADE, data from Kings County and IMPLAN input-output model

Notes: Income includes employee compensation and proprietor income.

(1) Income from direct jobs refers to the total income from dairy production employment in Kings County for a particular year.

(2) Income from indirect employment refers to income generated from supplier purchases made by Kings County dairy farms.

(3) Income from induced employment results from household purchases made by dairy farm production workers.

5. FISCAL IMPACTS

The dairy industry contributes property taxes to the County budget and expenditures by dairy employees contribute sales taxes and other public revenues both directly and through multiplier effects. This preliminary analysis focuses on the property tax revenue, and is based on recent dairy development history in Tulare County, since comprehensive tax records of dairy properties in Kings County are not available.

The Tulare County Assessor's office reports a range of assessed values for mid size dairies built in the 1990s and larger dairies built more recently.[15] For dairies with approximately 1,500 milk cows, typical assessed values per cow range from $1,000 to $1,200 for real property, not including land, equipment or associated residences. For larger dairies in the range of 3,000 to 7,000 cows, these figures have ranged from $1,600 to $2,500 per cow. Equipment costs are more uniform, at about $275 per cow using up to date equipment. All of these figures tend to increase over time due to constant improvements in technology that increase the mechanization of the industry.

There is tremendous variation in assessed land values in the industry, as for most agricultural property. The characteristics of the soils, the location of the property, and the presence of Williamson Act contracts or other agricultural easements all affect land values. Also, the fact that many dairies in Kings County have remained in single ownership for many years, tends to depress assessed values well below current market values, due to assessment procedures instituted by Proposition 13. In Tulare County, assessed values tend to range from $3,000 to $6,000 per acre but can go as high as $8,000 per acre in certain locations.[16] Kings County has seen similar land values.

For this analysis, we have used mid-range values to approximate existing and projected property taxes generated by the dairy industry. It is likely that this approach somewhat overestimates the current revenue generated by the industry since many existing assessed values may reflect market prices of twenty or thirty years ago. On the other hand, the future projection may be slightly understated if additional property turnover and technological advancements occur as the industry grows in Kings County. The values in Table 16 are based on figures of $1,500 per cow for real property, $275 per cow for equipment, and $5,000 per acre for land.

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[15] Gary Westbrook, Tulare County Assessor's Office, personal communication, September 7, 2000.
[16] Yvonne Montgomery, Kings County Assessor's Office, personal communication, September 7, 2000.

TABLE 16
PROPERTY TAX ESTIMATES FOR THE DAIRY INDUSTRY

	2000 Estimate	2010 Projection	2020 Projection
Cows	124,660	156,900	197,400
Acres	4,756	5,986	7,531
Assessed Value	$245,051,500	$308,427,566	$388,040,800
Property Tax	$2,450,515	$3,084,276	$3,880,408
County Share	$392,082	$493,484	$620,865

Source: ADE.

Based on this approach, it is estimated that dairies generate about $392,000 per year in property taxes for the County budget, not including the value of residences on dairy property. The projected growth to 2010 could increase this by more than 25 percent and possibly much more depending on future escalation of land and property values in the dairy industry. For comparison, the total county share of property taxes in the 1999-2000 budget is about $11.9 million. Based on these estimates, the dairy industry directly contributes about 3.3 percent of county property taxes, which is about half of its contribution to total industry output in the county. This does not, however, account for the fiscal benefits from the economic multiplier effects of the industry.

APPENDIX I-- SURVEY DATA

Kings County Survey of Dairies Analysis

Summary

Number of total Respondent (N) = 32

B) Facilities and Employment

What capital improvements have you made recently or will you make in the future ?

