



Manufacturing Cost Annual

California 2016 Data



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California **Manufacturing Cost Annual**

2016 Data

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Special Thanks

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.

We welcome your comments on this Manufacturing Cost Annual. Please send your comments and suggestions to:

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Introduction

The California Food and Agricultural Code specifies that the California Department of Food and Agriculture (CDFA) must consider manufacturing costs in determining appropriate minimum prices for products categorized as Class 4a (butter and dried milk products) and Class 4b (cheese). To comply with the legislative decree, CDFA has a direct need for gathering and summarizing information provided in the cost studies to formulate reasonable manufacturing cost (make) allowances through the public hearing process.

CDFA maintains a Manufacturing Cost Unit that consists of professional auditors specializing in dairy accounting practices. The auditors work with plant management to gather data on all aspects of the operation, review plant records on-site, and allocate plant expenditures to each product manufactured by the plant. The studies are conducted and developed in conformity with generally accepted accounting principles, cost accounting techniques, and instructions contained in the Dairy Marketing Branch's Audit and Cost Procedures Manual.

Any plant that produces Class 4a and/or Class 4b products may be asked to participate in the cost studies. Information gathered in the studies provides an accurate sampling of California's annual butter, nonfat dry milk (NFDM), and Cheddar cheese production. The 2016 California Manufacturing Cost Annual includes data obtained from seven butter plants, eight NFDM plants, and four Cheddar cheese plants. Data on condensed skim and cream is collected concurrently from plants that participate. Plants that manufacture condensed skim and cream but do not manufacture butter, NFDM, or Cheddar cheese are not included in the condensed skim and cream overview. As a result, data on condensed skim and cream is based on a lower percentage of annual production.

The data from the cost studies has a practical significance beyond the boundaries of California. They are the only studies in the U.S. which present the audited and detailed processing costs of butter, NFDM, and Cheddar cheese over several years. For the plants in the study, the results can help to isolate the actual costs of manufacturing and provide benchmark figures obtained from other California manufacturing plants. Consequently, although CDFA has the legal authority to collect cost information from the various types of milk processors, the majority of plants have found the information contained in the studies valuable and have cooperated voluntarily.



Introduction

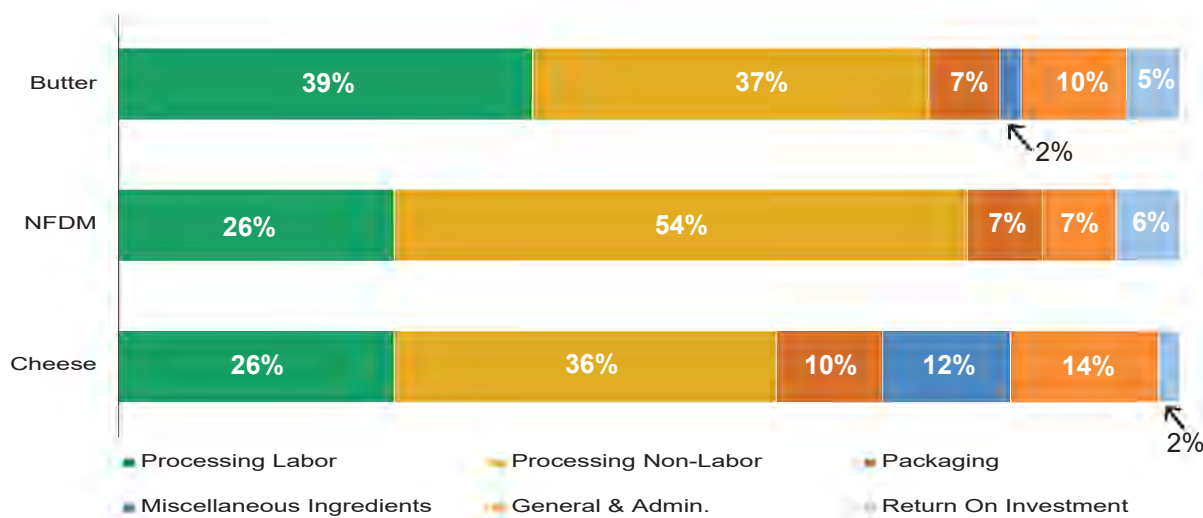
Manufacturing Cost Overview

The weighted average manufacturing cost of a product includes six categories as presented in Figure 1. To obtain a weighted average cost, an individual plant cost is weighted by the plant's production volume relative to the total volume of all the plants included in a study.

- Processing labor costs are derived from plant wages, plant salaries, payroll taxes, and fringe benefits associated with the processing of a product.
- Processing non-labor includes costs such as utilities, repairs, maintenance, supplies, depreciation, plant insurance, and rental expenses.
- Packaging costs include all non-reusable items used in the packaging of a product, such as boxes, bags, tape, glue, and stretch wrap.
- Other ingredient costs may include salt, color, rennet, etc.
- General and administrative costs include expenses incurred in the management of a plant, for example, office supplies, short-term interest, dues and subscriptions, accounting fees, headquarter expenses, office clerical wages, and executive salaries.
- Return on investment (ROI) allowance is an opportunity cost that represents how much interest the plant 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 plant invested its capital elsewhere.

The chart below displays the breakdown of manufacturing cost for each product by category (Figure 1).

Figure 1. Manufacturing Costs by Category



Butter Study

The butter study included seven butter processing plants. The seven plants processed 559.41 million pounds of butter during the period January 2016 through December 2016, representing 99.35 percent of the butter processed in California. Production included both bulk and cut butter; however, published costs are for the processing of bulk butter (25kg and 68lb block) only.

To avoid revealing plant specific information, each plant was assigned to either a low or high cost group based on its total manufacturing cost. In 2016, the low cost group included three plants, while the high cost group included four plants. Table 1 lists the weighted average cost per pound for each category of the butter manufacturing cost.

Table 1. Butter Manufacturing Costs

CURRENT Study Period: January through December 2016
With Comparison to the same time period Prior Year (2015)

- Manufacturing cost data were collected and summarized from seven California butter plants. The seven plants processed 559.41 million pounds of butter during the 12-month study period, January through December 2016, representing 99.35% of the butter processed in California.
- 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).
- 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 included in this cost study.

