California

Manufacturing Cost Annual 2005

Compiled and Published in 2006

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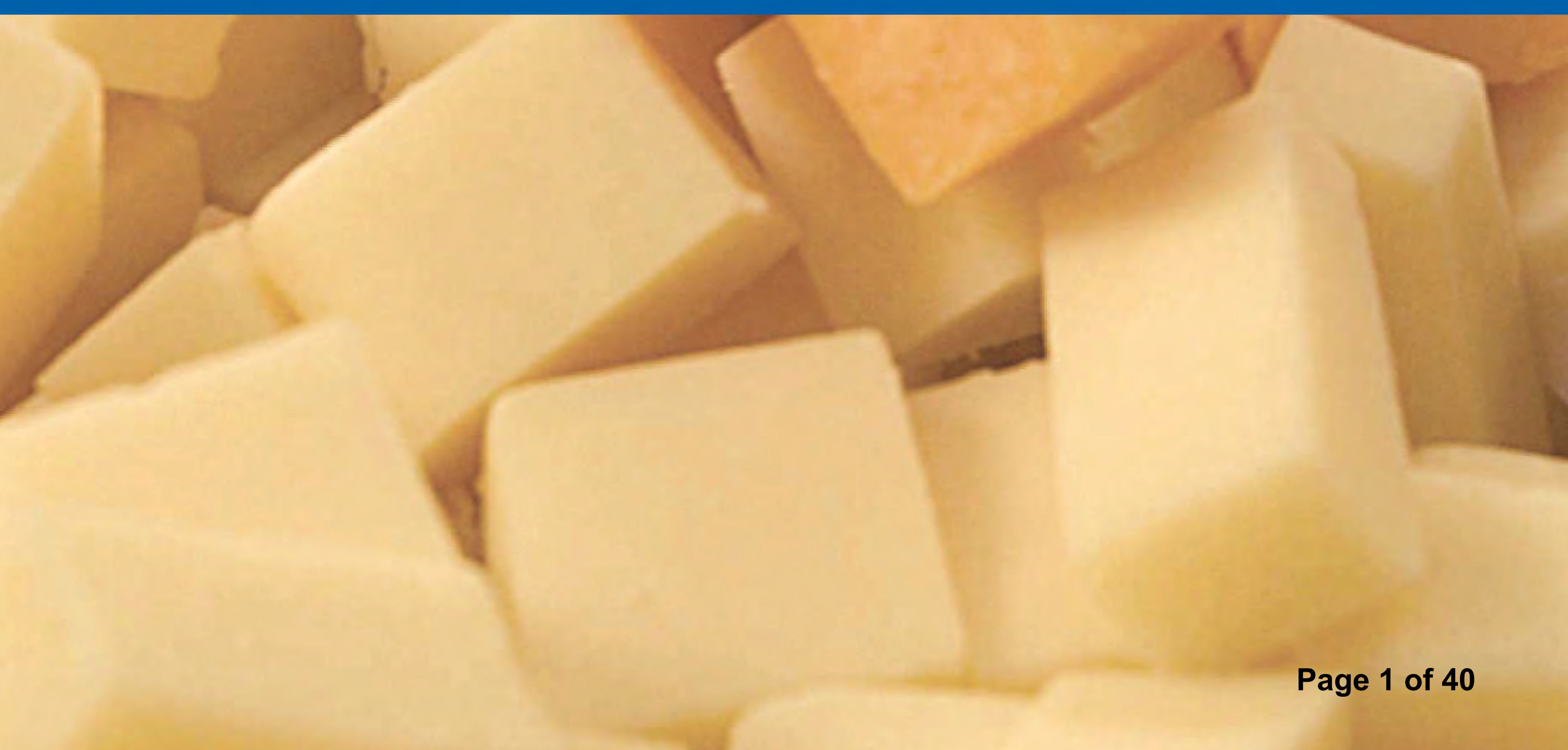

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Manufacturing Cost Annual

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This publication would not be possible without the cooperation of the individuals and firms engaged in the production, manufacture, and distribution of milk and dairy products.

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Introduction

The California Food and Agricultural Code specifies that the Department of Food and Agriculture (Department) must consider manufacturing costs in determining appropriate minimum prices for products categorized as Class 4a (butter, whey and dried milk products) and Class 4b (cheese). Notwithstanding the legislative decree, the Department has a more direct need for the cost studies in light of the end product pricing formulas used to establish milk prices. The studies have been used frequently to establish reasonable manufacturing cost (make) allowances through the public hearing process.

The Department maintains a Manufacturing Cost Unit that collects and summarizes cost data from California dairy manufacturing plants. Any plant that produces Class 4a or Class 4b products may be asked to participate in the cost studies. The study is very nearly a census of California's butter, nonfat dry milk (NFDM), skim whey powder and Cheddar cheese plants. Butter, NFDM, skim whey powder, and Cheddar cheese study participants typically account for over 97 percent of respective products manufactured in California. Data on cream and condensed skim were collected concurrently from plants that participated in the butter, NFDM, skim whey powder, and Cheddar cheese studies. As a result, data on cream and condensed skim accounted for significantly less volume. Plants that manufacture cream and condensed skim but do not manufacture butter, NFDM, skim whey powder or Cheddar cheese were not included in the study.

The data from the cost studies have a practical significance beyond the boundaries of California. They are the only studies in the U.S. which present detailed audits of processing cost of butter, NFDM, skim whey powder, and Cheddar cheese plants over a period of several years. The studies are conducted by professional auditors specializing in dairy accounting practices. The auditors review plant records on site and work with plant management to collect data on all aspects of the operation. The auditors also determine allocations of plant expenditures for each product manufactured by the plant. For the plants in the study, the results can help to isolate the actual costs of manufacturing and give benchmark figures obtained from other California manufacturing plants. Consequently, although the Department has the legal authority to collect cost information from the various types of milk processing plants, most plants find the study and resulting comparisons valuable and cooperate in the cost studies voluntarily.

Highlights of the Manufacturing Cost Studies

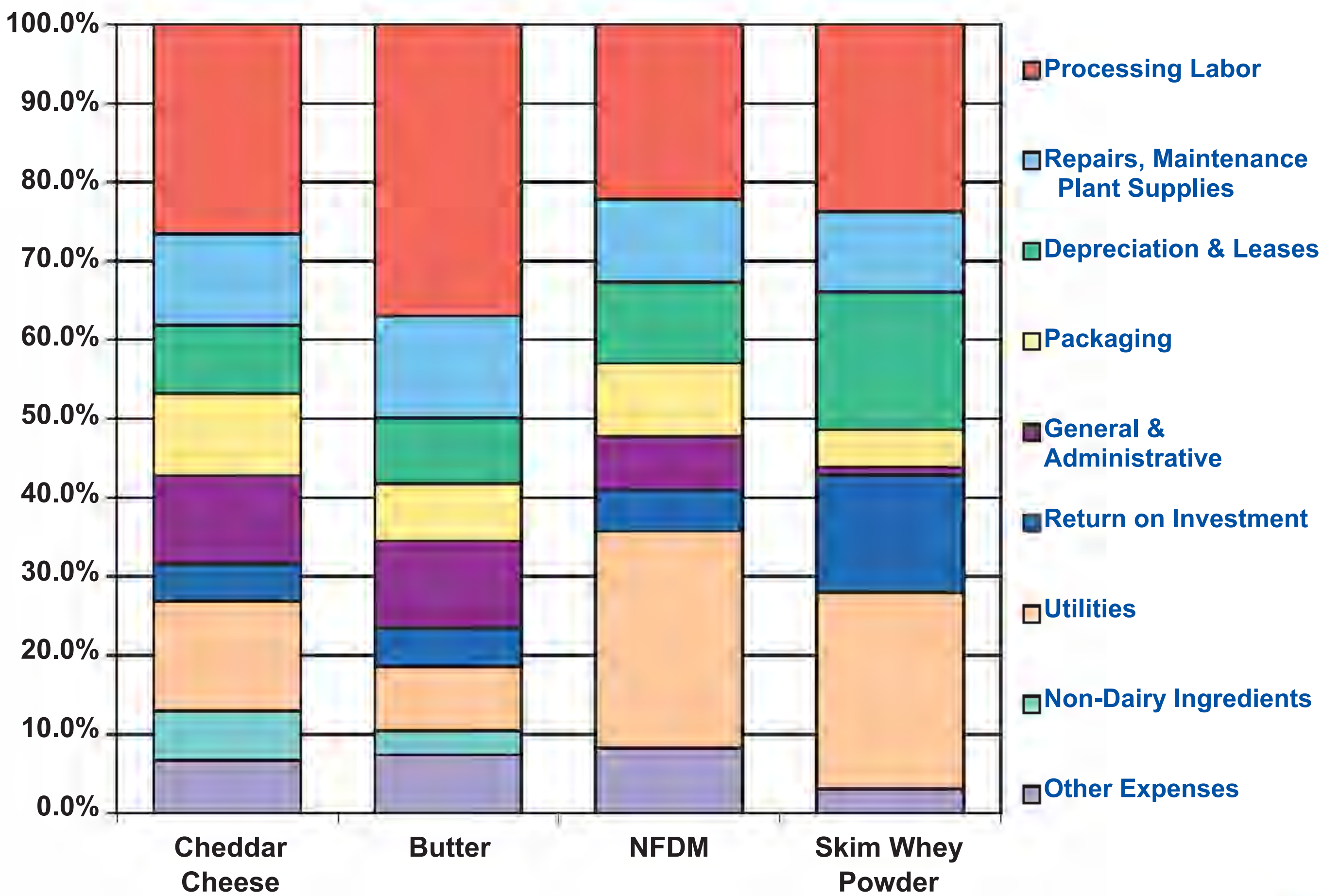
Each plant in the study gave access to cost data for a 12-month period during the study period January 2004 to December 2004. The 2004 cost studies included 8 butter plants, 10 NFDM plants, 3 skim whey powder plants, 7 Cheddar cheese plants, 9 condensed skim plants and 9 cream plants. For these cost studies, the butter plants accounted for 99.9 percent of the butter produced in California. Similarly, the NFDM plants accounted for 99.2 percent of the NFDM produced in California, 79 percent of the skim whey powder produced in California, and Cheddar cheese plants accounted for 98.5 percent of the Cheddar and Monterey Jack cheese produced in California. Since about half the plants process and sell bulk cream and /or condensed skim, data was also accumulated for these products.

Labor Was the Largest Cost Component

The predominant category contributing to overall processing costs for any of the four types of studies was labor (Figure 1). Labor contributed an average of 37 percent to total butter processing costs, 22 percent of NFDM processing costs, 27 percent of Cheddar cheese processing costs and 24 percent of skim whey powder processing cost. The dollar impact of other cost categories varied by product type. Utility costs accounted for 28 percent of NFDM processing costs, 8 percent of butter processing costs, 14 percent of Cheddar cheese processing costs and 25 percent of skim whey powder processing costs. Depreciation and lease expenses also showed variability among plant types – 9 percent for Cheddar cheese plants, 8 percent for butter plants, 10 percent for NFDM plants, and 17 percent for skim whey powder plants. The difference in cost structures appears to be attributable, in part, to differences in type of plant ownership. The majority of the butter, NFDM and skim whey powder plants (but only about half of the Cheddar cheese plants) are operated by farmer-owned cooperatives.

This publication is divided into sections by product, e.g., Cheddar cheese, Butter, NFDM and skim whey powder. Each section includes a summary table which describes categorized processing costs. Bar charts identify the distribution of costs among the study plants. Pie charts detail the overall contribution of individual cost categories to the overall cost structure. This issue of the Manufacturing Cost Annual also contains some general information on the cream and condensed skim milk.

Figure 1. Comparison of Costs by Category for California Manufacturing Plants



Cheese Study

Cost studies were completed on seven cheese plants for 2004. Each was assigned to one of two groups based on the plant's total processing cost. While costs were calculated based on 40 lb. blocks of Cheddar cheese only, the plants typically manufactured other cheese products and a variety of by-products (Figure 2). Cost summary statistics based on the plants in the study provide a quantitative profile of California Cheddar cheese plants, including production capacity, per pound processing costs and cheese vat information (Tables 1 and 2).

- The data indicated that the lower cost Cheddar plants in the state tended to be the larger plants. Specifically, the three low cost plants produced 77 percent of the Cheddar and Jack cheese in 2004.

- Among the two cost groupings, labor cost was the single largest category that determined manufacturing cost. Processing labor ranged from 4.0¢ per pound in the low cost group to 7.1¢ per pound in the high cost group, a 78 percent difference.

- Processing non-labor costs as a group were larger than labor costs but included several different plant expenses, such as utilities, depreciation, repairs and maintenance, laundry, supplies and plant insurance. In the high cost group, these costs averaged 5.8¢ per pound; in the low cost group, these costs averaged 7.6¢ per pound.

- The return on investment (ROI) allowance is calculated by subtracting accumulated depreciation from the original cost of the assets. The remaining book value is multiplied by the Moody's "BAA" corporate bond index. Those amounts are then allocated to the products in the plant based on the same methods used to allocate the depreciation expense.

- The ROI allowance is an opportunity cost and represents how much interest the company could have earned if its capital was not tied up in land, buildings and equipment. In other words, it is viewed as an alternative source of income had the company invested the capital elsewhere. A higher ROI cost suggests that a plant is relatively new with little accumulated depreciation of its assets (high book value) or that an established plant has low production volume such that the ROI cost has a larger impact than plants with more production volume, all other factors being equal.

- Packaging costs showed little variation comparing the high cost group (2.1¢ per pound) with the low cost group (1.8¢ per pound).

- Only small differences among cheese making parameters were evident when using the two cost groups (Table 2).

Table 1. Processing Costs for Seven California Cheddar Cheese Plants

1. Manufacturing cost data were collected and summarized from seven California cheese plants. The seven plants processed 817 million pounds of cheese during the study period, representing 98.5% of the Cheddar and Monterey Jack cheese processed in California.

2. The processing costs summarized in this study were incurred during a 12-month period, starting in January 2004 and concluding in December 2004.

3. The "Processing Non-Labor" category includes costs such as utilities, repairs and maintenance, supplies, depreciation and rent.

4. The volume total includes both Cheddar and Monterey Jack cheeses, but the costs reflect only costs for 40 lb. blocks of Cheddar.

5. Three plants processed 500-lb. barrels or 640-lb. blocks. Packaging costs and packaging labor for 40 lb. blocks were substituted for these plants.

6. To obtain the weighted average, individual plant costs were weighted by their cheese processing volume relative to the total volume of cheese processed by all plants involved in the cost study.

7. The current manufacturing cost allowance for cheese is $0.171 per pound. About 62% of the cheese was processed at a cost less than the manufacturing cost allowance.

8. The weighted average yield was 11.53 lbs. of cheese per hundredweight of milk. The weighted average moisture was 37.04%, and weighted average vat tests were 4.02% fat and 9.05% SNF.

Cost Groups		Number of Plants	Processing Labor	Processing Non-Labor	Package	Other Ingredient	General & Administrative	Return on Investment	Total Cost	Volume in Group
			dollars per pound of cheese							
Low Cost		3	$0.0397	$0.0759	$0.0180	$0.0089	$0.0191	$0.0094	$0.1710	628,560,303
High Cost		4	$0.0709	$0.0584	$0.0206	$0.0179	$0.0243	$0.0042	$0.1963	188,508,025
Summary Statistics										
Weighted Average			**$0.0469**	**$0.0719**	**$0.0186**	**$0.0110**	**$0.0203**	**$0.0082**	**$0.1769**	
Range	Minimum		$0.0340	$0.0518	$0.0146	$0.0066	$0.0077	$0.0024		
	Maximum		$0.0852	$0.0795	$0.0281	$0.0289	$0.0299	$0.0128		
Total										**817,068,328**

Table 2. Cheddar Cheese Production Parameters from Cost Studies[1]

Cost Group	Finished Moisture %	Vat Fat Test %	Vat SNF Test %	Vat Yield (Lbs.)
Low	37.03%	4.01%	9.00%	11.58%
High	36.89%	3.94%	9.18%	10.95%
Wt'd Avg.	**37.04%**	**4.02%**	**9.05%**	**11.53%**

[1] Moisture, vat tests and yields reflect levels achieved for Cheddar cheese only.

Characteristics of Cheddar Cheese Plants

While the summary analyses of the cost studies that have been published historically have provided many insights into Cheddar cheese operations in California, they do not address some of the most basic features of the plants and how different costs compare among the plants in the study. In the following section, summary statistics are provided to indicate how much variation exists among cheese plants. The "weighted average" is weighted by pounds of cheese produced. The "median" is the midpoint in the data and indicates the point at which half of the plants are above and half of the plants are below the given figure.