1999	Total Expenditure	No. Respondents	Percent
Facility Expansion	5006000	6	19%
Facility productivity improvements	1610000	5	16%
Replacing/upgrading equip	599000	9	28%
Regulatory compliance	322000	6	19%
Total respondents		26	81%
Missing		6	19%
2000			
Facility Expansion	900000	2	6%
Facility productivity improvements	2180000	10	31%
Replacing/upgrading equip	718000	8	25%
Regulatory compliance	205000	4	13%
Total respondents		24	75%
Missing		8	25%
2001-2004			
Facility Expansion	1150000	2	6%
Facility productivity improvements	2850000	3	9%
Replacing/upgrading equip	1168000	4	13%
Regulatory compliance	125000	2	6%
Total respondents		11	34%
Missing		21	66%

Range of expenditure (dollars)

1999	Expenditure ($)	No. Respondents	Percent
Facility Expansion	5000-1million	6	19%
Facility productivity improvements	5000-1million	5	16%
Replacing/upgrading equip	5000-250,000	9	28%
Regulatory compliance	2,000-150,000	6	19%
Total		26	81%
Missing		6	19%
2000			
Facility Expansion	400,000 -500,00	2	6%
Facility productivity improvements	5,000 - 1 millior	10	31%
Replacing/upgrading equip	5,000 - 250,000	8	25%
Regulatory compliance	10,000 - 150,000	4	13%
Total		24	75%
Missing		8	25%
2001-2004			
Facility Expansion	50,000 - 900,00	2	6%
Facility productivity improvements	5,000 -2 millior	3	9%
Replacing/upgrading equip	80,000 -750,00	4	13%
Regulatory compliance	35,000 - 90,000	2	6%
Total		11	34%
Missing		21	66%

Number of employees at this location (annual average) in the past, now, and in the future

	1999	No. Respondents	Percent
Number of employees Full Time	247	30	94%
Number of employees Part Time	61	6	19%
Number of employees Seasonal	0	0	0
Total Employment	308		
	2000	**No. Respondents**	**Percent**
Number of employees Full Time	298	32	100%
Number of employees Part Time	13	6	19%
Number of employees Seasonal	2	1	3%
Total Employment	**313**		
	2001	**No. Respondents**	**Percent**
Number of employees Full Time	256	23	72%
Number of employees Part Time	16	5	16%
Number of employees Seasonal	0	0	0%
Total Employment	**272**		
	2002	**No. Respondents**	**Percent**
Number of employees Full Time	206	15	47%
Number of employees Part Time	15	4	13%
Number of employees Seasonal	0	0	0
Total Employment	**221**		

C) Production and Markets

How do you expect the growth of the dairy industry to change in the next two three years?

	Respondent	Percent
Grow more slowly than the past 3 yrs	18	56%
Grow as fast as the past 3 yrs	10	31%
Grow more quickly than past 3 yrs	2	6%

Please estimate your herd size (annual average) now and in the future
(total herd size by year)
Total Herd by year and no of respondents

	1999	Total Respondents	2000	Total Respondents	2004	Total Respondents
Milk Cows	26,538	32	26,635	29	22,694	15
Dry Cows	4,572	28	7,493	27	4,258	16
Heifers 2 years or less	11,288	22	12,325	20	12,354	14
Heifers 2 years or more	1,561	17	1,278	15	922	10
Calves less than 3 months	4,878	21	3,285	18	2,948	11
Calves 3 months to 1 year	8,953	18	7,761	14	8,988	13
Total Herd	**57,790**		**58,777**		**52,164**	

Projections 2000 -2004

	2000	2004	Absolute Growth	% Growth
Milk Cows	**20,505**	**22,694**	**2,189**	**11%**
Dry Cows	3,573	4,258	685	19%
Heifers 2 years or less	10,530	12,354	1,824	17%
Heifers 2 years or more	843	922	79	9%
Calves less than 3 months	2,621	2,948	327	12%
Calves 3 months to 1 year	7,428	8,988	1,560	21%
Total Herd	45,800	52,164	6,364	14%

If planning to increase herd size, why?

	Yes	Percent
Have excess milking barn capacity	6	19%
Need to increase efficiency	11	34%
Price of milk	8	25%
Demand for milk increasing	3	9%
Technological improvements making it	5	16%
Other Planning 1	0	0%

If not planning to increase herd size, why?