Breakdown of Butter Manufacturing Costs - January through December 2016

Categories	Low Cost Group	High Cost Group	Range of Costs		CURRENT Weighted Average Cost All Plants Jan-Dec 2016	PRIOR YEAR Weighted Average Cost All Plants Jan-Dec 2015	Actual Difference Current Less Prior Year
			Minimum	Maximum			
<i>Dollars Per Pound of Butter</i>							
Number of Plants	3	4	7	7	7	7	0
Processing Labor	\$0.0656	\$0.0966	\$0.0451	\$0.1301	\$0.0754	\$0.0692	\$0.0062
Processing Non-Labor	\$0.0726	\$0.0718	\$0.0633	\$0.1946	\$0.0724	\$0.0705	\$0.0019
Packaging	\$0.0121	\$0.0144	\$0.0114	\$0.0147	\$0.0128	\$0.0130	-\$0.0002
Misc. Ingredients	\$0.0037	\$0.0039	\$0.0034	\$0.0044	\$0.0038	\$0.0034	\$0.0004
General & Administrative	\$0.0175	\$0.0230	\$0.0142	\$0.0260	\$0.0193	\$0.0179	\$0.0014
Return on Investment	\$0.0123	\$0.0052	\$0.0034	\$0.0204	\$0.0101	\$0.0102	-\$0.0001
Average Total Cost	\$0.1838	\$0.2149	--	--	\$0.1938	\$0.1842	\$0.0096
Volume in Group (Lbs.)	382,442,483	176,970,985	--	--	559,413,468	575,438,032	-16,024,564
% Volume by Group	68.4%	31.6%	--	--	100.0%	100.0%	--

Butter Study

Butter Manufacturing Costs

Processing labor costs of \$0.0754 per pound represented 39 percent of the total butter manufacturing cost. Analysis revealed bulk packaging to be the most costly labor performed (Figure 2).

Figure 2. Butter Processing Labor

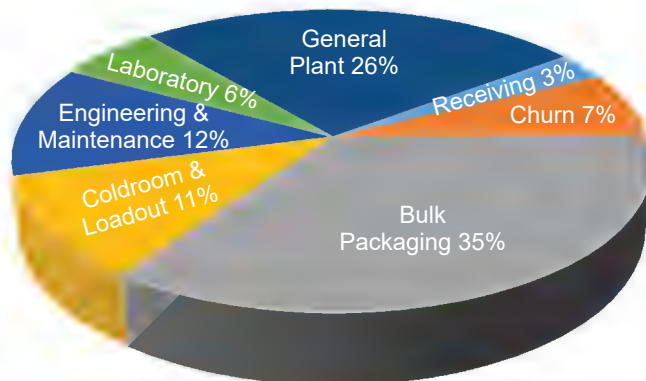
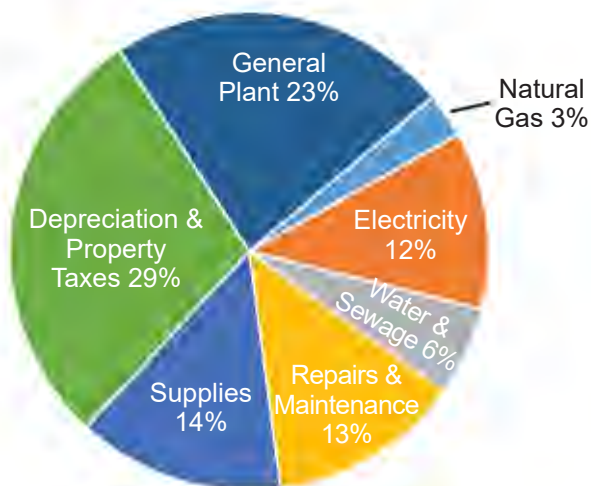
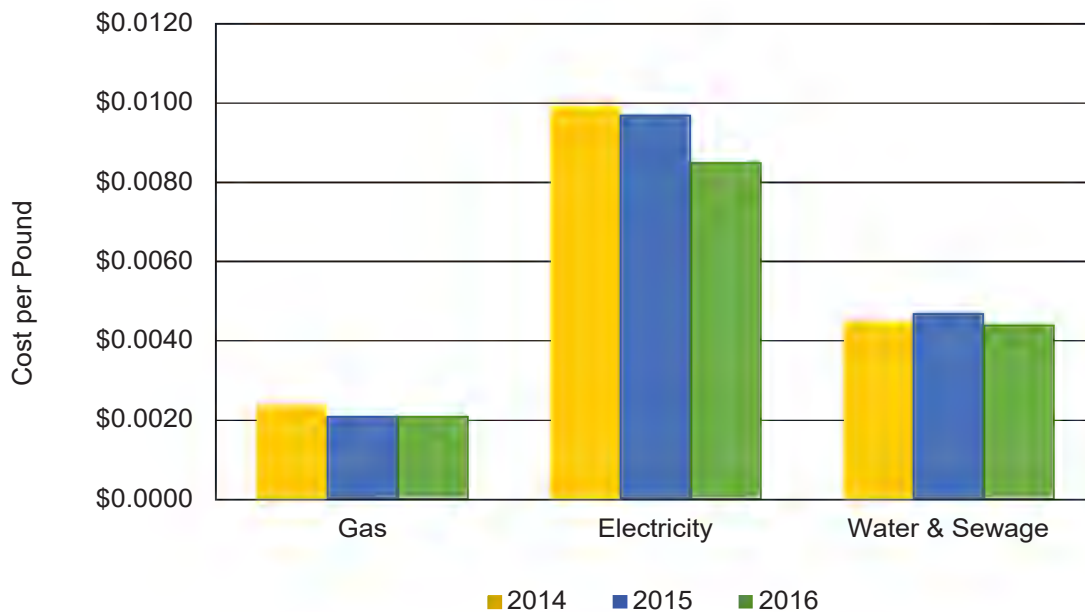


Figure 3. Butter Processing Non-Labor



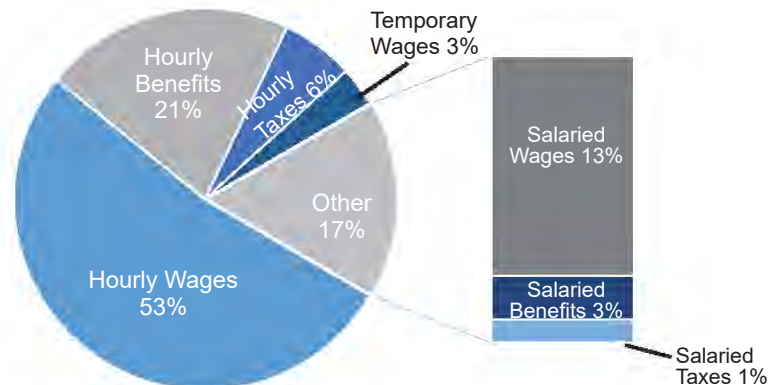
Processing non-labor costs of \$0.0724 per pound represented 37 percent of the total manufacturing cost. Furthermore, the combined utility costs for electricity, natural gas, water and sewage accounted for 21 percent of processing non-labor costs (Figure 3). Figure 4 below provides the changes in utility costs over a three-year period.