Throughout this section, column charts are used to show the distribution of the plants within a specified category or the breakdown of costs by category. The charts give an indication of how much variation exists among the plants and the relative impact of individual cost categories.

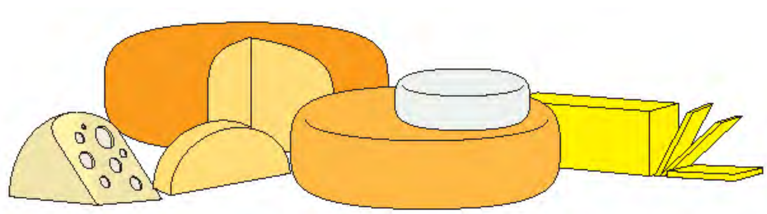


Figure 2. Simplified Product Flow in a Cheese Plant with By-Product Processing

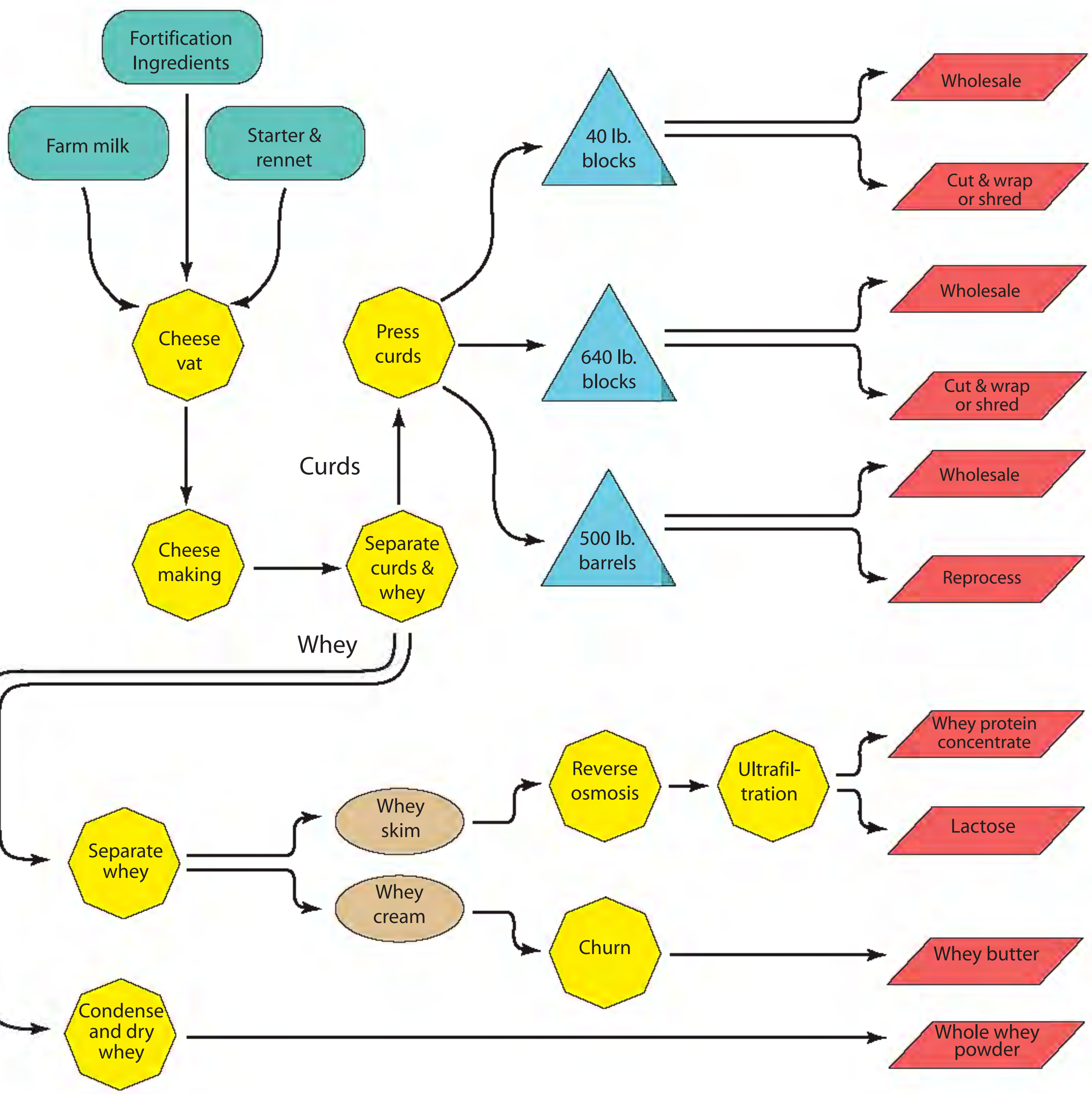


Figure 3. Breakdown of Cheddar Cheese Processing Costs

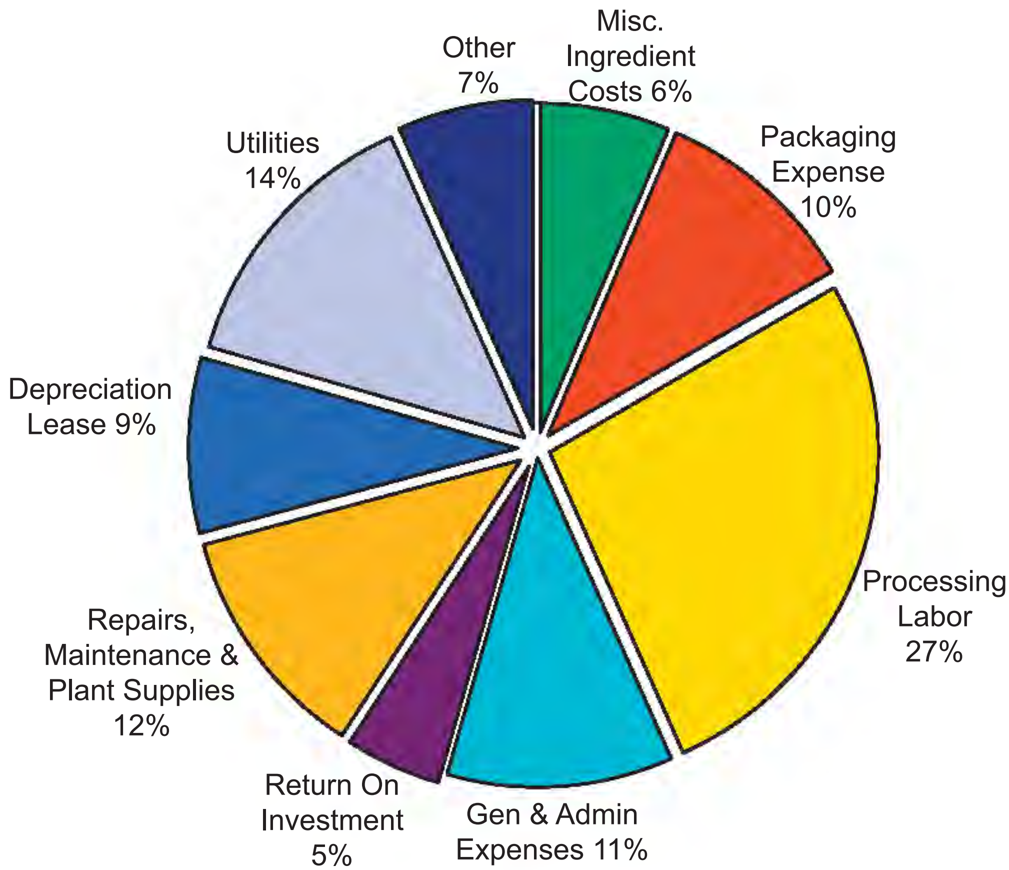


Figure 4. Breakdown of Cheddar Cheese Packaging Sizes

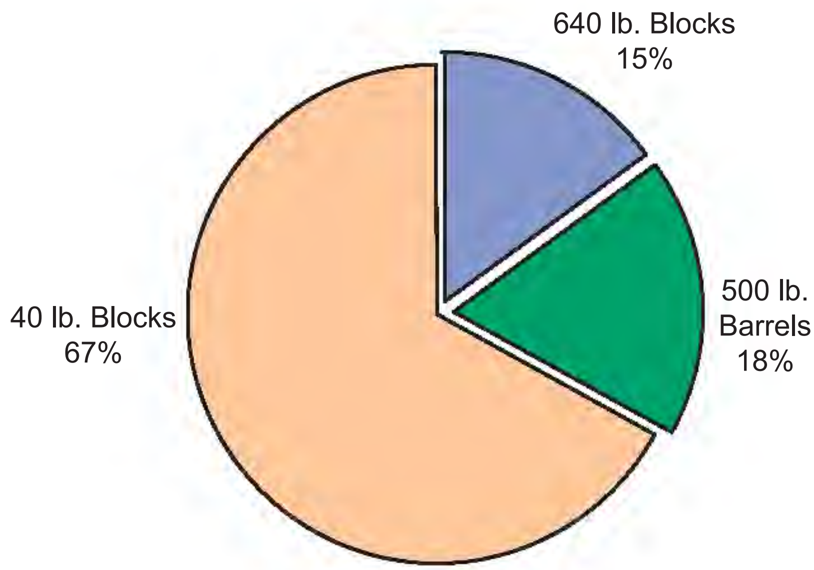
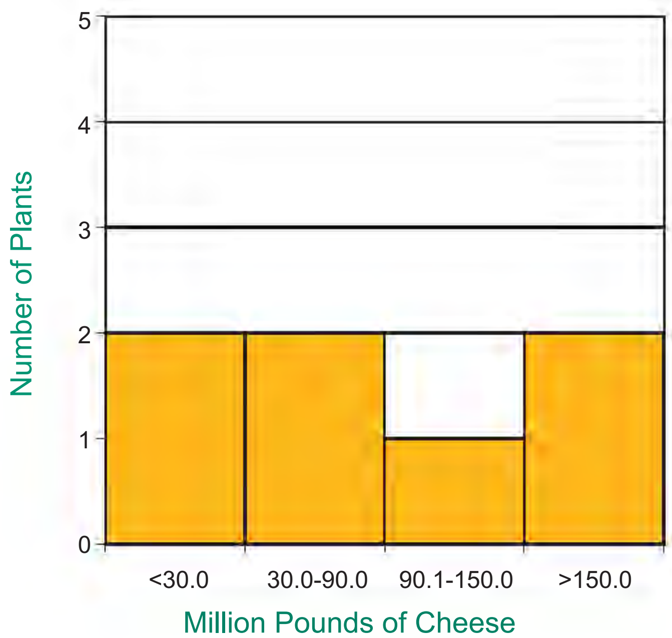


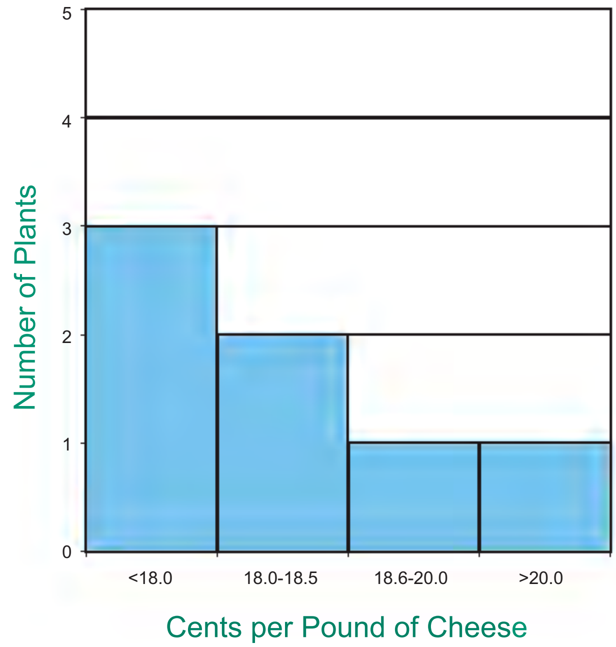
Figure 5. Annual California Cheddar and Jack Cheese Production



Average	=	117 million pounds
Median	=	88 million pounds
Average of low 3	=	33 million pounds
Average of high 4	=	179 million pounds

- Two plants produced over 180 million pounds.
- Three of the seven plants produced less than 50 million pounds.

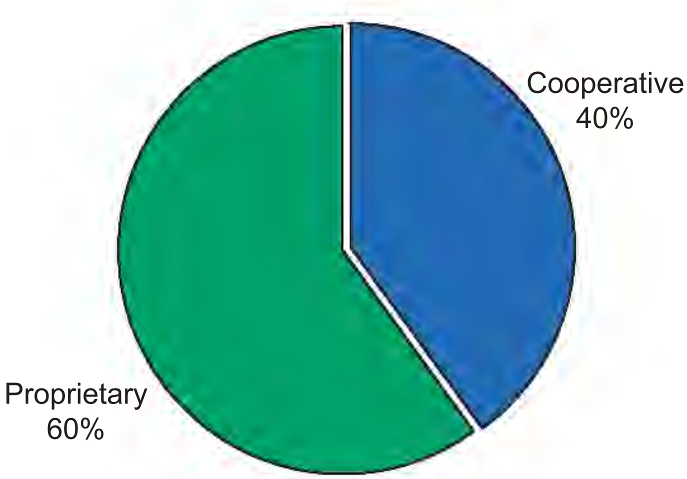
Figure 6. Manufacturing Cost per Pound



Average	=	18.3¢ per pound
Wt'd Average	=	17.6¢ per pound
Median	=	17.7¢ per pound
Average of low 3	=	17.1¢ per pound
Average of high 4	=	19.6¢ per pound

- In general, larger plants had lower costs per pound than smaller plants.
- Cost per pound ranged from 17¢ per pound to greater than 20¢ per pound.
- Three plants had costs per pound of less than 18¢.

Figure 7. Share of California Cheddar and Jack Cheese Production by Ownership Type and by Workforce Type



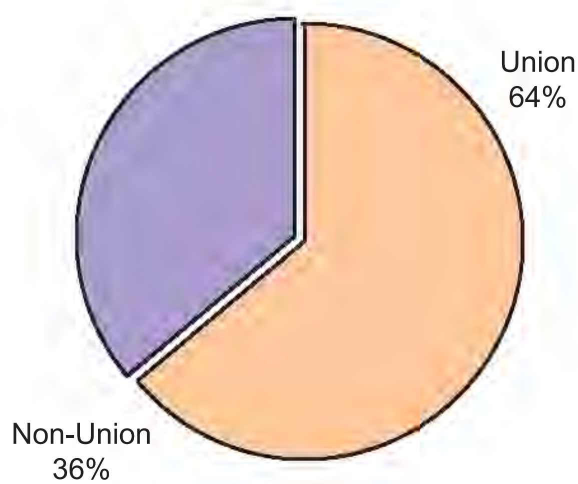
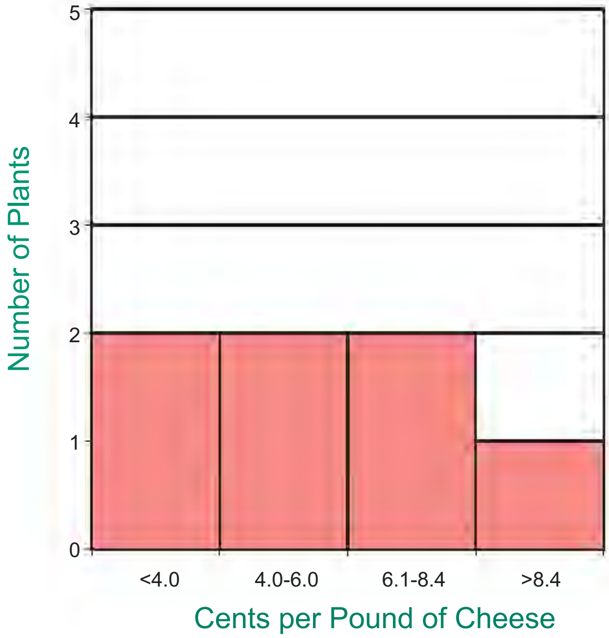


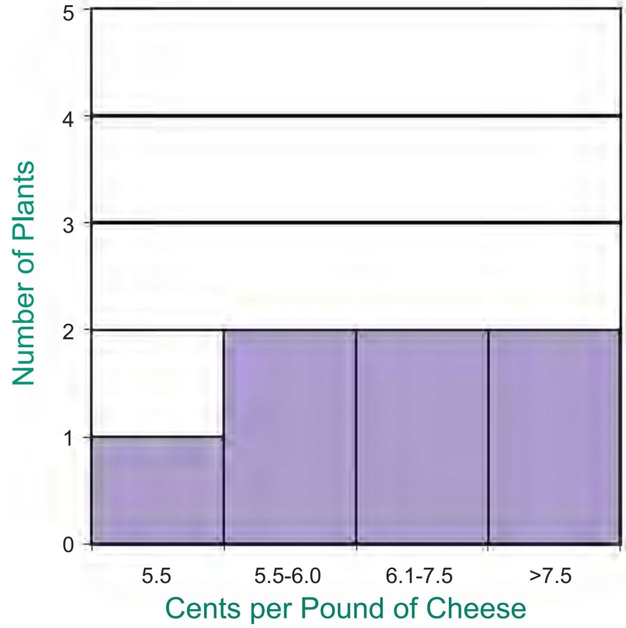
Figure 8. Processing Labor Cost per Pound



Average	=	5.6¢ per pound
Wt'd Average	=	4.7¢ per pound
Median	=	5.1¢ per pound
Average of low 3	=	4.0¢ per pound
Average of high 4	=	7.1¢ per pound

- Three plants had labor costs ranging from 3¢ to 5¢ per pound.
- The average labor cost per pound for the high 4 plants was 78% higher than the average labor cost for the low 3 plants.
- Simple average labor cost was 5.6¢ whereas the weighted average cost based on production volume was 4.7¢ indicating a lower cost, generally, for larger plants.