	Yes	Percent
Don't want to upset ecosystem	2	6%
Personal or family reasons	2	6%
Capital costs	2	6%
Planning tech improvements	1	3%
Plant can't be expanded	5	16%
Qualified labor not available	2	6%
Lack of land for manure	4	13%
Lack of land to dispose water	5	16%
Price of milk	5	16%

Whether or not you are planning to increase herd size, what improvements would you need to make in order to increase production?

	Yes	Percent
More acres of land to spread dry manur	6	19%
More acres of land to dispose wastewat	9	28%
More milking stalls	13	41%
Other improvements	10	31%

What cooperative are you a member of?

	No Respondents	Percent
California Dairies, Inc	18	56%
Dairyman's Division of land 'o lakes	6	19%
Dairy Farmers of America	1	3%
Security Milk	0	0%
Hilmar Cheese	0	0%
Other cooperatives ?	4	13%

If you know, Where does milk go for processing on a typical day?

	No Respondents	Amount (lbs)	Percent
Local processor	15	1,178,250	47%
Out of area	1	51,000	3%
Other plant	17		53%

What was your total production and revenue in 1999 and your expected production in the future ?

Total production & revenue

	Amount lbs	AveAmount	Revenue	AveRevenu	No Respondents
1999	379,734,401	$ 11,507,103	$ 57,394,067	$ 1,739,214	24
2000	420,958,150	$ 12,756,308	$ 52,492,844	$ 1,590,692	30
2004	334,680,437	$ 10,141,831	$ 32,807,229	$ 994,158	13

Projections 2000 - 2004

	2000	2004	Absolute Change	% Change
Amount lbs	293,377,950	334,680,437	41,302,487	14%
Revenue ($)	29,744,519	30,807,229	1,062,710	4%

Operating Capacity

Present Capacity used (%)	No respondents	Percent
25	1	3%
65	1	3%
75	2	6%
80	6	19%
90	4	13%
100	10	31%
Total	24	75%
Missing	8	25%

# of cows that could be added without expansion

Range of Cows	No Respondents	Percent	No Cows
0-100	9	28%	602
101-300	5	16%	875
301-500	1	3%	500
501-700	1	3%	700
701-1000	1	3%	1,000
Total	**17**	**53%**	**3,677**

D) Operations

Year diary established	No Respondents	Percent
1 1978 or earlier	20	63%
after 1978	12	38%
Total	32	100%

What is the acreage of your facility, including corrals, milking facilities, barns, feed storage and manure handling areas?

Acreage of dairy facility Range	No of Respondents	Percent
0-20	14	44%
21-40	9	28%
41-80	6	19%
100-200	2	6%
200-400	1	3%
Total	32	100%
Total Acreage	**1,589**	

	Yes	Percent	No	Percent
Spread dry manure on my own crop land	19	59%	13	41%

Acreage Range	No. of Respondents	Percent
0-200	7	22%
201-400	2	6%
401-700	6	19%
701-1000	1	3%
1001-3000	2	6%
Total	18	56%
missing	14	44%

	Yes	Percent	No	Percent
Sell Excess dry manure to other farmers?	16	0.5	16	0.5

Annual Income Range	No of Respondents	Percent
0-700	0	0%
700-1000	1	3%
1001-3000	4	13%
3001-5000	2	6%
5001-6000	2	6%
Total	8	25%
Missing	24	75%

What land is irrigated by water generated by dairy operation ? What is the ownership and agreement?

	No of Respondents	Percent
Own	15	47%
Lease	20	63%
Own and Lease	2	6%
Secured by agreement for thus use? Yes	9	28%

what are your other westwater solutions?

	Yes
Sell excess wastewater to farmers	9%
Sell excess wastewater to processors	0%
Purchase wastewater for own crops	3%

Percent Range	**0-25**	**26-50**	**51-75**	**76-100**	**Total Respondents**
Grow Own Feed on adjacent lands	6%	19%	3%	47%	75%
Grown on other land not adjacent to dairy	6%	3%	0%	9%	19%
Purchase from other growers	13%	16%	6%	31%	66%

What Are the factors that are the most important for the daily operation of your business?