Figure 4. Butter Utilities Comparison



Butter Study

Figure 5. Butter Payroll Costs



Employer paid expenses for payroll include gross wages, fringe benefits, and payroll taxes (includes workers' compensation). Figure 5 provides a breakdown of plant payroll costs by percentage.

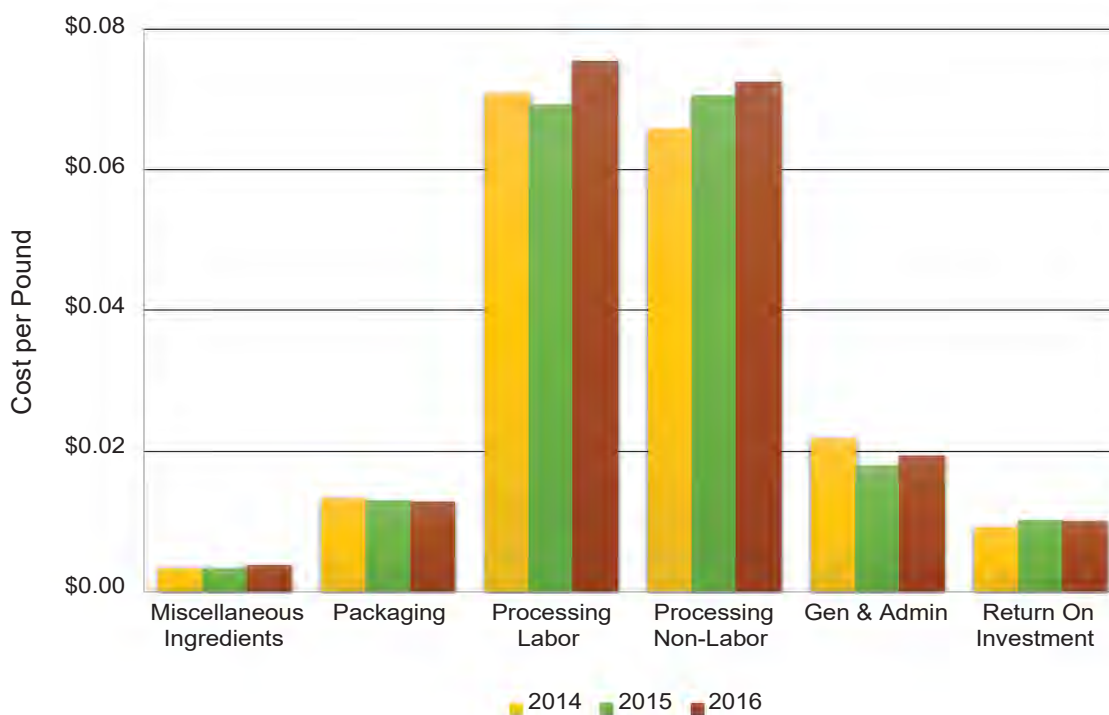
Packaging cost of \$0.0128 per pound represented 7 percent of the total manufacturing cost. Bulk packaging includes all non-reusable items used in the packaging of bulk butter, such as boxes, bags, cartons, liners, tape, glue, and stretch wrap.

Miscellaneous ingredient costs increased 12 percent in 2016. The weighted average cost of \$0.0038 per pound represented 2 percent of the total manufacturing cost. General and administrative costs of \$0.0193 per pound represented 10 percent of the total manufacturing cost.

Return on investment costs decreased 1 percent to \$0.0101 per pound due in part to a 5.63 percent decrease in the Moody's BAA corporate bond index.

The cost of manufacturing butter increased to \$0.1938 from \$0.1842 per pound the year prior. Figure 6 provides us a comparison for each category of cost over a three-year period.

Figure 6. Butter Manufacturing Costs Comparison



Nonfat Dry Milk Study

The 2016 nonfat dry milk (NFDM) study included eight plants whose combined production was 555.02 million pounds, representing 97.44 percent of the NFDM produced in California. To avoid revealing plant specific information, each plant was assigned to either a low cost group or high cost group based on its total manufacturing cost. In 2016, each cost group included four plants. Table 2 lists the weighted average cost per pound for each category of the manufacturing cost.

Table 2. Nonfat Dry Milk Manufacturing Costs

CURRENT Study Period: January through December 2016
With Comparison to the same time period Prior Year (2015)

- Manufacturing cost data were collected and summarized from eight California NFDM plants. The eight plants processed 555.02 million pounds of NFDM during the 12-month study period, January through December 2016, representing 97.44% of the NFDM processed in California.
- The volume includes NFDM, both animal and human consumption. NFDM for human consumption represented 99.64% of the 555.02 million pounds of NFDM processed, and NFDM for animal consumption represented 0.36%.
- The volume total includes all grades of NFDM packaged in any container size, but the costs reflect only costs for 25 kg and 50 lb. bags of NFDM.
- To obtain the weighted average, individual plant costs were weighted by their NFDM processing volume relative to the total volume of NFDM processed by all plants included in the cost study.

Breakdown of Nonfat Dry Milk Manufacturing Costs - January through December 2016

Categories	Low Cost Group	High Cost Group	Range of Costs		CURRENT Weighted Average Cost All Plants Jan-Dec 2016	PRIOR YEAR Weighted Average Cost All Plants Jan-Dec 2015	Actual Difference Current Less Prior Year
			Minimum	Maximum			
<i>Dollars Per Pound of NFDM</i>							
Number of Plants	4	4	8	8	8	9	-1
Processing Labor	\$0.0452	\$0.0803	\$0.0339	\$0.1939	\$0.0538	\$0.0523	\$0.0015
Processing Non-Labor	\$0.1004	\$0.1513	\$0.0858	\$0.2082	\$0.1129	\$0.1138	-\$0.0009
Packaging	\$0.0154	\$0.0148	\$0.0144	\$0.0164	\$0.0152	\$0.0152	\$0.0000
General & Administrative	\$0.0131	\$0.0166	\$0.0101	\$0.0362	\$0.0140	\$0.0133	\$0.0007
Return on Investment	\$0.0113	\$0.0156	\$0.0057	\$0.0213	\$0.0123	\$0.0132	-\$0.0009
Average Total Cost	\$0.1854	\$0.2786	--	--	\$0.2082	\$0.2078	\$0.0004
Volume in Group (Lbs.)	418,880,396	136,140,071	--	--	555,020,467	687,122,384	-132,101,917
% Volume by Group	75.5%	24.5%	--	--	100.0%	100.0%	--

Nonfat Dry Milk Study

Nonfat Dry Milk Manufacturing Costs

Processing labor costs were \$0.0538 per pound, 3 percent higher than in 2015. The weighted average cost for 25-kg bag packaging labor was \$0.0056 per pound, representing 10 percent of processing labor costs (Figure 7).