Figure 9. Processing Non-Labor Cost per Pound



Average	=	6.7¢ per pound
Wt'd Average	=	7.2¢ per pound
Median	=	6.7¢ per pound
Average of low 3	=	7.6¢ per pound
Average of high 4	=	5.8¢ per pound

- Includes utilities, depreciation, repairs and maintenance, laundry, supplies, and plant insurance.

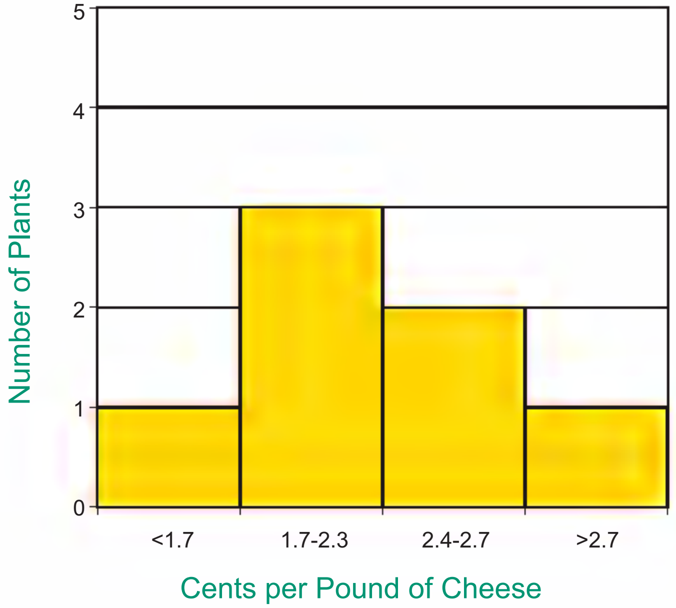
- Three plants had non-labor costs of less than 6¢; two plants had non-labor costs in the 6¢ to 7¢ range; and the remaining two plants ranged from 7¢ to 8¢ per pound.

Figure 10. Cheddar Cheese Labor Breakdown by Category

Based on detailed data:
Labor cost averaged 5.6¢ per pound
Labor cost averaged $2.22 per 40 lb. block

Note: "Other" includes pasteurizing, separating, plant manager/superintendent, general plant, plant clerical, and whey disposal.

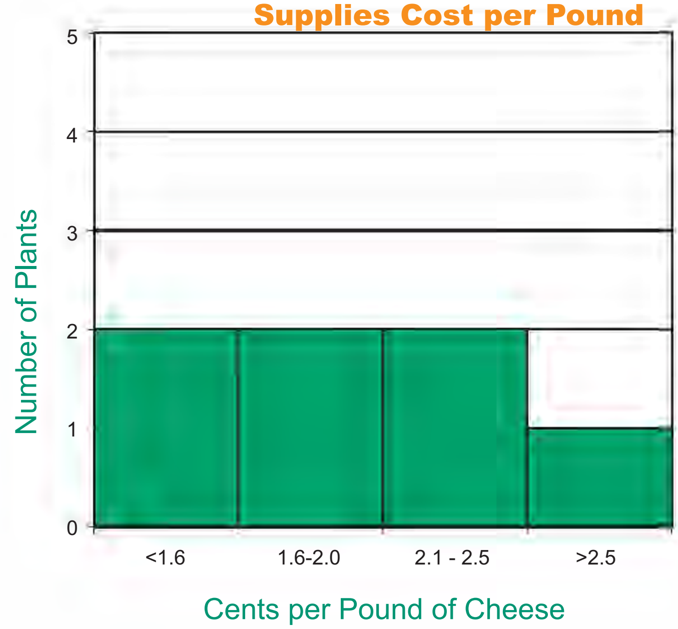
Figure 11. Utility Cost per Pound



Average	=	2.3¢ per pound
Wt'd Average	=	2.5¢ per pound
Median	=	2.3¢ per pound
Average of low 3	=	2.0¢ per pound
Average of high 4	=	2.6¢ per pound

- Utility costs ranged from 1.5¢ to 2.8¢ per pound.
- The average utility cost per pound for the high 4 plants was 30% more than that of the average utility cost for the low 3 plants.
- Electricity represents 37% of the utility cost while natural gas represented approximately 33%. Sewage, water, and whey disposal make up 30% of the total cost.

Figure 12. Repairs, Maintenance, and Supplies Cost per Pound



Average	=	2.0¢ per pound
Wt'd Average	=	2.1¢ per pound
Median	=	2.0¢ per pound
Average of low 3	=	1.6¢ per pound
Average of high 4	=	2.3¢ per pound

- Repairs and maintenance represent approximately 63% of the costs incurred in this category; and supplies represent 38%.
- Older plants tended to have higher per pound repair and maintenance costs.
- Repair and maintenance cost per pound of cheese ranged from 1.4¢ to 2.6¢ per pound. The weighted average repair and maintenance cost per pound of cheese was 2.1¢.

Figure 13: Comparison of Payroll Breakdown for Plant Employees, Hourly and Salaried

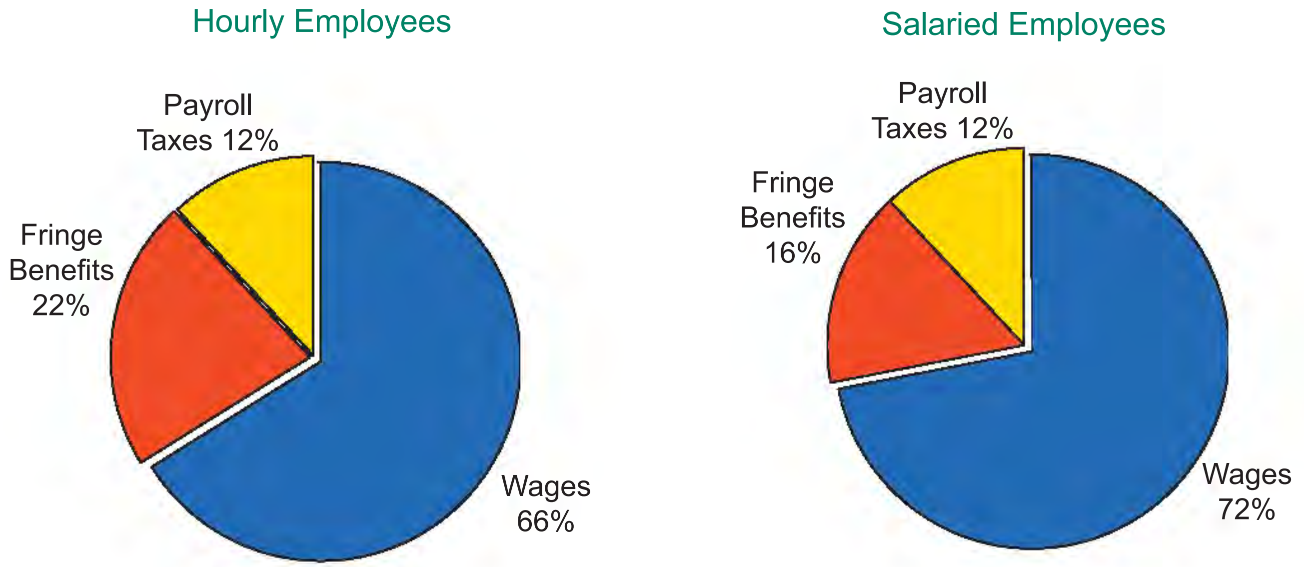
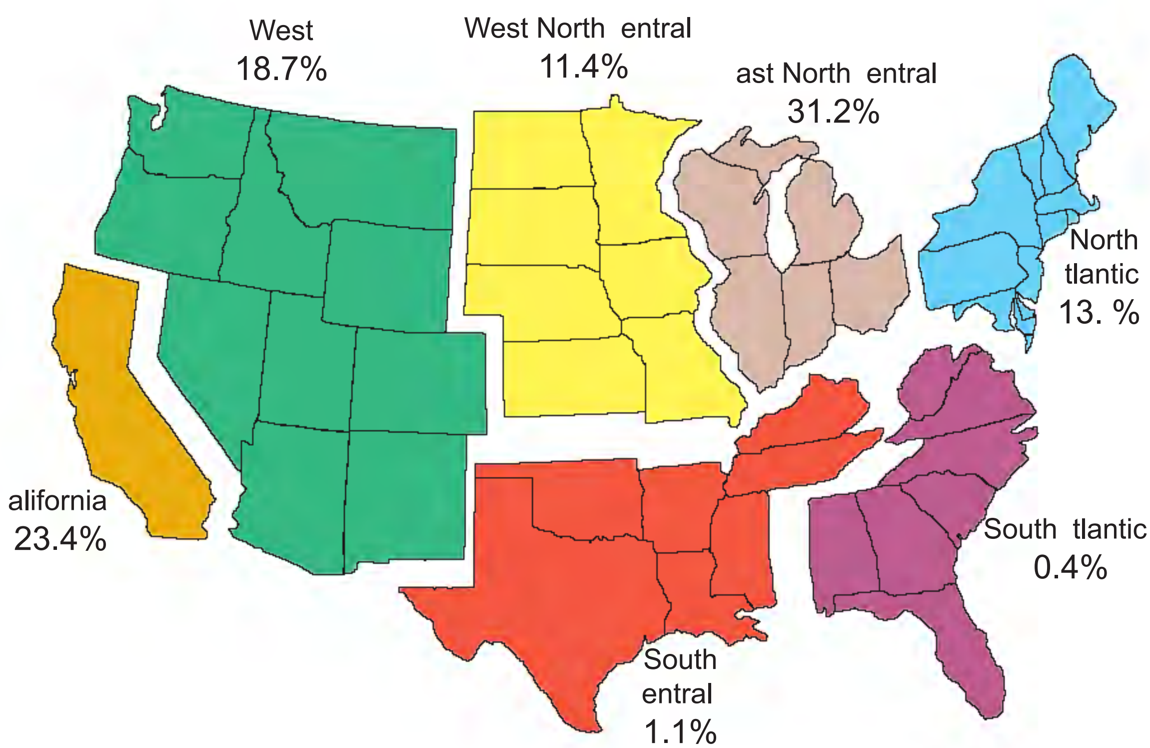


Figure 14. Share of Cheese Production by Region, 2005



Butter Study

Cost studies were completed on eight butter plants for 2004. Plant cost summary statistics based on the study plants give an indication of plant size and per pound processing costs for various categories (Table 3). To avoid revealing plant-specific information, the eight plants were assigned to one of two groups according to total processing cost. Only costs for bulk butter (25kg and 68 lb. boxes) were analyzed although most plants produced a variety of other sizes (Figures 17).

- The data indicated that the lower cost butter plants in the state tended to be plants with larger production volumes. Specifically, the four low cost plants produced 75 percent of the butter in California during 2004.

- Between the two cost groupings, labor cost was the single largest item that determined manufacturing cost. Processing labor ranged from a weighted average of 4.5¢ per pound in the low cost group to an average of 6.9¢ per pound in the high cost group, a 53 percent increase.

- Processing non-labor cost as a group was slightly less than labor cost but included several different plant expenses, such as utilities, depreciation, repairs and maintenance, laundry, supplies and plant insurance. These costs ranged from 4.6¢ per pound to 6.5¢ per pound, a 41 percent difference.

- The return on investment (ROI) allowance is calculated by subtracting accumulated depreciation from the original cost of assets. The remaining book value is multiplied by the Moody's "BAA" corporate bond index. Those amounts are then allocated to the products in the plant based on the same methods used to allocate the depreciation expense. ROI costs were 11.5% higher for the low cost plants.

- Packaging costs showed little variation among the two cost groups, but general and administrative costs were 119 percent higher for the high cost group.

Table 3. Processing Costs for Eight California Butter Plants

1. Manufacturing cost data were collected and summarized from eight California butter plants. The eight plants processed 382.9 million pounds of butter during the study period, representing 99.9% of the butter processed in California.

2. The processing costs summarized in this study were incurred during a 12-month period, starting in January 2004 and concluding in December 2004.

3. The “Processing Non-Labor” category includes costs such as utilities, repairs and maintenance, supplies, depreciation and rent.

4. The volume total includes both bulk butter and cut butter, but the costs reflect only costs for bulk butter (25 kg and 68 lb. blocks).

5. To obtain the weighted average, individual plant costs were weighted by their butter processing volume relative to the total volume of butter processed by all plants involved in the cost study.

6. The current manufacturing cost allowance for butter is $0.156 per pound. About 75% of the butter was processed at a cost less than the manufacturing cost allowance.

Cost Groups	Number of Plants	Processing Labor	Processing Non-Labor	Package	Other Ingredient	General & Administrative	Return on Investment	Total Cost	Volume in Group
		dollars per pound of butter							
Low Cost	4	$0.0446	$0.0456	$0.0098	$0.0045	$0.0117	$0.0068	$0.1230	288,092,738
High Cost	4	$0.0692	$0.0652	$0.0106	$0.0026	$0.0256	$0.0061	$0.1793	94,838,606
Summary Statistics									
Weighted Average		**$0.0507**	**$0.0504**	**$0.0100**	**$0.0040**	**$0.0151**	**$0.0066**	**$0.1368**	
Range: Minimum		$0.0392	$0.0336	$0.0073	$0.0016	$0.0053	$0.0038		
Range: Maximum		$0.1826	$0.1124	$0.0141	$0.0086	$0.0914	$0.0103		
Total									**382,931,344**

Characteristics of Butter Plants

While the summary analyses of the cost studies that have been published historically have provided many insights into butter processing plants in California, they do not address some of the most basic features of the plants and how different costs compare among the plants in the study. In the following section, summary statistics are provided to indicate how much variation exists among butter plants. The "weighted average" is based on pounds of butter produced. The "median" indicates the point at which half of the plants are above and half of the plants are below the given figure.

Throughout this section, column charts are used to show the distribution of plants within a specified category or the breakdown of costs by category. The graphs give an indication of how much variation exists among the plants and the relative impact of individual cost categories.