	Not at all	Somewhat	Important	Very Important	Critical	% of Total
Labor costs	0%	9%	38%	34%	19%	100%
Labor supply	9%	6%	28%	31%	25%	100%
Transportation	22%	16%	38%	9%	9%	94%
Interest rates	6%	6%	44%	22%	22%	100%
Energy costs	0%	9%	38%	31%	22%	100%
Feed costs	3%	0%	19%	22%	53%	97%
Regulatory compliance	3%	3%	31%	47%	16%	100%
Local property taxes	9%	19%	34%	31%	6%	100%
State or corporate income taxes	6%	9%	28%	34%	16%	94%
Market condition economy	0%	0%	13%	25%	56%	94%

Which factors are most difficult to have control over?

	Not at all	Somewhat	Important	Very Important	Critical	% of Total
Labor costs	3%	25%	41%	16%	3%	85%
Labor supply	9%	19%	31%	25%	6%	88%
Transportation	22%	22%	25%	6%	9%	82%
Interest rates	3%	9%	28%	25%	28%	91%
Energy costs	3%	9%	28%	25%	28%	91%
Feed Costs	0%	16%	28%	25%	25%	91%
Regulatory compliance	0%	16%	22%	38%	22%	94%
Local property taxes	16%	16%	16%	25%	19%	88%
State or corporate income taxes	9%	16%	25%	22%	19%	88%
Market condition/economy	0%	3%	6%	28%	56%	91%

Manure Management

Please indicate the general type of manure management system which most accurately describes the system used at you dairy facility.

	No Respondents
1. Flushed freestall barn, flushed corrals. Manure separation pits/anaerobic lagoons	3
2. Flushed freestall barn, scrapped corrals. Manure separation pits/anaerobic lagoons	4
3. Scrapped freestall barn,scrapped corrals, solid manure stockpiling	2
4. Scraped corrals, solid manure stockpiling	5
5. Other describe.	
Owner handles waste and waste water	
Scraped corals with anerobic lagoons	
scraped corals with anerobic lagoons	
we don't have a floor, but we do scrap corrals and we give manure away	
no freestall barn, we do flush alleyways and we do have a lagoon	
open corrals floors are scrapped and manure is stock piled and applied to cropland.	
Total	**14**

APPENDIX II – METHODOLOGY

HERD SIZE AND DAIRY PRODUCTION VALUE ASSUMPTIONS

In dairy farm production, the volume of production and production values published in the agriculture commissioner's annual crop reports, while the herd size is estimated by the U.C. Cooperative Extension in from Kings County. Both sources provide historical data, and ADE used the data dating back to 1988. To more accurately track the prevailing growth trends since 1988, all of the production value figures were adjusted to 1999 constant dollars using the producer price index (PPI) for milk production. The producer price indexes come from the Bureau of Labor Statistics (BLS) and 1999 represents the most recent year with an annual index available.

ADE used these data sources as the basis for projecting future growth in the Kings County dairy cow herd and dairy production. The dairy cow projections assumed that the herd size would grow at an annual rate of 2.3 percent. This growth rate was calculated by generating a linear regression equation based on the herd size for each year from 1988 to 2000. A regression equation represents the "best fit" trend line for this time period because it shows the prevailing growth trend while accounting for the variations that occur from year to year.

Growth in dairy production will occur along with any increases in the number of dairy cows. Additionally, the data indicates that between 1988 and 2000, the production value per cow increased in constant dollar terms. Assuming that this long-term trend will continue, the analysis used an annual growth rate of 1.8 percent for the production value per cow. This represents real growth because the production value data has already been controlled for inflation using the PPI. The projected growth rate for production value per cow was calculated by generating a regression equation for data between 1988 and 1999. Using the growth components in the herd size and the production value per cow, the projected dairy production values were projected.

EMPLOYMENT AND GROWTH ASSUMPTIONS

Employment for the dairy farm production is calculated through a combination of data sources. The historic wage-and-salary employment comes from the ES202 county employment database, which is provided to ADE by the Minnesota IMPLAN Group (MIG). MIG uses the ES202 database, which is maintained by the Bureau of Labor Statistics (BLS), and runs the BLS data through a proprietary econometric model that estimates employment for industries that go unreported due to confidentiality requirements. The analysis uses the ES202 data to show employment at the county level for all industries in the Standard Industry Classification (SIC)

coding system between 1991 and 1998. The ES202 database does not include self-employment by dairy farm proprietors.