Figure 7. NFDM Processing Labor

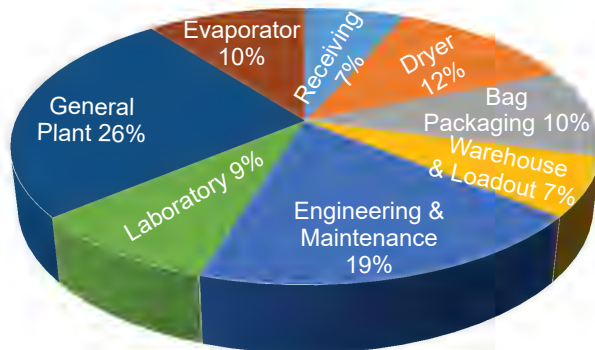
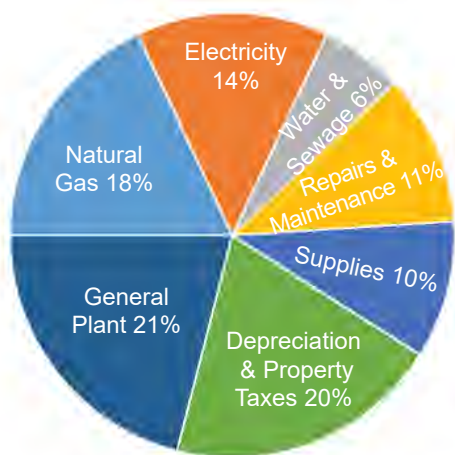
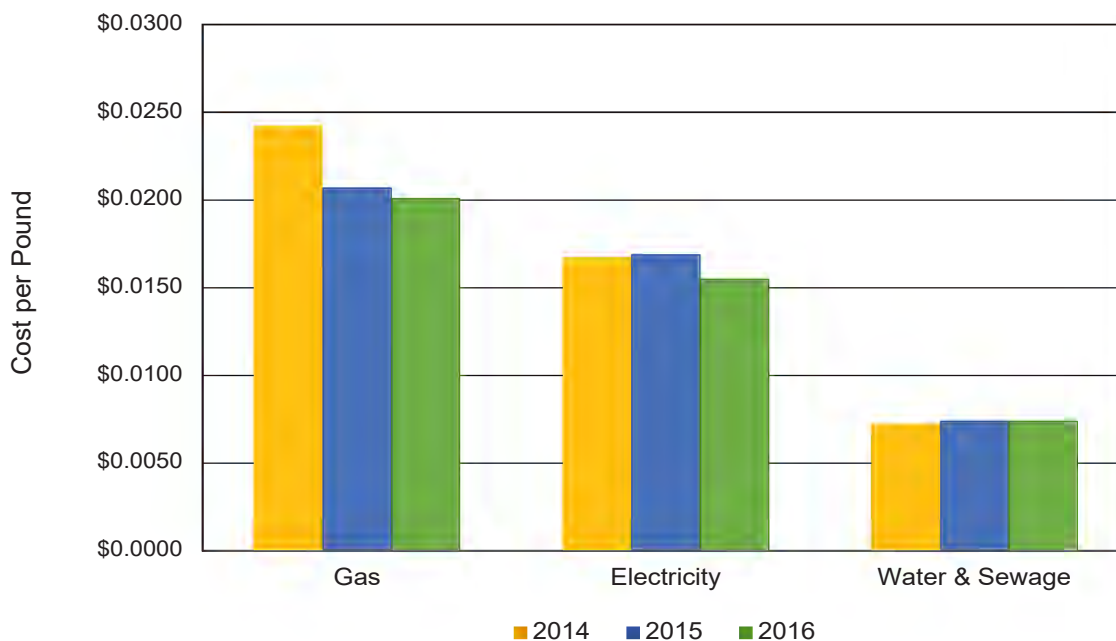


Figure 8. NFDM Processing Non-Labor



Processing non-labor costs of \$0.1129 per pound accounted for 54 percent of the NFDM manufacturing cost. The operation of both an evaporator and a dryer adds significantly to the utility costs of a powder processing plant. In 2016, the utilities cost represented 38 percent of the processing non-labor costs (Figure 8). Figure 9 below provides the changes in utility costs over a three-year period.

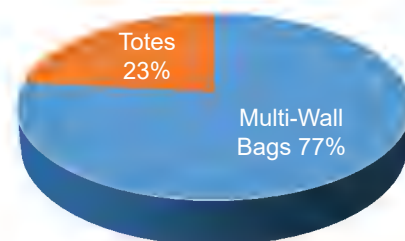
Figure 9. NFDM Utilities Comparison



Nonfat Dry Milk Study

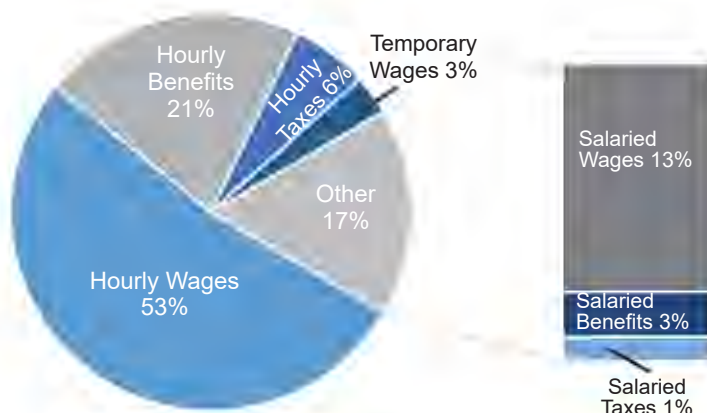
Packaging costs remained the same at \$0.0152 per pound representing 7 percent of the total NFDN manufacturing cost. 77 percent of the NFDN was packaged in 25-kg or 50-lb multi-wall bags; the remaining 23 percent was packaged in totes weighing between 1,100 to 3,200 lbs each (Figure 10). General and administrative costs of \$0.0140 per pound represented 7 percent of the total NFDN manufacturing cost.