Figure 15. Simplified Flowchart of a Butter and Nonfat Dry Milk Plant

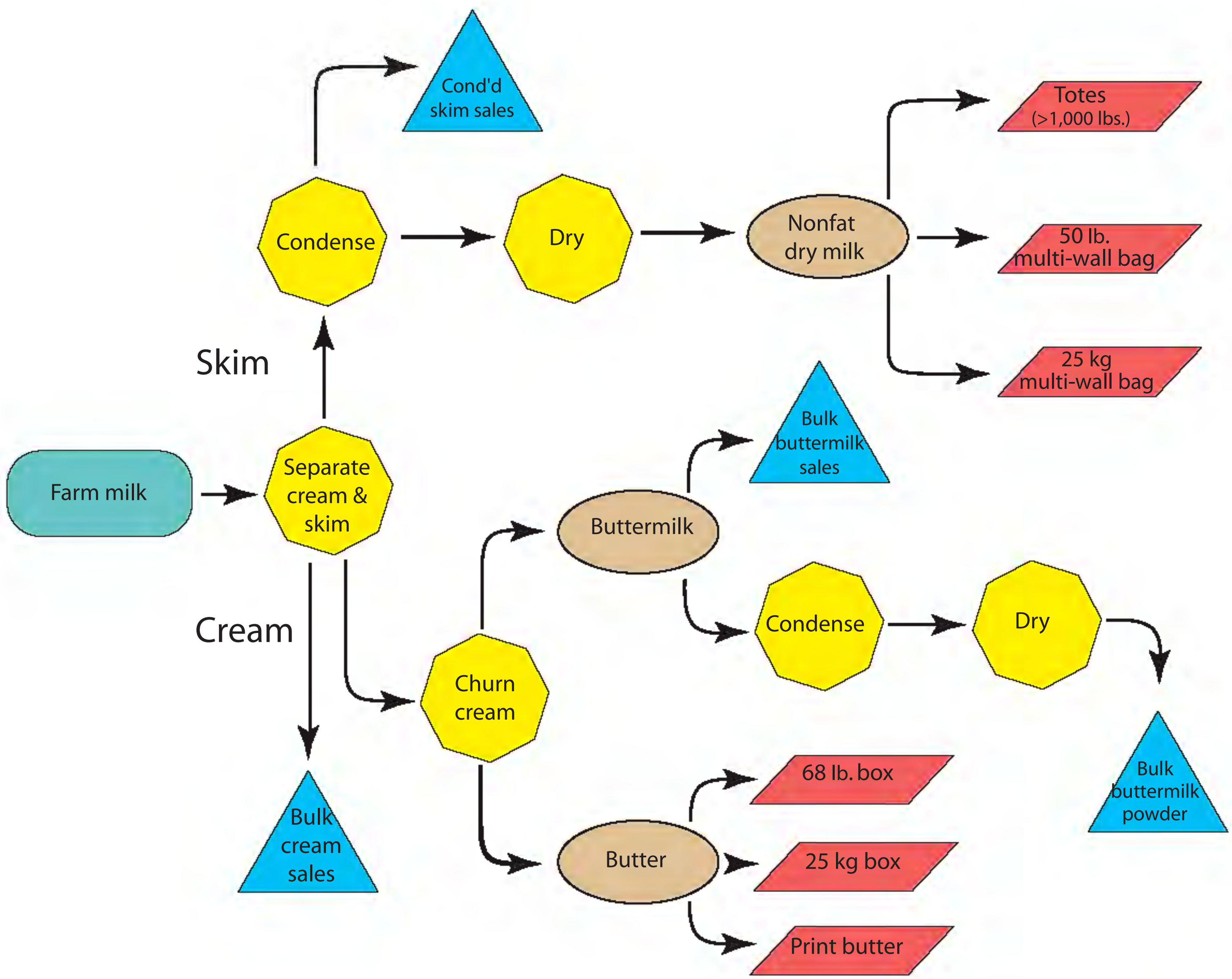


Figure 16. Breakdown of Butter Processing Costs

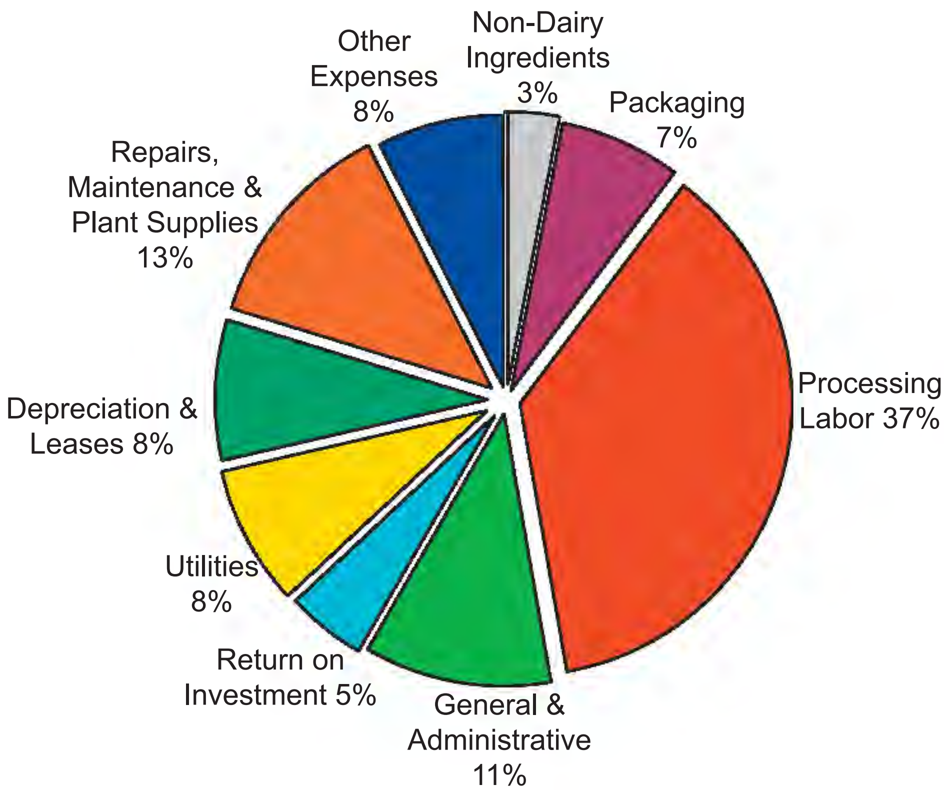


Figure 17. Breakdown of Butter Packaging Sizes and Types

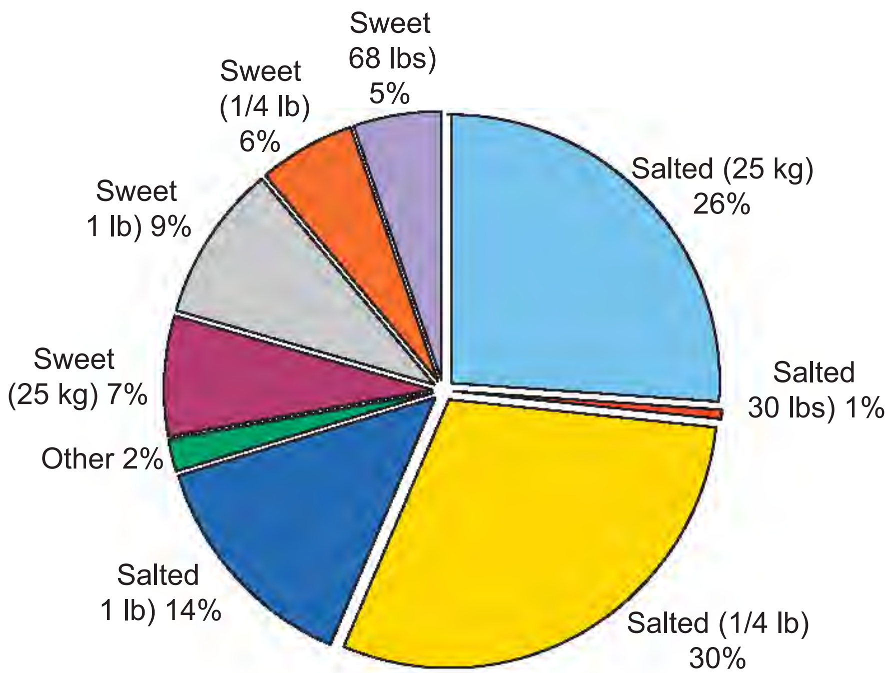
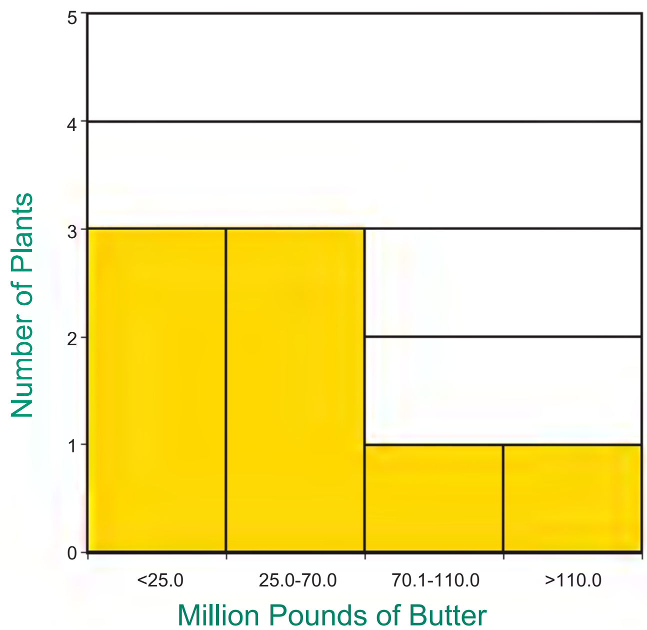


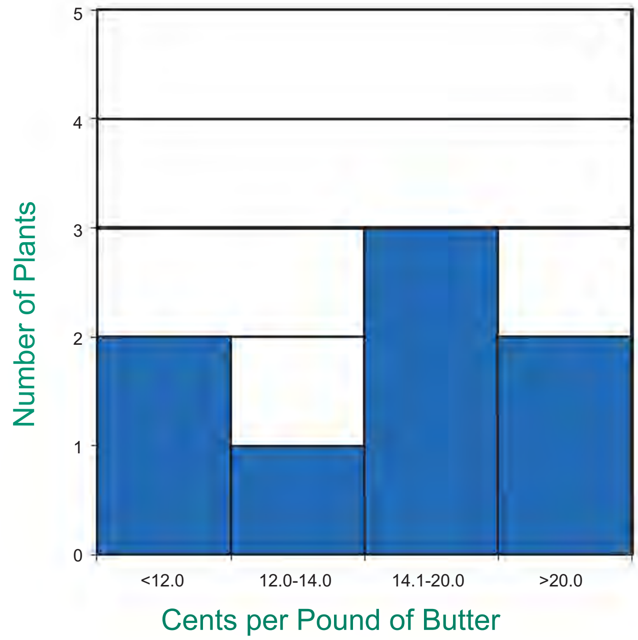
Figure 18. Annual California Butter Production



Average	=	48 million pounds
Median	=	31 million pounds
Average of low 4	=	16 million pounds
Average of high 4	=	79 million pounds

- Six plants produced less than 60 million pounds in 2004, while two plants produced more than 90 million pounds.
  The 4 largest plants produced 5 times more butter than the 4 smallest plants.

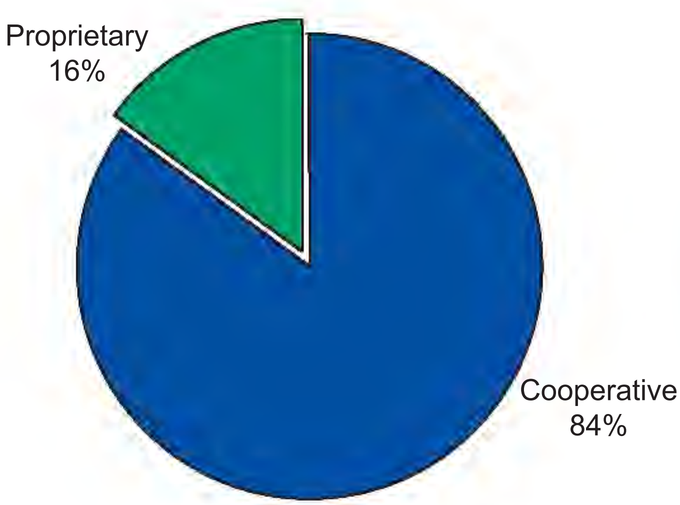
Figure 19. Butter Manufacturing Cost per Pound



Average	=	17.8¢ per pound
Wt'd Average	=	13.7¢ per pound
Median	=	14.2¢ per pound
Average of low 4	=	12.3¢ per pound
Average of high 4	=	17.9¢ per pound

- Half of the plants produced butter for less than 15¢ per pound.
- In general, larger butter plants tended to have lower per unit butter production costs than smaller plants.
- Plants with higher total processing costs also had higher labor costs.
- The average cost per pound of the high cost plants was 46% higher than that of the low cost plants.

Figure 20. Share of California Butter Production by Ownership Type and by Workforce Type



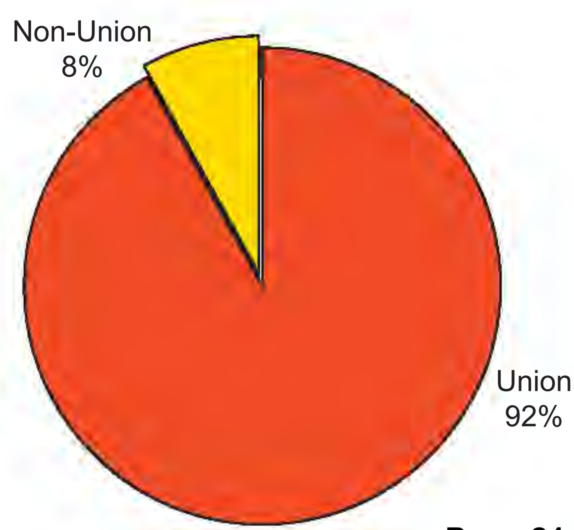
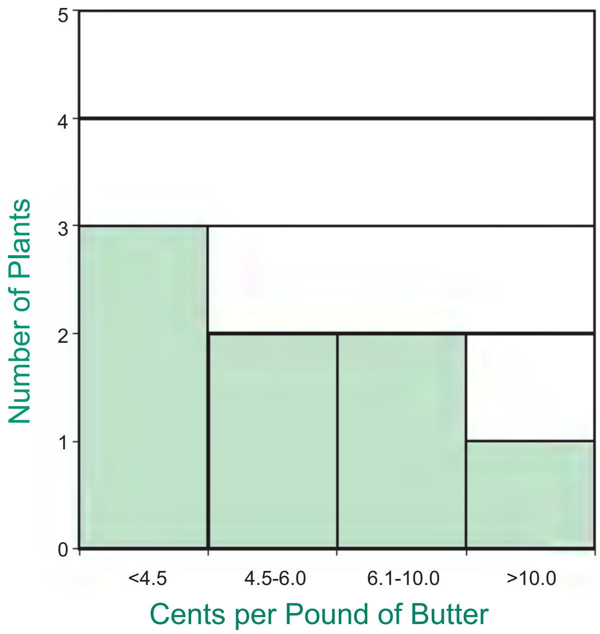


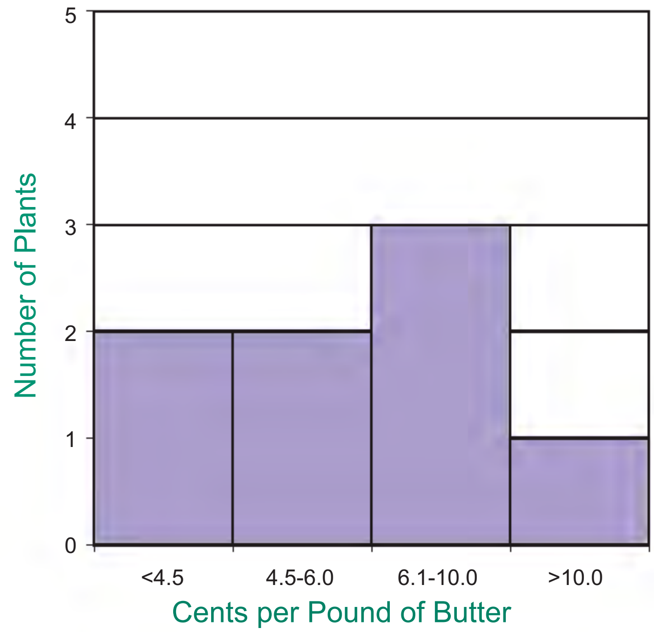
Figure 21. Processing Labor Cost per Pound



Average	=	6.9¢ per pound
Wt'd Average	=	5.1¢ per pound
Median	=	4.8¢ per pound
Average of low 4	=	4.5¢ per pound
Average of high 4	=	6.9¢ per pound

- Five plants had labor costs of 4.7¢ or more per pound.
- The average labor cost per pound for the high 4 plants was 53% higher than the average labor cost for the low 4 plants.