Projections for employment growth are based on the projected growth in the dairy cow herd size in Kings County. The analysis assumes about 120 dairy cows for every wage-and-salary worker and 80 dairy cows per worker if proprietors are included. This assumption is based on the ES202 database, the herd size data, the IMPLAN input-output model, and data from the Dairy Industry Survey. Depending on the year, the ES202 data, which does not include self-employment, gives a range of between 110 and 122 dairy cows per worker. Meanwhile, the IMPLAN input-output model, which includes self-employment and proprietor income, estimates an employment level that works out to about 80 cows per worker. Data from the Dairy Industry Survey reports a ratio of about 90 cows per worker, and a check of the survey forms indicates that dairy farms answering the survey likely included some proprietors in the employment totals.

ASSUMPTIONS FOR DATA GENERATED BY THE INPUT-OUTPUT MODEL

Input-output models are useful tools for identifying buyer-supplier relationships in a regional economy, and for estimating the contributions that different industries make to the regional economy. In the analysis of dairy industries in Kings County, key estimates made by the input-output model include proprietor income, industry output, and value added. In addition, input-output models can calculate multiplier effects from economic activity by a particular industry. These effects are typically classified as indirect and induced multipliers. An indirect effect comes from activity generated by supplier purchases (or inputs), while induced effects reflect demand for local goods and services made by employees. The input-output model used in the analysis is the IMPLAN Impro Professional 2.0 application. The model was developed by IMPLAN with data from the Bureau of Economic Analysis (BEA), BLS, and the ES202 employment database.

The Kings County analysis uses county-specific datasets from 1994 and 1996. In addition, the model allows the user to update and otherwise make changes to study data and relational assumptions. Because the model makes several calculations based on large national datasets, it is ideal to recalibrate the model whenever more specific data is available. In the Kings County analysis, some of the model parameters pertaining to dairy farm production, specifically the relationship between employment and industry output, were modified because county-specific information from the crop reports and dairy cow herd data was available.

DAIRY PROCESSING GROWTH ASSUMPTIONS

The methods used to make estimates and projections for dairy processing industries in Kings County differ somewhat from those used for dairy farm production. Because milk is one of many commodity inputs into the dairy processing industries rather than the main product, there is not as direct a connection between the herd size and the number of employees. With dairy processing, the employment estimates come directly from the ES202 county employment database. Projections for employment used a combination of historic growth patterns and projections by the California Employment Development Department Labor Market Information Division (LMID), which does not make projections for agricultural production sectors.

With these different data sources available, the analysis made two projections, one assuming moderate growth and one assuming high growth. The LMID statewide projections have a time horizon of 1998 to 2008, and have considerably more detail than the county projections, which go from 1995 to 2002 and define industries at a more aggregated level. The high projection estimates the detailed growth rate for the more specifically defined dairy processing industries. The high projected growth rate multiplied the LMID projected Kings County growth rate for all food processing industries (3.4 percent) with the historic ratio of the average annual growth rates for all food processing industries to the growth rate for dairy processing industries (1 to 1.6). This results in a high projected annual growth rate of 5.5 percent. The high projection assumes that the long-term employment growth will correspond to the employment growth trends observed between 1991 and 1998 when employment grew at an average annual rate of about five percent.

The moderate projection combines the high projected annual growth rate assumption and combines it with the statewide LMID projected annual growth rate for dairy processing industries (0.9 percent). This results in a moderate projected growth rate of 3.2 percent, which assumes that the growth pattern in Kings County will more closely track with the slower projected growth for all of California.

As with dairy farm production, the analysis looked at the buyer-supplier relationships of the processing industries using the IMPLAN input-output model. In this case, the primary input into the model was employment. The analysis used the model's assumptions regarding the relationship between employment and industry output.