Figure 10. NFDN Packaging Size



The return on investment (ROI) allowance is calculated by subtracting accumulated depreciation from the original cost of assets; the remaining book value is then multiplied by the Moody's BAA corporate bond index. In 2016, ROI costs were \$0.0123 per pound.

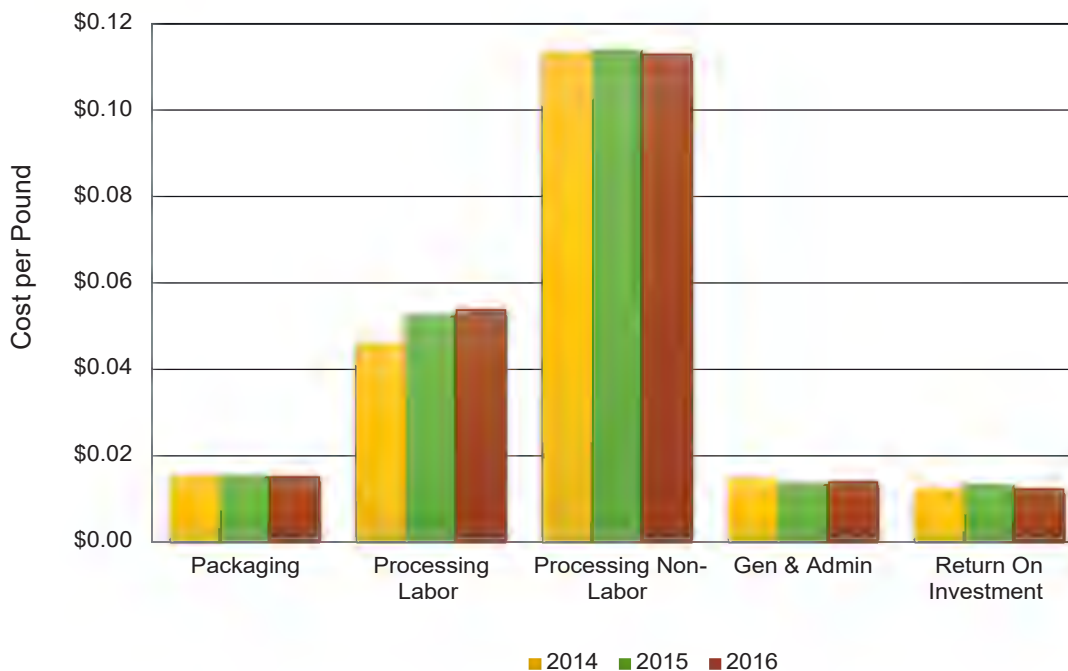
Figure 11. NFDN Payroll Costs



Employer paid expenses for payroll include gross wages, fringe benefits, and payroll taxes (includes workers' compensation). Figure 11 provides a breakdown of plant payroll costs by percentage.

In 2016, the NFDN manufacturing cost increased to \$0.2082 per pound. Figure 12 shows the changes that have occurred in each category of cost over a three-year period.

Figure 12. NFDN Manufacturing Costs Comparison



Cheese Study

In 2016, the cheese study included four processing plants. To avoid revealing plant specific information, the results gathered from all four plants were included in the calculation of one weighted average cost for each category of manufacturing expense (Table 3).

Table 3 Cheese Manufacturing Costs

CURRENT Study Period: January through December 2016
With Comparison to the same time period Prior Year (2014)

- Manufacturing cost data were collected and summarized from four California cheese plants. Due to confidential reasons, total cheese volumes cannot be displayed.
- The volume total includes both Cheddar and Monterey Jack cheeses, but the costs reflect only costs for Cheddar.
- 40-lb. blocks of Cheddar, 100-lb. barrels or 640-lb. blocks. Packaging costs and packaging labor for 40-lb. blocks were substituted for these plants.
- Two plants processed 50-lb. barrels or 640-lb. blocks. Packaging costs and packaging labor for 40-lb. blocks were substituted for these plants.
- 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 included in the cost study.
- For all cheese: the weighted average yield was 13.18 lbs. of cheese per hundredweight of milk. The weighted average moisture was 37.43% and the weighted average vat tests were 4.01% fat and 9.62% SNF.
- For cheddar: the weighted average yield was 13.31 lbs. of cheese per hundredweight of milk. The weighted average moisture was 37.04% and the weighted average vat tests were 4.73% fat and 9.62% SNF.

Breakdown of Cheese Manufacturing Costs - January through December 2016

Categories	CURRENT Weighted Average Cost All Plants Jan-Dec 2016	PRIOR YEAR Weighted Average Cost All Plants Jan-Dec 2015	Actual Difference Current Less Prior Year
<i>Dollars Per Pound of Cheese</i>			
Number of Plants	4	4	0
Processing Labor	\$0.0626	\$0.0640	-\$0.0014
Processing Non-Labor	\$0.0882	\$0.0862	\$0.0020
Packaging	\$0.0244	\$0.0239	\$0.0005
Misc. Ingredients	\$0.0286	\$0.0251	\$0.0035
General & Administrative	\$0.0355	\$0.0342	\$0.0013
Return on Investment	\$0.0061	\$0.0060	\$0.0001
Average Total Cost	\$0.2454	\$0.2394	\$0.0060

Cheese Study

In addition to Cheddar and Jack cheeses, the plants processed various other types of cheese and cheese by-products. For all Cheddar cheese though, the weighted average vat yield was 13.18 pounds of cheese per hundredweight (cwt) of milk, the weighted average moisture was 37.43 percent, and the weighted average vat test was 4.67 percent fat and 9.68 percent solids-not-fat (Table 4).