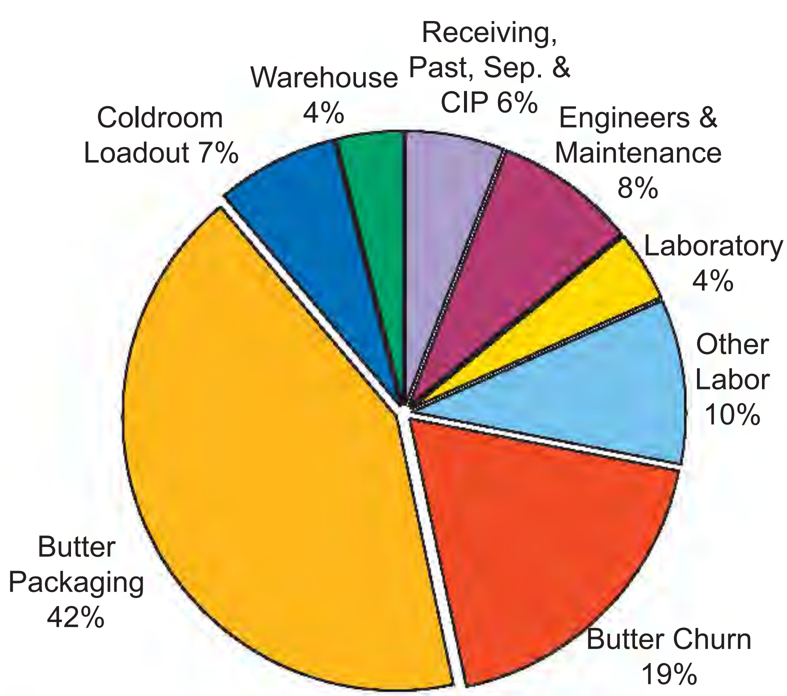
Figure 22. Processing Non-Labor Cost per Pound



Average	=	6.6¢ per pound
Wt'd Average	=	5.0¢ per pound
Median	=	6.2¢ per pound
Average of low 4	=	4.4¢ per pound
Average of high 4	=	9.0¢ per pound

- Processing non-labor costs were more variable than processing labor costs.
- Four of the plants had processing non-labor costs between 3¢ and 6¢ per pound.
- The average non-labor cost per pound for the high 4 plants was 41% higher than the average non-labor cost for the low 4 plants.

Figure 23. Butter Labor Breakdown by Category

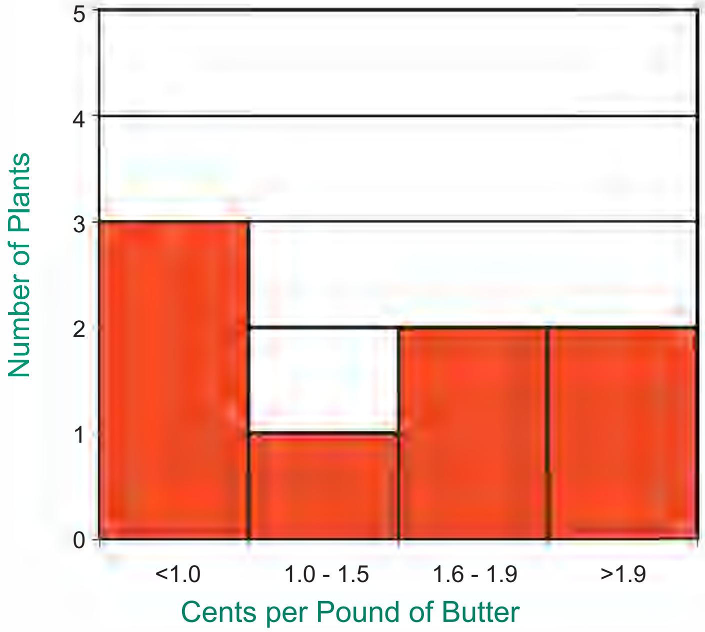


Based on detailed data:
Labor cost averaged 6.9¢ per pound
Labor cost averaged $3.82 per 25 kg box

Note: "Other" includes plant manager/ superintendent, general plant, and plant clerical

Figure 24. Utility Cost per Pound

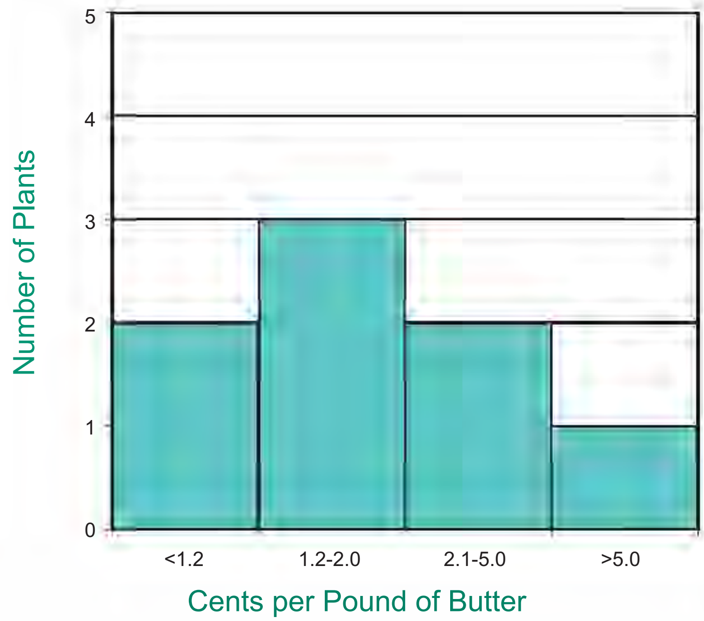
Includes cost of natural gas, fuel oil, electricity, and sewage



Average	=	1.6¢ per pound
Wt'd Average	=	1.1¢ per pound
Median	=	1.6¢ per pound
Average of low 4	=	1.0¢ per pound
Average of high 4	=	2.3¢ per pound

- Utility cost per pound ranged from 0.7¢ to 3.6¢.
- The average utility cost per pound for the high 4 plants was 130% higher than the average utility cost for the low 4 plants.

Figure 25. Repairs, Maintenance, and Supplies Cost per Pound



Average	=	2.4¢ per pound
Wt'd Average	=	1.8¢ per pound
Median	=	2.0¢ per pound
Average of low 4	=	1.5¢ per pound
Average of high 4	=	3.3¢ per pound

- Repair, maintenance, and supplies cost per pound ranged from 0.9¢ to 6.1¢ per pound.
- Six plants had costs of more than 1.9¢ per pound.
- Per-pound repairs and maintenance costs were not necessarily lower in the larger plants relative to the smaller plants.

Figure 26: Comparison of Payroll Breakdown for Plant Employees and Salaried Employees

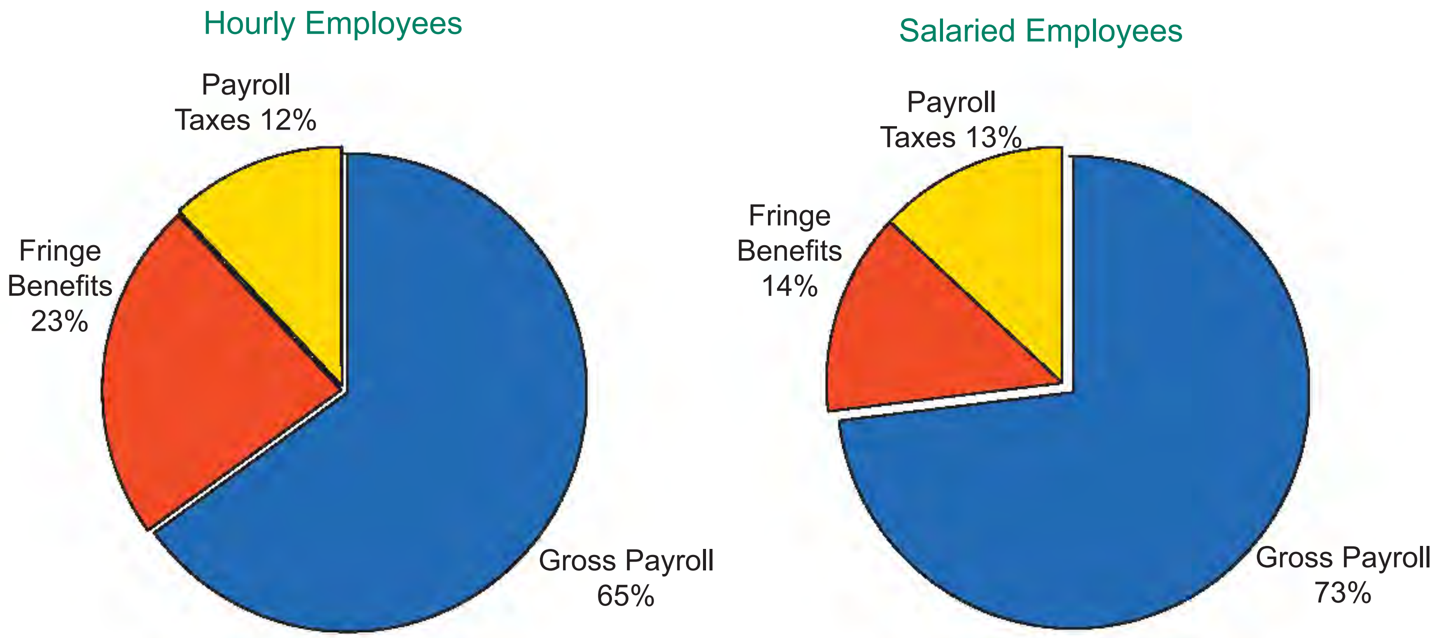
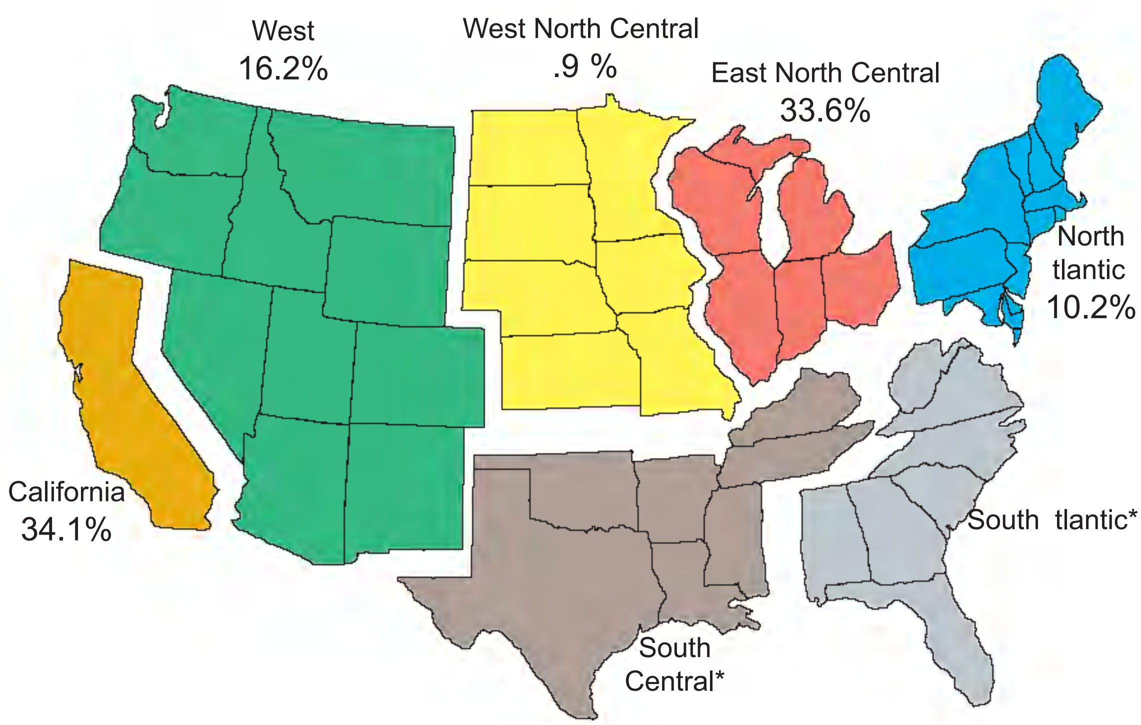


Figure 27. Share of Butter Production by Region, 2005



*Not disclosed for confidentiality reasons.

Nonfat Dry Milk Study

Cost studies were completed on ten nonfat dry milk (NFDM) plants for 2004. Plant cost summary statistics based on the study plants give an indication of of plant size and per pound processing costs for various categories (Table 4). To avoid revealing plant-specific information, the ten plants were assigned to one of three groups according to total processing cost. Only costs for bagged NFDM were analyzed although high-volume totes are becoming more common in some plants (Figures 30 and 32).

- The data indicated that the lower cost NFDM plants in the state tended to be the larger plants. Specifically, the three low cost plants in the study produced 63 percent of the NFDM in California during the study period.

- Among the three cost groupings, labor cost was the single largest item that determined NFDM manufacturing cost. Processing labor ranged from a weighted average of 2.9¢ per pound in the low cost group to an average of 8.4¢ per pound in the high cost group, a 5.5¢ difference from the low cost group to the high cost group.

- Processing non-labor costs as a group were larger than labor costs but included several different plant expenses, such as utilities, depreciation, repairs and maintenance, laundry, supplies and plant insurance. These costs ranged from 7.8¢ per pound to 12.3¢ per pound, a 4.5¢ difference from the low cost group to the high cost group.

- The return on investment (ROI) allowance is calculated by subtracting accumulated depreciation from the original cost of assets. The remaining book value is multiplied by the Moody's "BAA" corporate bond index. Those amounts are then allocated to the products in the plant based on the same methods used to allocate the depreciation expense. The ROI costs for NFDM plants are up slightly from last year due to the change from Prime Rate to Moody's "BAA."

- Packaging costs were somewhat lower for the high cost groups; general and administrative costs were 12 percent lower in the high cost group compared to the medium cost group.

Table 4. Processing Costs for Ten California Nonfat Dry Milk Plants

1. Manufacturing cost data were collected and summarized from ten California nonfat powder plants. The ten plants processed 745 million pounds of nonfat powder during the study period, representing 99.2% of the nonfat powder processed in California.

2. The processing costs summarized in this study were incurred during a 12-month period, starting in January 2004 and concluding in December 2004.

3. The “Processing Non-Labor” category includes costs such as utilities, repairs and maintenance, supplies, depreciation and rent.

4. The volume total includes all grades of nonfat powder packaged in any container size, but the costs reflect only costs for 25 kg and 50 lb. bags of nonfat powder.

5. To obtain the weighted average, individual plant costs were weighted by their nonfat powder processing volume relative to the total volume of nonfat powder processed by all plants involved in the cost study.

6. The current manufacturing cost allowance for nonfat powder is $0.152 per pound. About 63% of the nonfat powder was processed at a cost less than the manufacturing cost allowance.

Cost Groups	Number of Plants	Processing Labor	Processing Non-Labor	Package	General Administrative	Return on Investment	Total Cost	Volume in Group
		dollars per pound of powder						
Low Cost	3	$0.0291	$0.0784	$0.0141	$0.0089	$0.0068	$0.1373	468,014,288
Medium Cost	4	$0.0360	$0.0986	$0.0152	$0.0136	$0.0099	$0.1733	238,532,017
High Cost	3	$0.0840	$0.1228	$0.0115	$0.0121	$0.0108	$0.2412	38,852,610
Summary Statistics								
Weighted Average		**$0.0342**	**$0.0872**	**$0.0143**	**$0.0106**	**$0.0080**	**$0.1543**	
Range: Minimum		$0.0283	$0.0750	$0.0096	$0.0075	$0.0032		
Range: Maximum		$0.1037	$0.1955	$0.0158	$0.0351	$0.0157		
Total								**745,398,915**

Characteristics of Nonfat Dry Milk Plants

While the summary analyses of the cost studies that have been published historically have provided many insights into NFDM operations in California, they do not address some of the most basic features of the plants and how different costs compare among the plants in the study. In the following section, summary statistics are provided to indicate how much variation exists among NFDM plants. The weighted average is weighted by pounds of NFDM produced. The “median” indicates the point at which half of the plants above and half of the plants are below the given figure.

Throughout this section, column charts are used to show the distribution of plants within a specified category or the breakdown of costs by category. The charts give an indication of how much variation exists among the plants and the relative impact of individual cost categories.