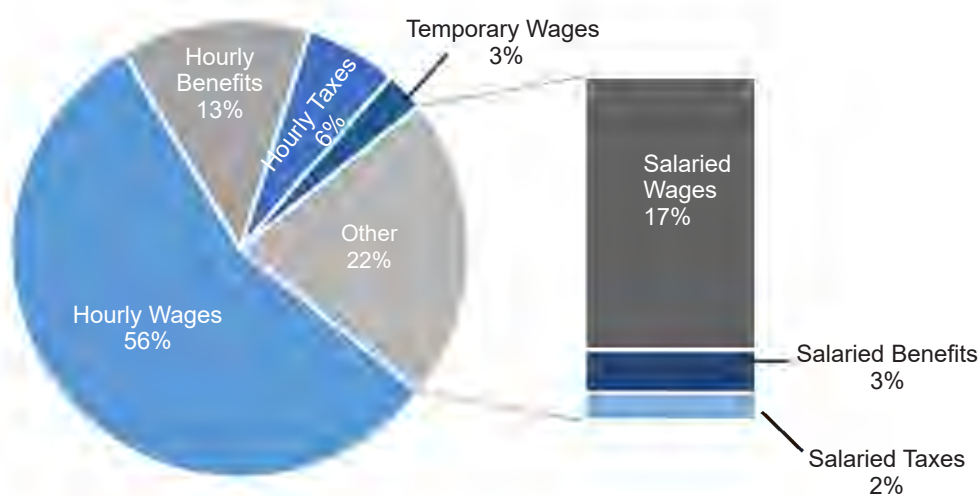
Cheddar Cheese Manufacturing Costs

Table 4. All Cheddar Cheese Production Parameters Comparison

Weighted Average Year	Finished Moisture %	Vat Fat Test %	Vat SNF Test %	Vat Yield (Lbs.)
2016	37.43	4.67	9.68	13.18
2015	37.04	4.73	9.62	13.31

Employer paid expenses for payroll include gross wages, fringe benefits, and payroll taxes (includes workers' compensation). Figure 13 provides a breakdown of plant payroll costs by percentage.

Figure 13. Cheese Payroll Costs



Cheese Study

Processing labor costs were \$0.0626 per pound. For the plants that processed 500-lb barrels or 640-lb blocks, the weighted average packaging labor cost for 40-lb block Cheddar cheese was substituted. (Figure 14)

Figure 14. Cheese Processing Labor

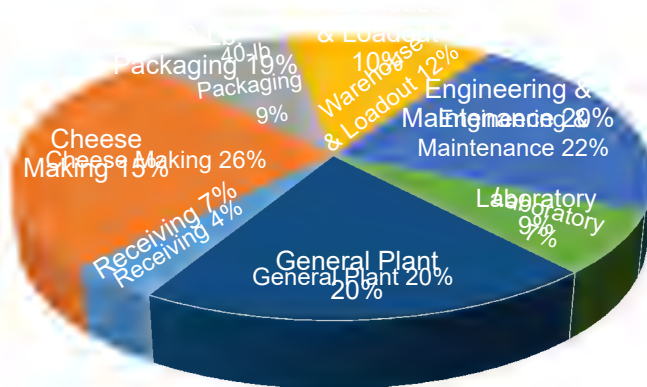
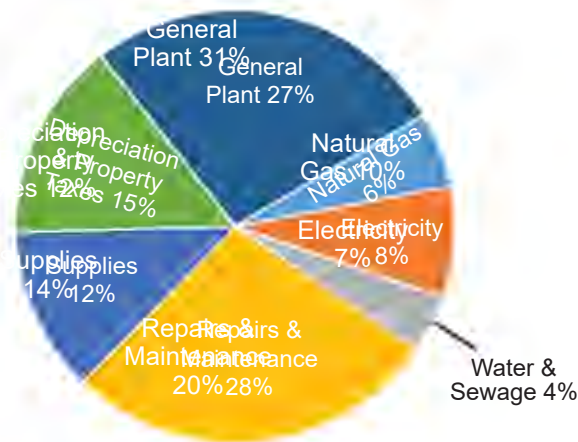
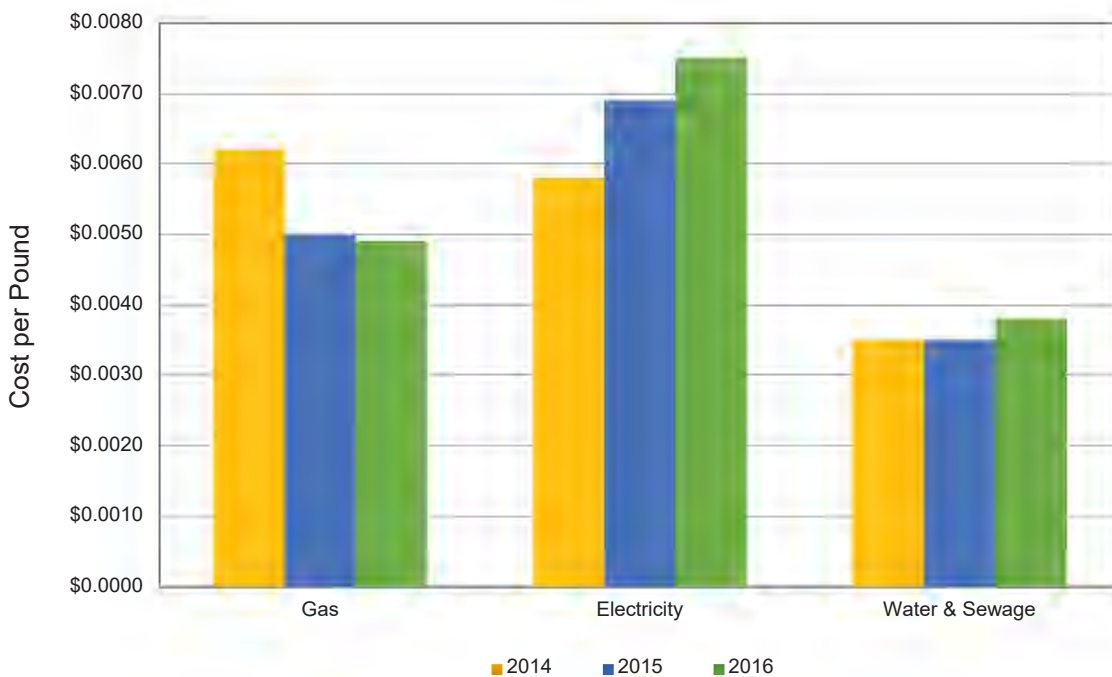


Figure 15. Cheese Processing Non-Labor



Processing non-labor costs of \$0.0882 per pound were 36 percent of the total manufacturing cost. Furthermore, the combined utility costs of gas, electricity, water and sewage accounted for 19 percent of processing non-labor costs (Figure 15). Figure 16 below provides the changes in utility costs over a three-year period.

Figure 16. Cheese Utilities Comparison



Cheese Study

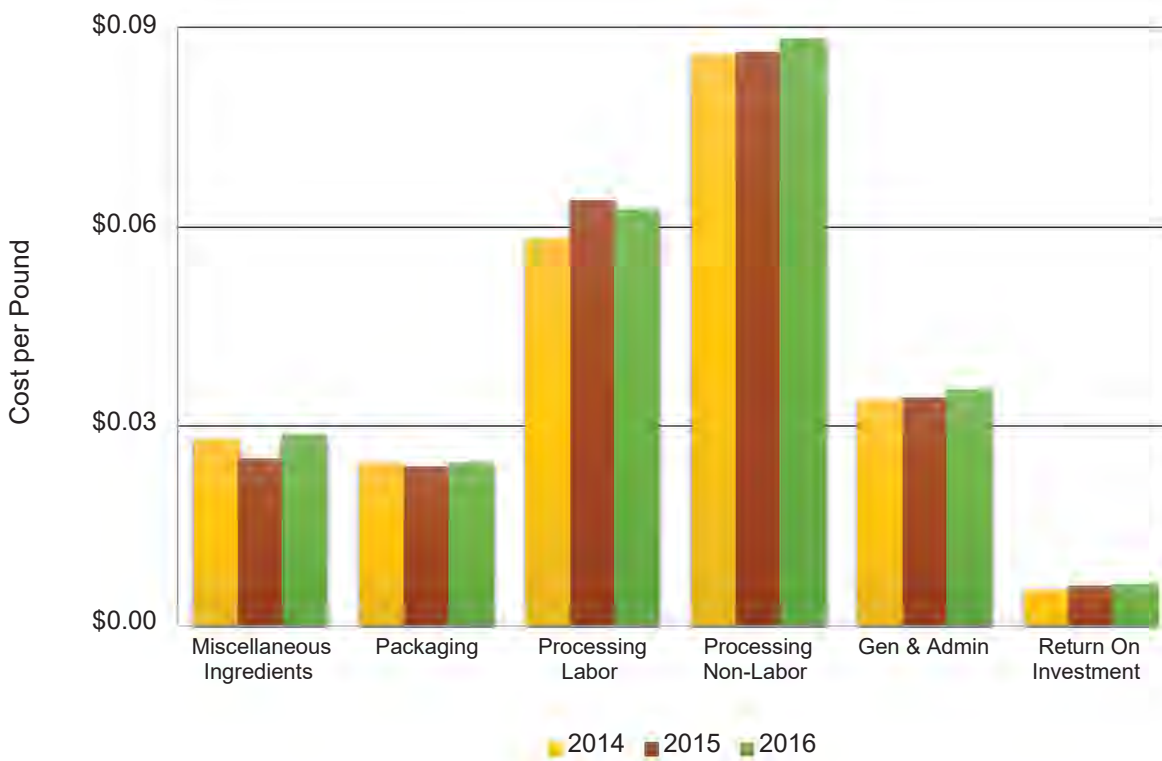
Packaging costs included all non-reusable items, such as boxes, liners, tape, glue, and stretch-wrap. The weighted average packaging cost for 40-lb block Cheddar cheese was substituted for those plants producing 500-lb barrel or 640-lb block cheese. Packaging costs were \$0.0244 per pound.

Miscellaneous ingredient costs for Cheddar cheese included salt, color, rennet, fortification costs, etc. In 2016, the weighted average cost was \$0.0286 per pound. General and administrative costs of \$0.0355 per pound accounted for 14 percent of the manufacturing cost.

Return on investment (ROI) costs increased 2 percent to \$0.0061 per pound and represented just 2 percent of the total manufacturing cost.

Overall, the 2016 cost of manufacturing cheese increased to \$0.2454 per pound. Figure 17 displays the type of changes occurring in each category of cost over a three-year period.

Figure 17. Cheese Manufacturing Costs Comparison



Condensed Skim and Cream

The manufacturing cost of bulk dairy products, such as condensed skim and cream, are not as precise as packaged products like butter, NFDM, and cheese. There are very few direct costs associated with bulk dairy products. Most, if not all, bulk dairy product costs are derived from the general plant costs allocated to them based on component hundred-weight (cwt).

Condensed Skim Overview

In 2016, the condensed skim study was completed on seven plants whose combined sales were 230.4 million pounds (Figure 18). The weighted average manufacturing cost of condensed skim decreased 4 percent from the prior year to a cost of \$5.1617 per cwt. (Figure 19).

Figure 18. Condensed Skim Sales Comparison

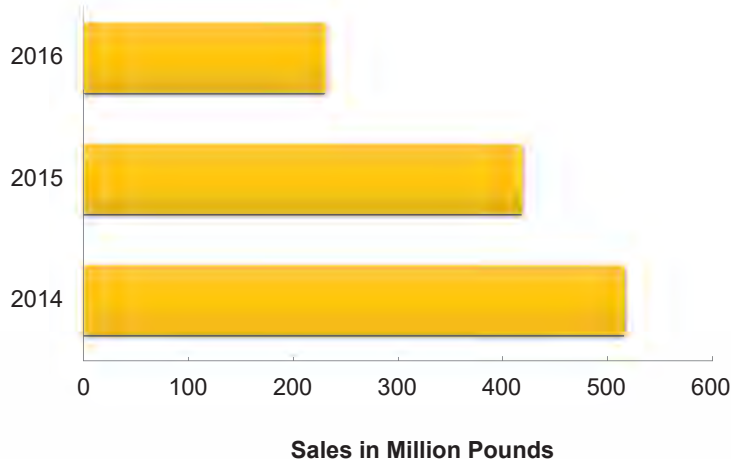


Figure 19. Condensed Skim Manufacturing Cost 2014-2016



Condensed Skim & Cream

Cream Overview

In 2016, the cream study included eight plants whose combined sales were more than 193.8 million pounds (Figure 20). The weighted average manufacturing cost of cream decreased 7 percent to \$5.3646 per cwt. (Figure 21).