Figure 28. Simplified Flowchart of a Butter and Nonfat Dry Milk Plant

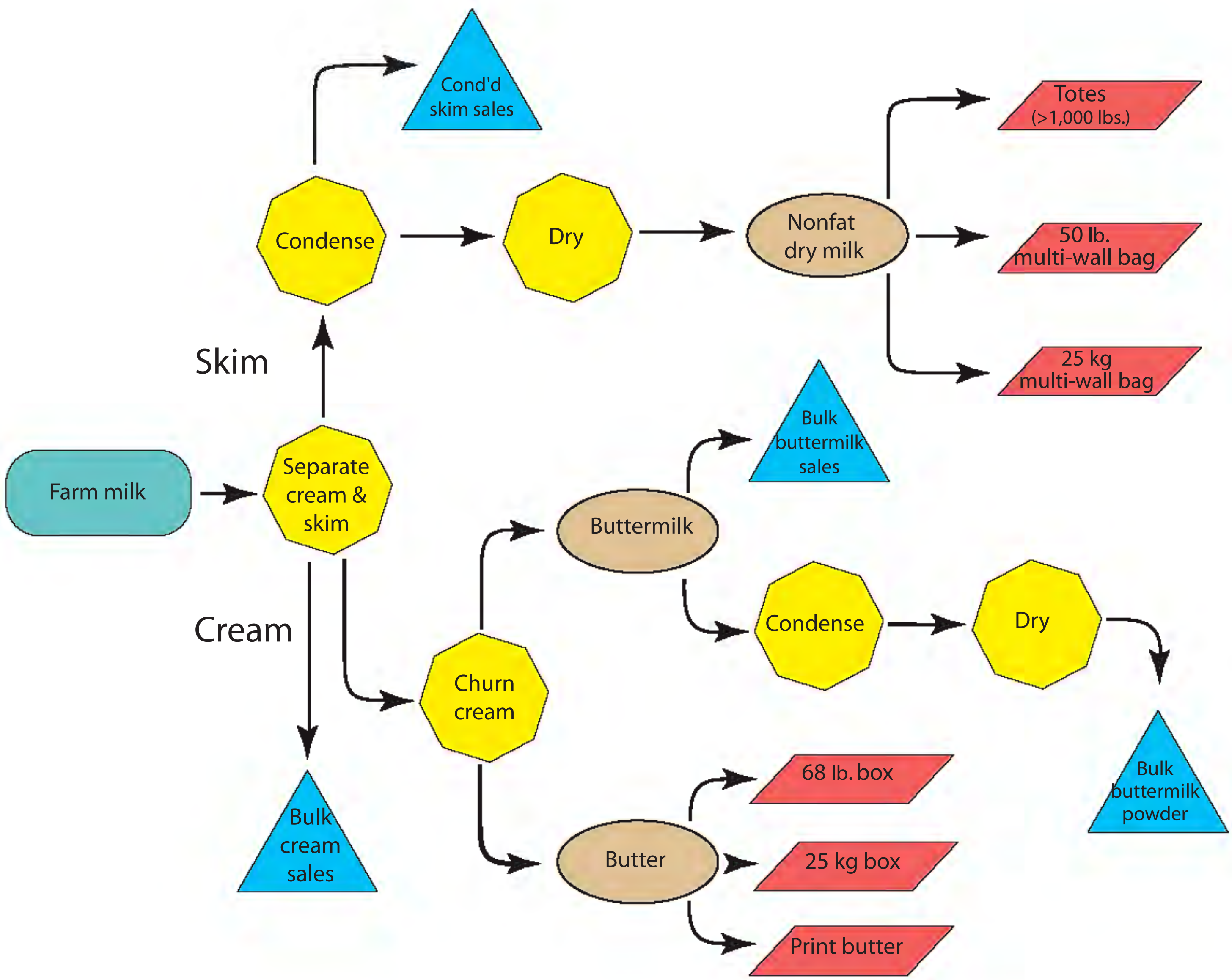


Figure 29. Breakdown of Nonfat Dry Milk Processing Costs

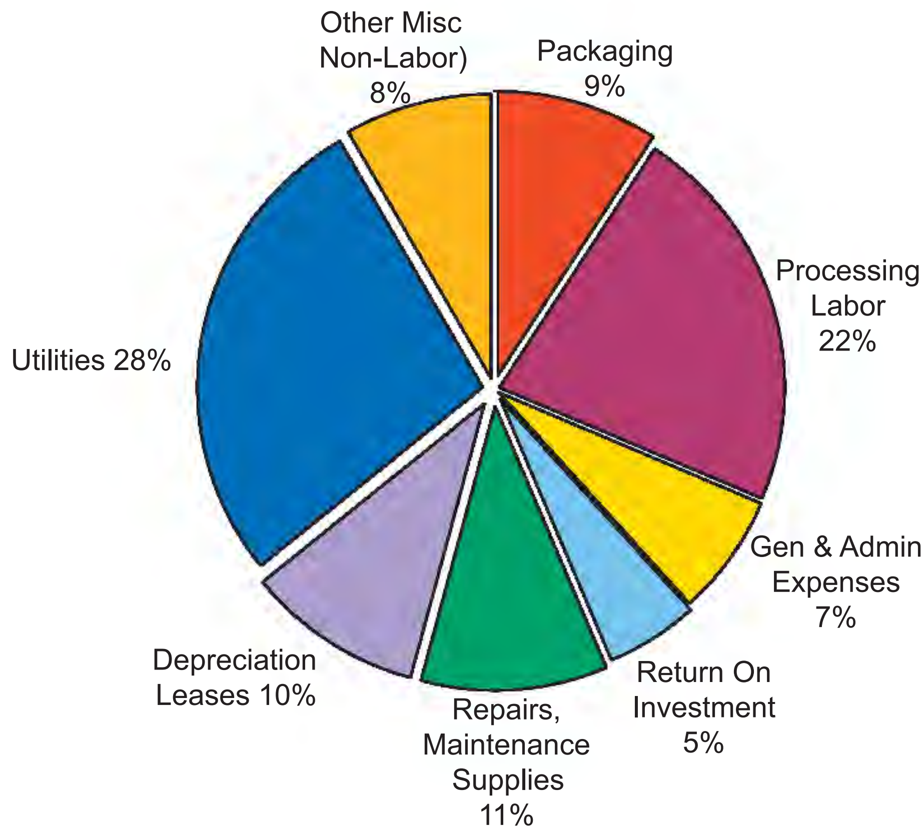


Figure 30. Breakdown of Nonfat Dry Milk Packaging Sizes

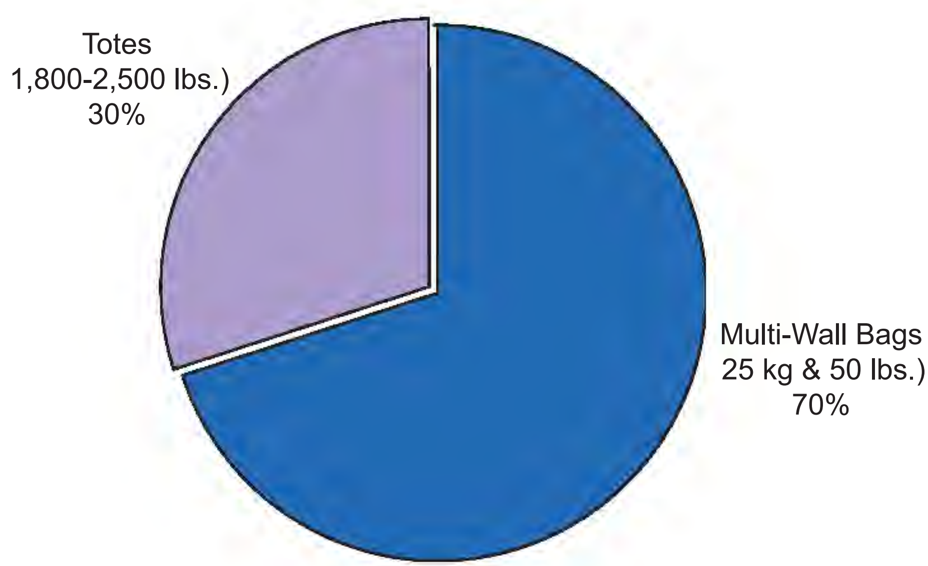
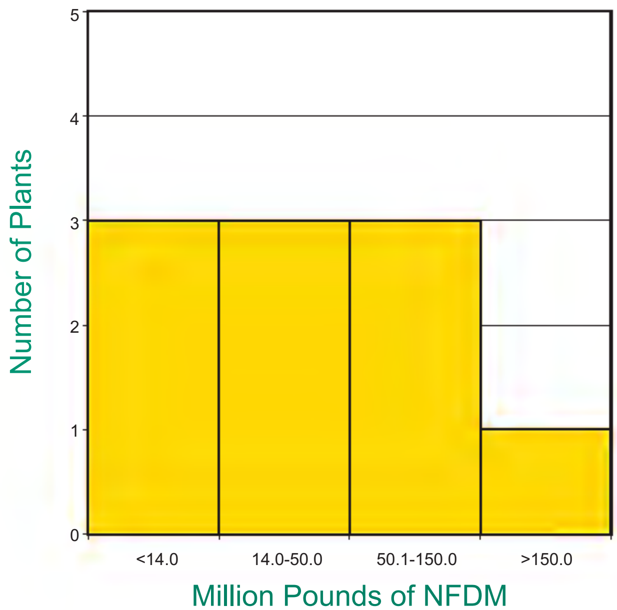


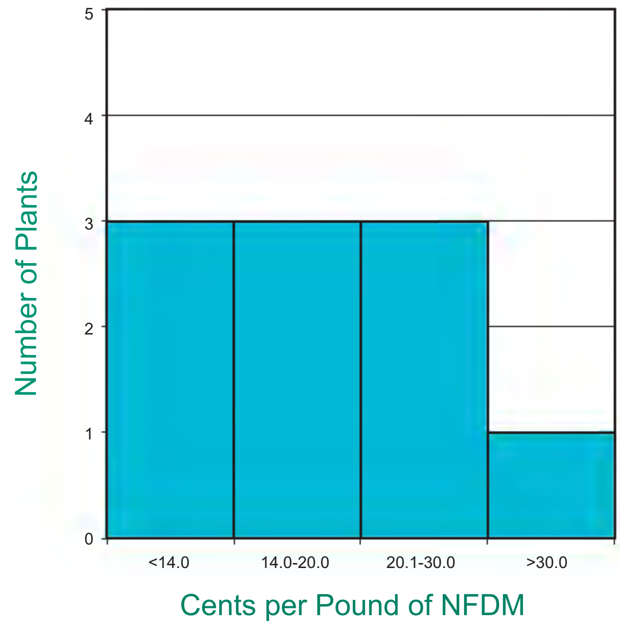
Figure 31. Annual California Nonfat Dry Milk Production



Average	=	75 million pounds
Median	=	39 million pounds
Average of low 3	=	11 million pounds
Average of high 3	=	166 million pounds

- Four plants produced more than 100 million pounds of NFDM annually which represents over 83% of total powder.
- On average, the three largest plants produced nearly 15 times more NFDM than the three smallest plants.

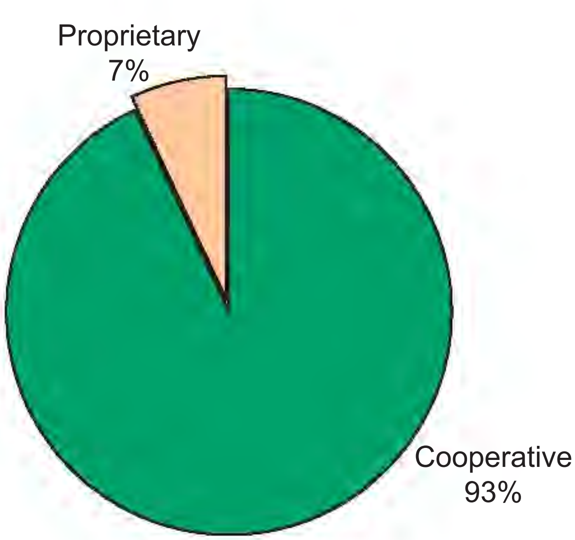
Figure 32. NFDM Manufacturing Cost per Pound



Average	=	19.2¢ per pound
Wt'd Average	=	15.4¢ per pound
Median	=	17.3¢ per pound
Average of low 3	=	13.7¢ per pound
Average of high 3	=	24.1¢ per pound

- Three plants produced NFDM for less than 14¢ per pound, and seven plants produced NFDM for more than17¢ per pound.
- The four lowest volume plants were also the highest cost plants.
- The plants with the lowest processing labor costs had the lowest total manufacturing costs.

Figure 33. Share of California Nonfat Dry Milk Production by Ownership Type and by Workforce Type



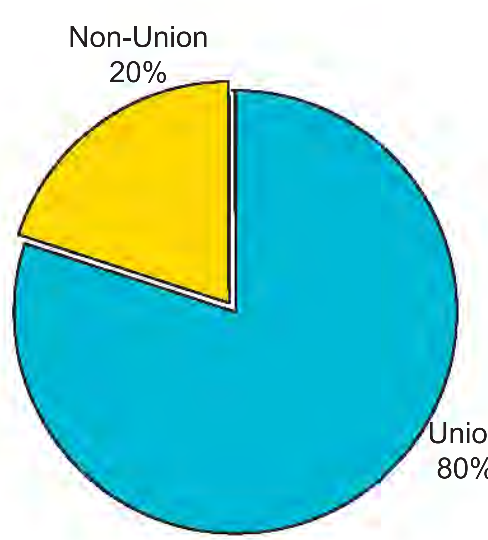
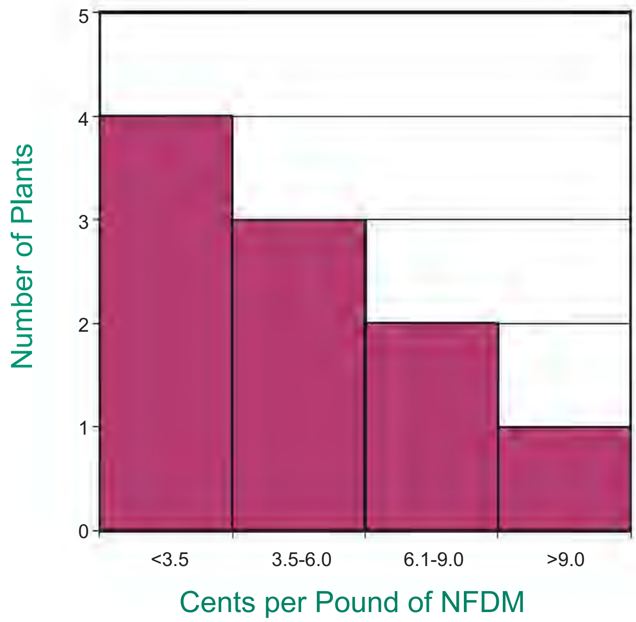


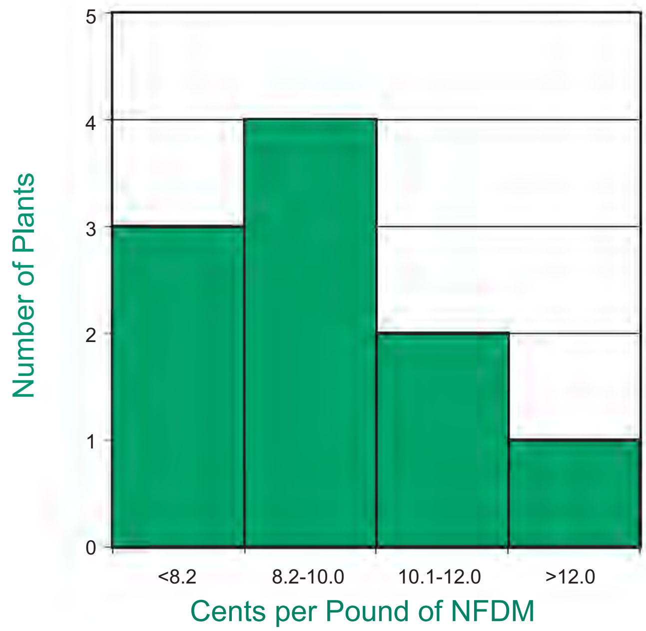
Figure 34. NFDM Processing Labor Cost per Pound



Average	=	5.2¢ per pound
Wt'd Average	=	3.4¢ per pound
Median	=	4.5¢ per pound
Average of low 3	=	2.9¢ per pound
Average of high 3	=	8.4¢ per pound

- Three out of ten plants had labor costs over 6¢ per pound.
- The average labor cost per pound for the high 3 plants was 190% higher than the average labor cost for the low 3 plants.