Figure 20. Cream Sales Comparison

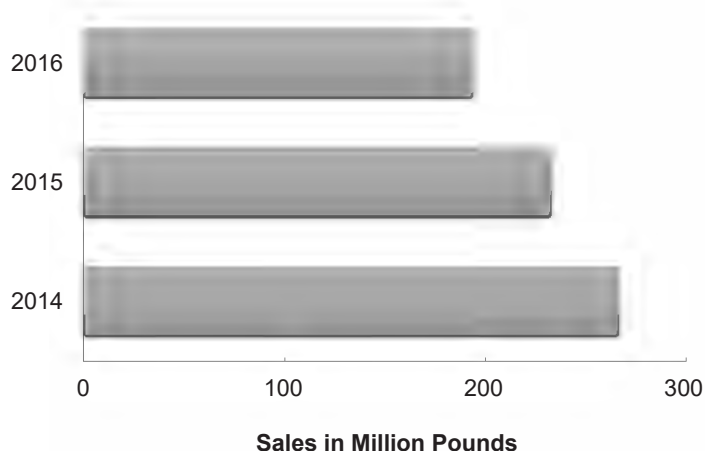


Figure 21. Cream Manufacturing Costs 2014-2016

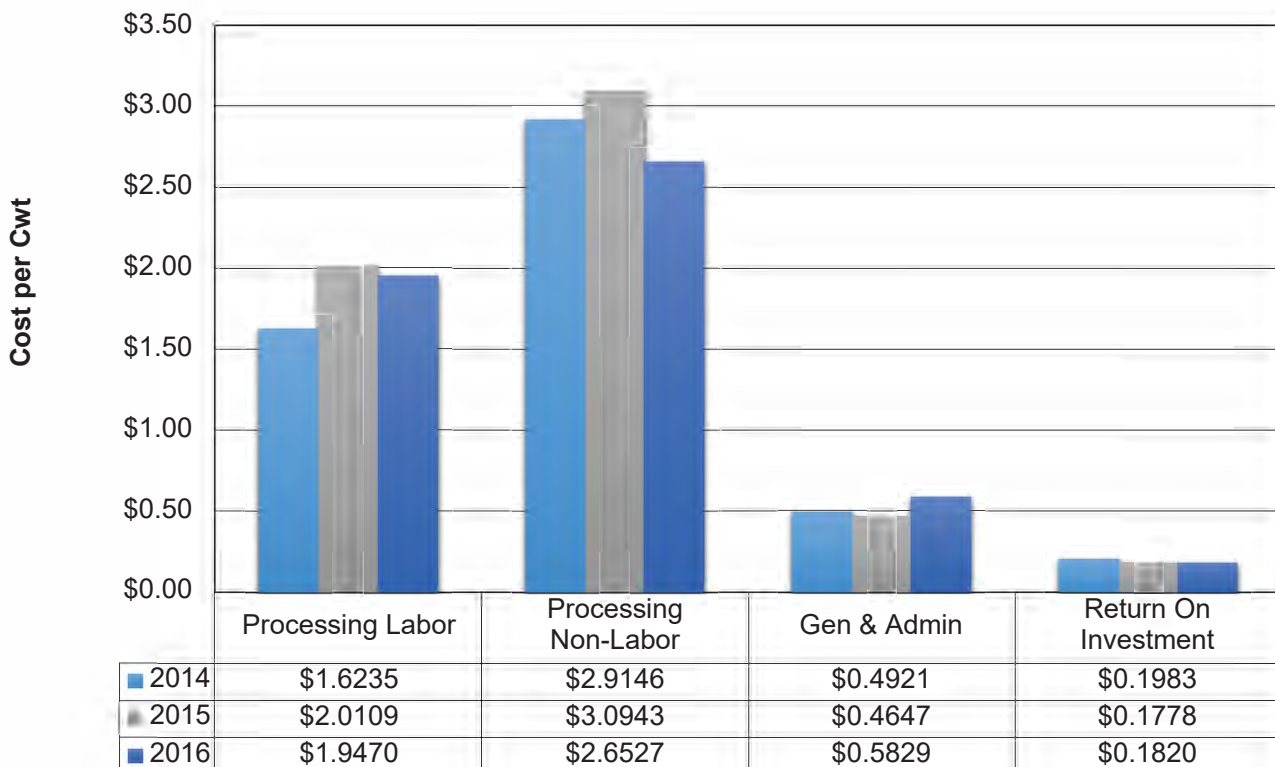


Figure 22. Simplified Flowchart of a Butter and Nonfat Dry Milk Plant

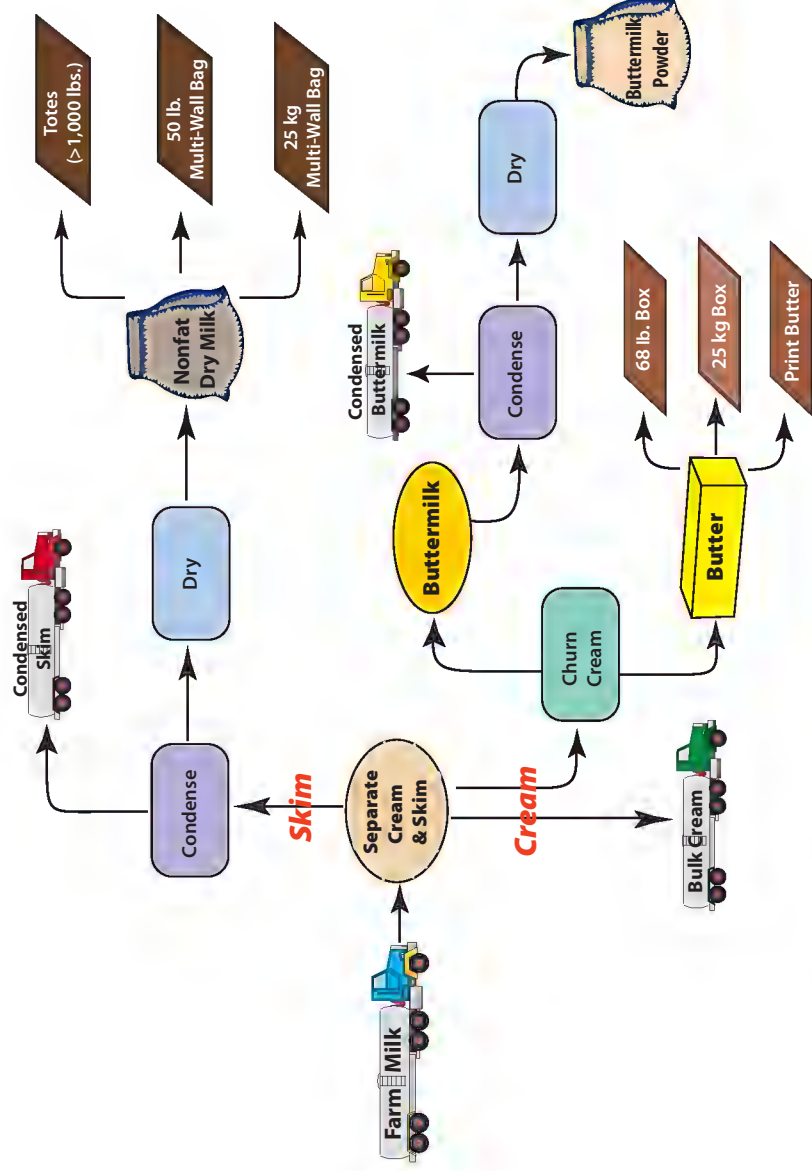


Figure 23. Simplified Flowchart of a Cheese Plant with By-Product Processing