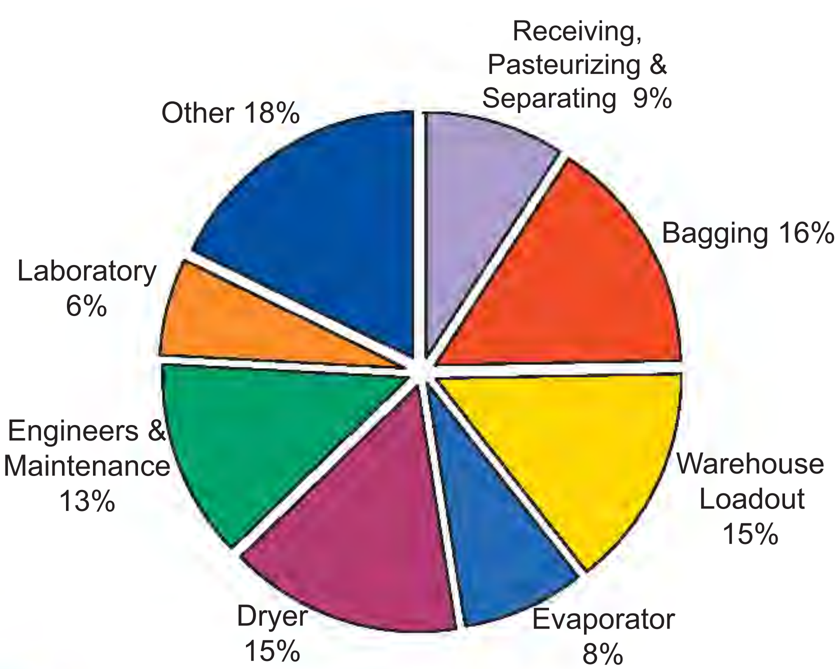
Figure 35. NFDM Processing Non-Labor Cost per Pound



Average	=	10.4¢ per pound
Wt'd Average	=	8.7¢ per pound
Median	=	9.6¢ per pound
Average of low 3	=	7.8¢ per pound
Average of high 3	=	12.3¢ per pound

- The variation in processing non-labor cost was much larger than other cost categories, ranging from 7.5¢ to 19.6¢ per pound.
- In higher cost plants, processing non-labor costs was 58% higher than labor costs.

Figure 36. Nonfat Dry Milk Labor Breakdown by Category

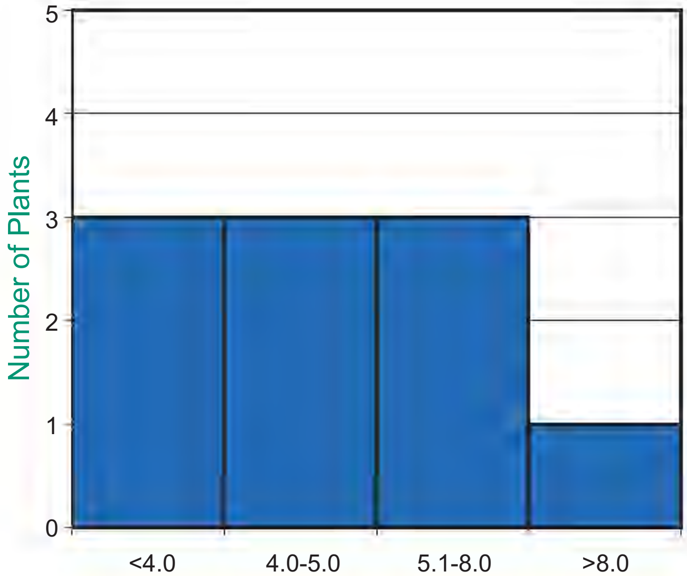


Based on detailed data:
Labor cost averaged 5.2¢ per pound
Labor cost averaged $2.86 per 25 kg bag

Note: "Other" includes plant manager/superintendent, general plant, plant clerical, and field men.

Figure 37. Utility Cost per Pound

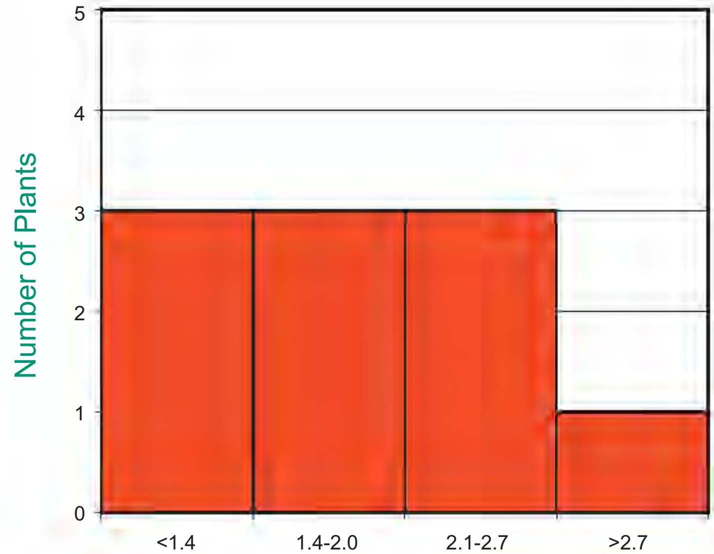
Includes cost of natural gas, fuel oil, electricity and sewage



Average	=	5.4¢ per pound
Wt'd Average	=	4.3¢ per pound
Median	=	4.5¢ per pound
Average of low 3	=	3.7¢ per pound
Average of high 3	=	8.1¢ per pound

- The operation of the dryer added significantly to the utility cost of the powder plants. Natural gas costs ranged from 26% to 75% of the total cost of utilities.
- Most of the plants had utility costs between 3¢ and 6¢ per pound.

Figure 38. Repairs, Maintenance, and Supplies Cost per Pound



Average	=	1.9¢ per pound
Wt'd Average	=	1.6¢ per pound
Median	=	2.0¢ per pound
Average of low 3	=	1.2¢ per pound
Average of high 3	=	2.5¢ per pound

- Five plants had costs less than 2.0¢ per pound.
- Cost of plant supplies exceeded repairs and maintenance by 40%.
- Per pound repairs and maintenance costs were lower in larger volume plants relative to smaller volume plants.

Figure 39. Weighted Average Breakdown of Dollars Spent per Year on Natural Gas and Electricity in NFDM Plants

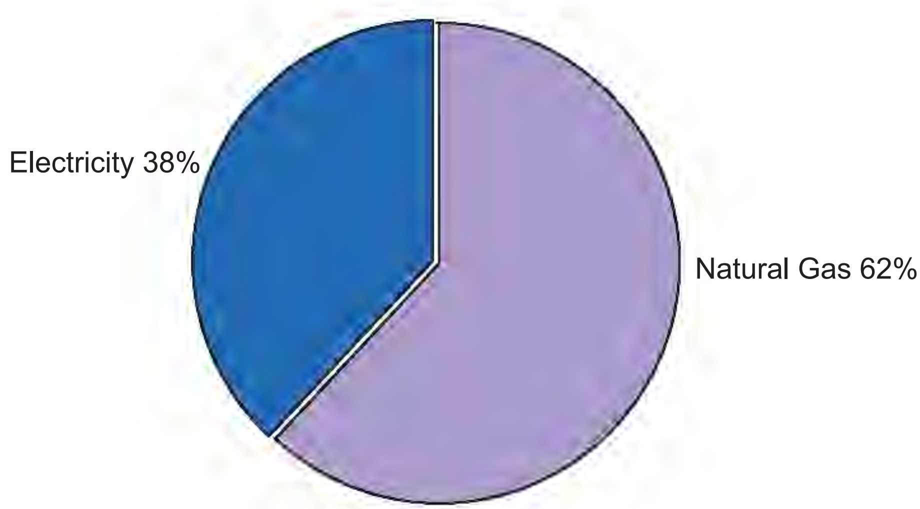


Figure 40: Comparison of Payroll Breakdown for Plant Employees and Salaried Employees

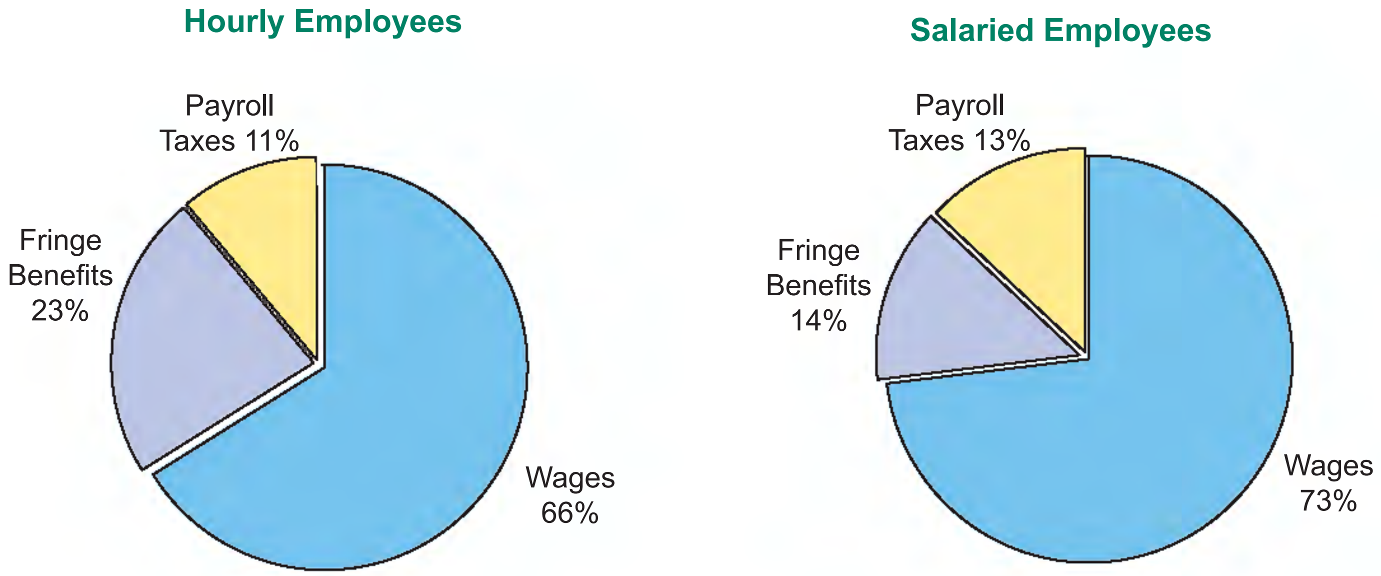
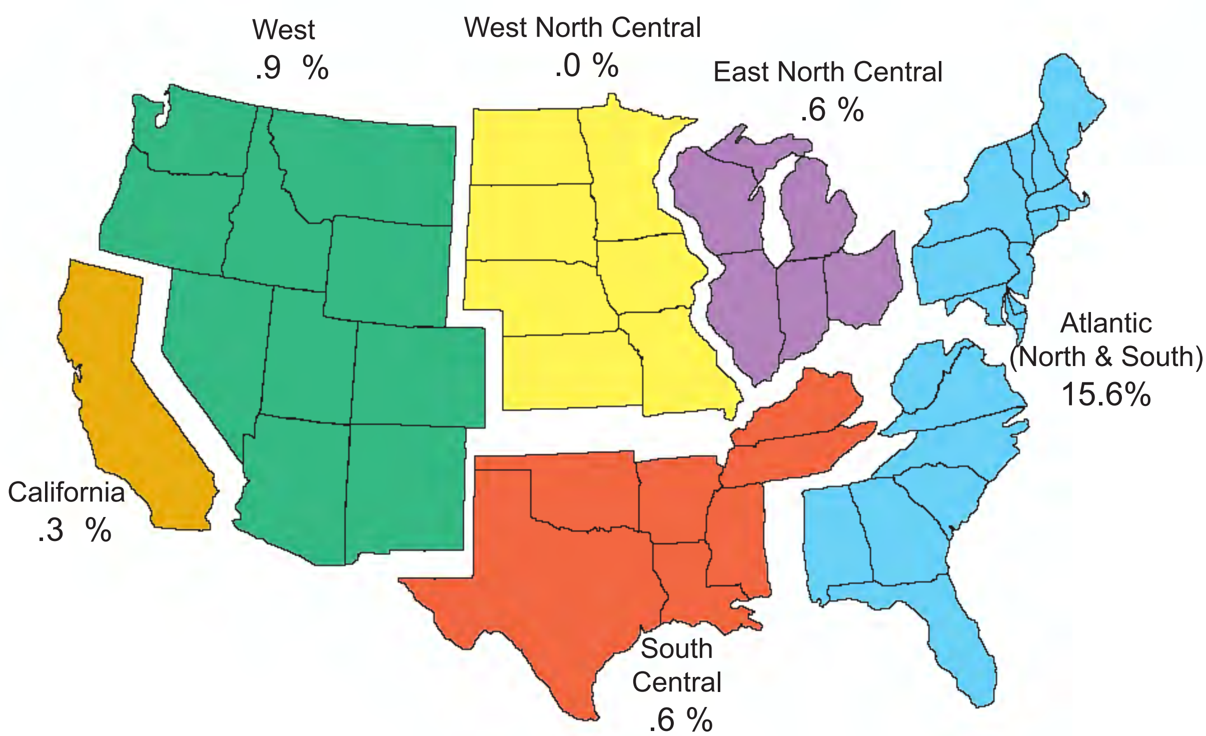


Figure 41. Share of NFDM Production, by Region, 2005



Skim Whey Powder Study

Cost studies were completed on three skim whey powder plants for 2004. Plant cost summary statistics based on the study plants give an indication of plant size and per pound processing costs for various categories (Table 5). Only costs for bagged skim whey powder were analyzed.

- The data indicated that the lower cost skim whey powder plant in the State tended to be the larger plant. Specifically, the low cost plant in the study produced the largest percent of the skim whey powder in California during the study period.

- Processing non labor cost was the largest item that determined whey manufacturing cost. Non labor costs averaged 14.9¢ per pound. Processing non labor costs included several different plant expenses, such as utilities, depreciation, repairs and maintenance, laundry, supplies and plant insurance.

- Processing labor costs as a group were smaller than non labor costs. These costs averaged 6.4¢ per pound.

- The return on investment (ROI) allowance is calculated by subtracting accumulated depreciation from the original cost of assets. The remaining book value is multiplied by the Moody's "BAA" corporate bond index. Those amounts are then allocated to the products in the plant based on the same methods used to allocate the depreciation expense.

Throughout this section, column charts are used to show the distribution of plants within a specified category or the breakdown of costs by category. The charts give an indication of how much variation exists among the plants and the relative impact of individual cost categories.

Table 5. Processing Costs for Three California Skim Whey Powder Plants

1. Manufacturing cost data was collected and summarized from three California skim whey powder plants. The three plants processed 93.2 million pounds of skim whey powder during the study period, representing 79% of the skim whey powder processed in California in 2004.

2. The "Processing Non-Labor" category includes costs such as utilities, repairs and maintenance, supplies, depreciation and rent.

3. The volume total includes skim whey powder packaged in container sizes of 25 kg and 50 lb. bags.

4. To obtain the weighted average, individual plant costs were weighted by their skim whey powder processing volume relative to the total volume of skim whey powder processed by all plants involved in the cost study.

5. The current manufacturing cost allowance for whey is $0.20 per pound. All three plants processed skim whey powder at costs higher than the manufacturing cost allowance.

Cost Groups	Number of Plants	Processing Labor	Processing Non-Labor	Package	General & Administrative	Return on Investment	Total Cost	Volume in Group
		dollars per pound of skim whey powder						
Weighted Average	3	**$0.0635**	**$0.1488**	**$0.0126**	**$0.0026**	**$0.0398**	**$0.2673**	93,271,893
Summary Statistics								
Range: Minimum		$0.0487	$0.1364	$0.0091	$0.0013	$0.0314		
Range: Maximum		$0.0772	$0.1921	$0.0199	$0.0049	$0.0514		
Total								**93,271,893**

Figure 42. Breakdown of Skim Whey Powder Processing Costs

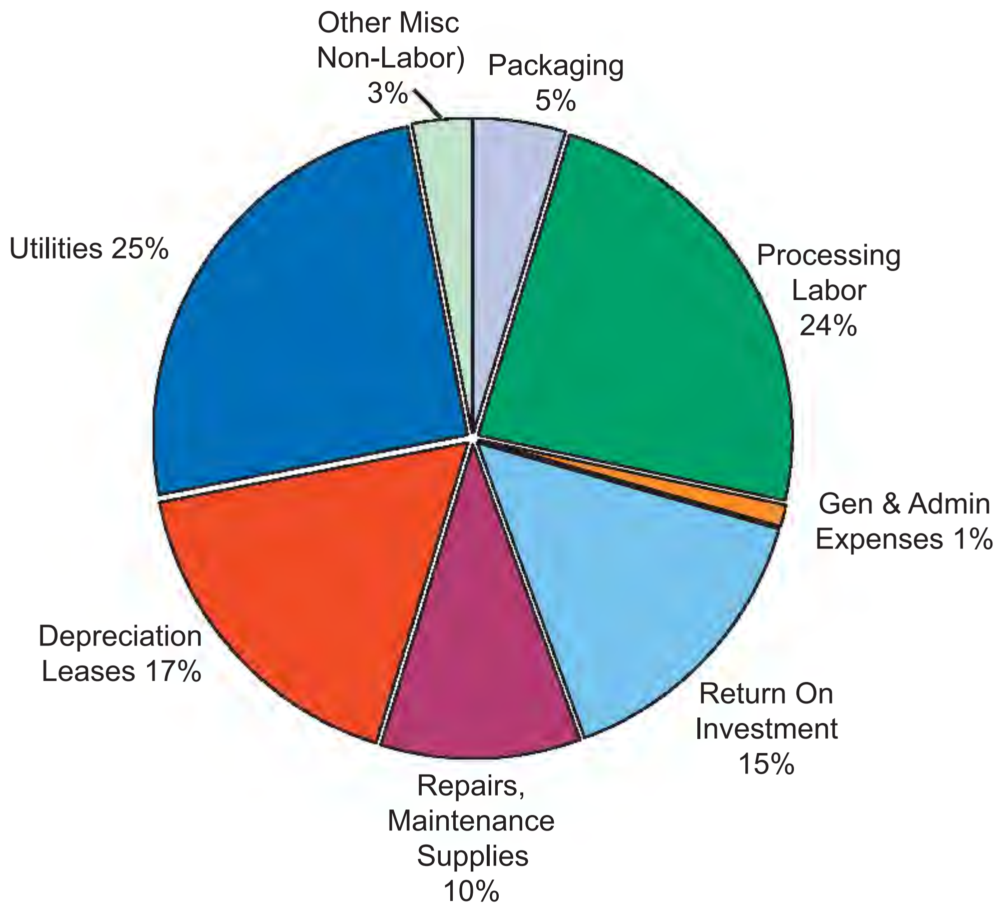


Figure 43. Weighted Average Breakdown of Dollars Spent per Year on Natural Gas and Electricity in Skim Whey Powder Plants

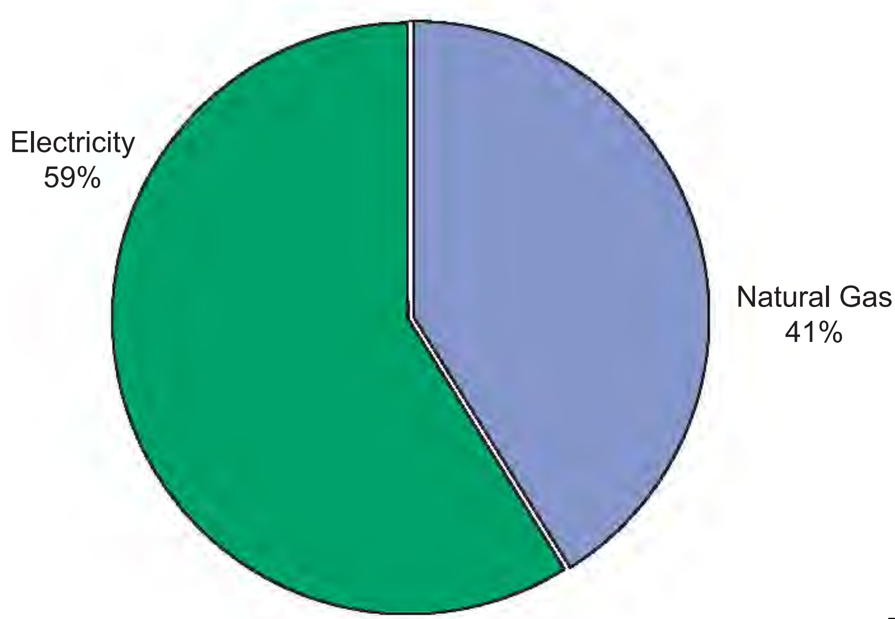
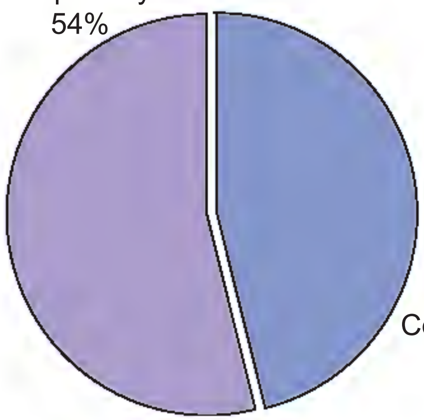


Figure 44. Share of California Skim Whey Powder Production by Ownership Type and by Workforce Type



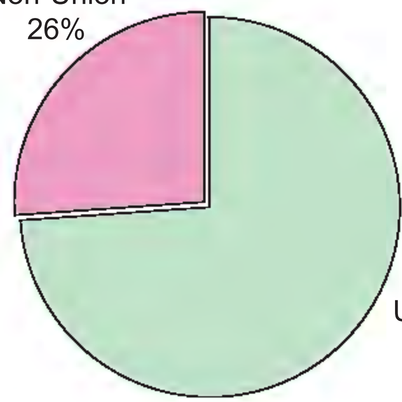
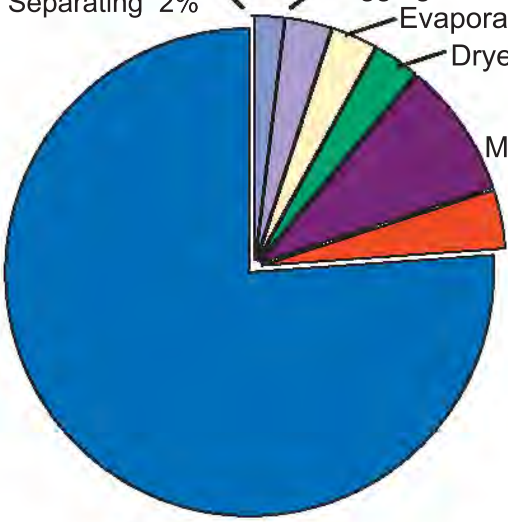


Figure 45. Skim Whey Powder Labor Breakdown by Category

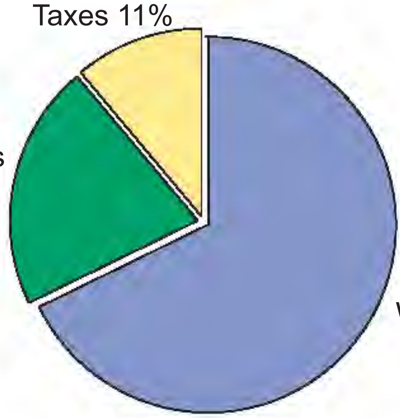


Based on detailed data:
Labor cost averaged 6.4¢ per pound
Labor cost averaged $3.94 per 25 kg bag
Labor cost averaged $2.15 per 20 kg bag

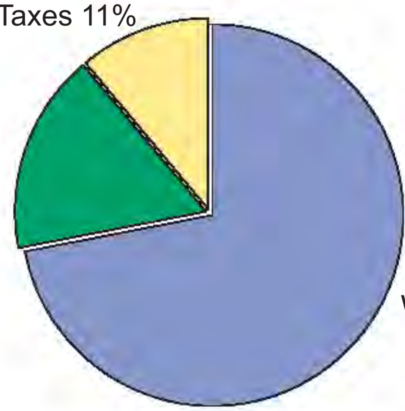
Note: "Other" includes plant manager/ superintendent, general plant, plant clerical, and field men.

Figure 46: Comparison of Payroll Breakdown for Plant Employees and Salaried Employees

Hourly Employees



Salaried Employees



Condensed Skim and Cream Study

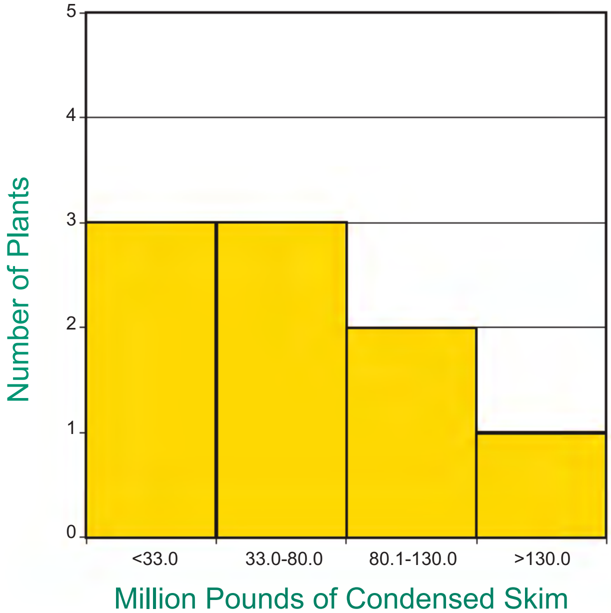
Most of the costs allocated to cream, condensed skim and other bulk dairy products come from general labor and general non-labor plant expenses. There are very little, if any, direct plant expenses allocated to these bulk fluid products. Because of the nature of allocating general plant expenses, the costs per pound of condensed skim and cream are not as precise compared to the costs per pound on packaged products such as butter, powder and cheese whose plant costs are largely composed of direct expenses.

Condensed Skim Overview

Cost studies were completed on nine condensed skim plants for 2004. In order not to reveal individual plant information, only general information is included in this section.

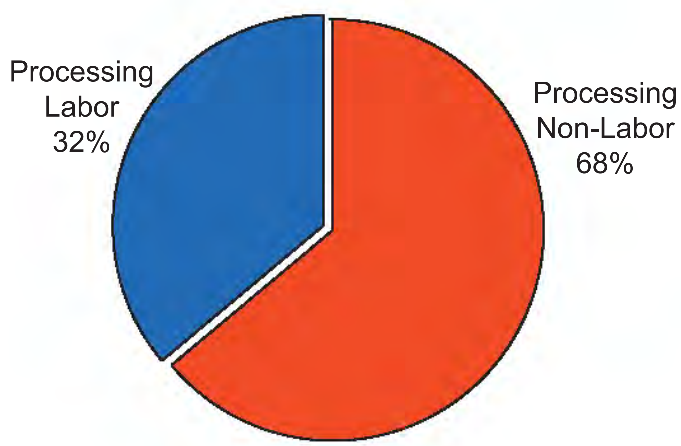
- Plants processed an average of 65 million pounds of condensed skim per year, but this statistic is somewhat misleading because of the tremendous disparity in actual processing volume. Two of the nine plants processed less than 20 million pounds per year, and three plants processed over 100 million pounds per year. The remaining four plants processed between 29 million and 80 million pounds per year.

Figure 47. Annual Condensed Skim Production



Average	=	65 million pounds
Median	=	37 million pounds
Average of low 3	=	14 million pounds
Average of high 3	=	132 million pounds

Figure 48. Comparison of Processing Costs for Condensed Skim

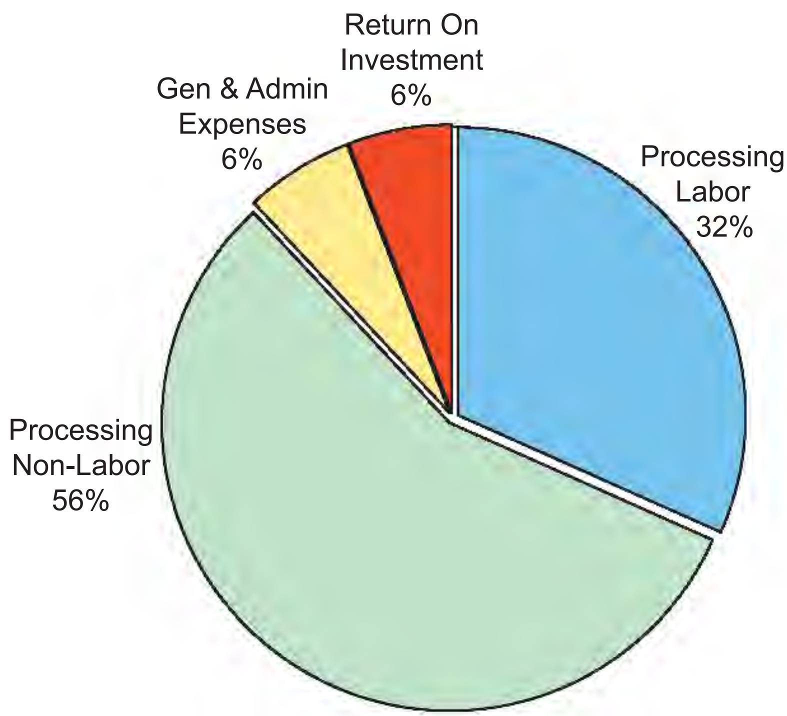


Processing non-labor includes utilities, depreciation, repairs and maintenance, laundry, supplies, and plant insurance

Low ratio	=	22% Labor 78% Non-Labor
High ratio	=	49% Labor 51% Non-Labor

- In general, processing non-labor costs for condensed skim production were about twice as large as labor costs but included several different plant expenses, such as utilities, depreciation, repairs and maintenance, laundry, supplies and plant insurance. Processing non-labor costs showed surprisingly little variation, ranging from 1.3¢ per pound to 2.8¢ per pound.

Figure 49. Breakdown of Condensed Skim Processing Costs



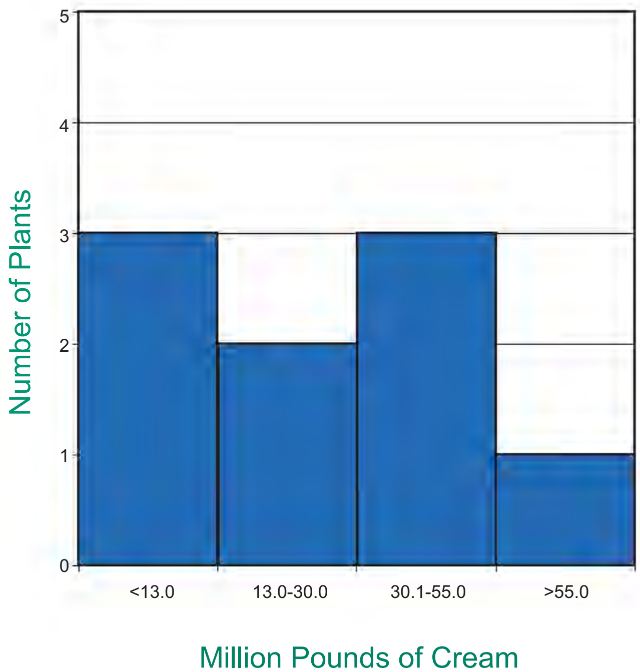
Cream Overview

Cost studies were completed on nine cream plants for 2004. So as not to reveal individual plant information, only general information is included in this section.

- Plants processed an average of 32 million pounds of cream per year. Unlike condensed skim processing, the range of cream volumes was relatively narrow.

- In general, processing non-labor costs as a group were about 56 percent higher than labor costs but included several different plant expenses, such as utilities, depreciation, repairs and maintenance laundry, supplies and plant insurance.

Figure 50. Annual Cream Production



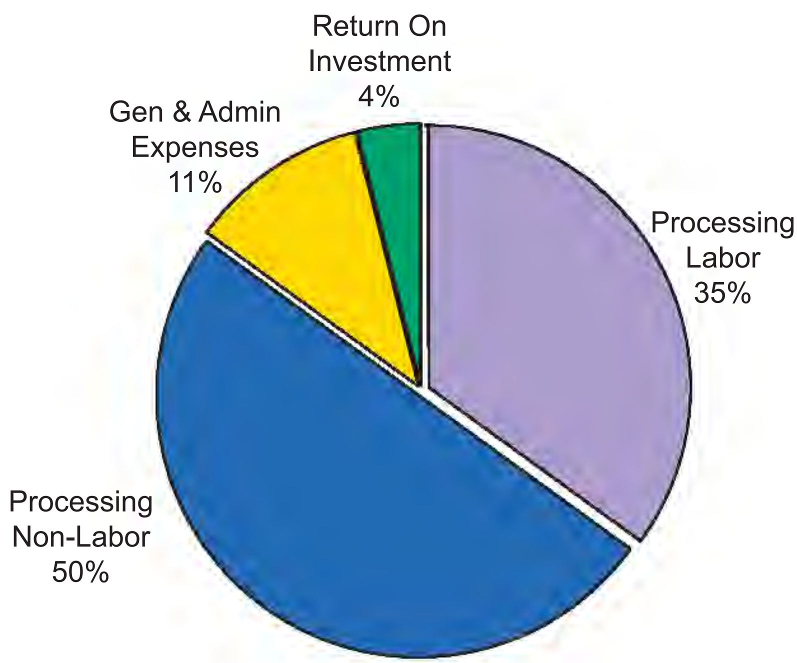
Average	=	32	million pounds
Median	=	30	million pounds
Average of low 3	=	9	million pounds
Average of high 3	=	60	million pounds

Figure 51. Comparison of Processing Costs for Cream

Processing non-labor includes utilities, depreciation, repairs and maintenance, laundry, supplies, and plant insurance

Low ratio	=	29% Labor 71% Non-Labor
High ratio	=	52% Labor 48% Non-Labor

Figure 52. Breakdown of Cream Processing Costs



Manufacturing Cost Unit
Dairy Marketing Branch
California Department of Food and Agriculture
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Sacramento, CA 95814-5621