Staff Contribution E-5

Miscellaneous Staff Contribution of the Department of Agricultural Economics

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"Opportunities for Reducing Milk
Handling and Processing Costs"
(Remarks of Charles E. French,
1958 National Marketing Service Workshop,
Springfield, Illinois)

This will be essentially a broad survey of suggested opportunities. No attempt will be made to confine the survey to opportunities dependent upon research already available or underway. Yet, it will not be mere dreaming of what might be opportunities. Service workers can act now to capitalize upon most of these opportunities either through existing research or through answers which should be forthcoming in a progressive service program.

This survey will be couched in terms of the operating statement breakdown of plant costs. I will emphasize fluid operations but most of what I say is equally applicable to fluid or manufacturing operations. As orientation, I would like to draw on a breakdown of costs reported by a rather large group of above-average independent plants of varying size scattered throughout most of the United States, (Table 1).

My remarks will be directed at opportunities for cost reduction in the major cost areas. This does not imply that there are not important savings in many of the minor cost areas; however, other things being equal, economic prudence says work where the greatest opportunities lie.

Sales income is not a cost area, but one comment seems in order here. Plants should probably expect the unit sales return in fluid milk to decline relatively to many other commodity and cost unit values. Fluid milk will probably reduce service value relative to product value - a trend opposite that in food industries in general. This is based on the high relative service costs on milk traditionally and the trends in recent years away from some of these services. However, manufactured

dairy products will probably continue to add services relative to product, and a relative unit return reduction is not expected here.

Milk and Other Ingredients

Milk is the main outlay item (currently about one-half of the sales dollar) in dairy plant operation - a fact so easily overlooked. Other ingredients are actually almost insignificant costwise relative to milk. Other ingredient costs will increase relatively; however, and a manager must keep his eye on them. Some cost reduction is possible in minor ingredient selection and control with good methods which eliminate loss, control optimum quantities, and provide for substitution of lower cost sources where they are available.

The leverage for savings in milk loss in a plant is almost unbelievable. The average milk loss in a good fluid operation is probably slightly under 2 percent. Federal orders generally put losses of more than 2 percent in Class I utilization to protect farmers against poor plant procedures. However, the range in fat loss percentages among plants is extremely wide, and it is not unusual for such losses to exceed 5 percent for extended periods of time. Chart 1 illustrates the annual volume increases necessary to offset increases in fat loss with reasonable profit percentages and fat costs.

Factors which affect fat loss make it an imposing list. A few of these include: (1) Bad sampling, (2) innacurate weights, (3) poor standardization, (4) general leakage and spillage, (5) bottle breakage and leaks, (6) overfilling, (7) poor salvage on returns, (8) theft and pilferage, (9) evaporation, (10) poor control of donations, and (11) product spoilage.

Salaries, Wages and Commissions

The next most important outlay item after milk is labor (currently about one-fourth of the sales dollar or one-half of the gross margin). This is a broad category and we do not have good breakdowns of this by labor types, but we can probably expect about one nickel of each sales dollar to go for administration costs. Also, the selling and delivery labor costs are much more than the plant labor costs. One helpful comparison here is the fact that the plants above may be expected to have total plant expenses of about 17 cents of each sales dollar and selling and delivery expenses of about 23 cents. Selling and delivery expenses are made up of a much higher proportion of labor than are plant expenses.

However, plant labor savings are important. Starting in the receiving operations, probably the major considerations today involve handling dual intakes. Especially in small plants, 100 percent bulk receiving will reduce receiving costs substantially. One study at Minnesota placed reasonable savings for a 40,000 pounds-per-day plant at 22 cents per hundredweight, a 75,000 pounds-plant at 11 cents, and a 160,000 pounds-plant at 7 cents. Our studies would suggest that these may be quite realistic as an average and some plants can expect much higher savings than these.

Many plants cannot convert 100 percent to bulk; however, and must live for some time with dual facilities. Our studies suggest that a plant receiving 75,000 pounds or less should consider only one man in the receiving room and two men with assistance for cleanup should be able to handle up to 225,000 pounds. Three-and four-man crews in receiving rooms are generally inefficient. When a volume is only slightly above a crew breakover point, attempts should be made to schedule these men for additional work, often in bulk milk receiving.

Processing is moving toward automation. Possibilities do exist for labor efficiencies with present equipment. For example, bottling crews in progressive plants have been essentially cut in half in recent years by rearrangement of bottling machines and use of accumulating tables. Well-placed conveyors and proper location of switches, small tools, and dials allow meaningful savings. However, plant processes suggest large-scale automation. Cleaning has been automatized in some plants. Generally, continuous processing gives us many advantages over batch processing. However, the need is for a thorough evaluation of the automation potential.

The opportunities for cost reduction will depend somewhat upon the attitude of labor unions. More important, however, will be the attitude of people working for cost reduction in processing plants themselves. Food industries were among the last to industrialize. Food processes were simple and did not need industrialization, but the industrial machinery industries had more lucrative markets elsewhere. I fear that food will again be the last to automatize unless the industry solves a few technical problems and presents a lucrative market for the automatic control industry to exploit.

Another big area of plant labor use lies in the storage and load-out departments. Cramped storage areas have been a big problem. Our work shows that stacking cases 1 to 6 high takes a fairly constant labor input per case. However, if we go, say 10 high rather than 6 high, our labor requirements go up 21 percent in order to get 66 percent more cases stored. Such information is useful in evaluating new storage areas and refrigerated delivery trucks.

Another problem in this area has been in speed up of load-out. Recently, 6 out of 21 of our plants with more than 30,000 pounds daily

intake were found to use dolly load-out. These systems have been put in for speed and on the surface, the systems look fairly efficient. However, the pre-assembly time necessary to prepare the dolly loads reduces the efficiency of these operations much below the conveyor systems. Cost reduction seems possible here now, especially since we have refrigerated trucks.

Savings in plant labor add up. Feasible labor savings in this area appear to be much better bets to increase profits than do sales increases in most cases (Chart 2).

Basic trends toward fewer services in milk delivery are probably the major factors influencing cost reduction in this area. The largest single savings was the shift to alternate day delivery and this was fostered in large part by government decree. The trend will be toward even fewer deliveries and probably the shift here is much too slow for maximum cost reduction.

Another basic trend affecting delivery costs is the trend toward store sales. Undoubtedly, this trend will continue further, but there are good individual plant reasons to hold house-to-house delivery. These customers are much "safer" customers.

Unit load handling and basic institutional changes, such as the shift toward vendor operators, are big factors affecting costs in this area. Selling and delivery are big areas and probably the ones begging most for penetrating analysis on cost reduction.

Opportunities for reducing labor costs in administration involve two areas - the time of the manager himself and the time of those responsible for keeping records and preparing reports. Actually, we know relatively little about the level of efficiency here. However, it may be quite low. Currently, we have a cooperative project with the Transportation and Facilities Branch to dig deeper into this area.

We know that management time is valuable. If a managers works 244 eight-hour days annually, this schedule shows how valuable his time really is:

Annual Salary	Every Hour Is Worth	Every Minute Is Worth	An Hour Saved Each Day Would Amount to This Over The Year
$ 5,000	$ 2.56	$ .04	$ 625
7,500	3.84	.06	937
8,500	4.35	.07	1,061
10,000	5.12	.09	1,249
12,000	6.15	.10	1,501
14,000	7.17	.12	1,749
16,000	8.20	.14	2,001
20,000	10.25	.17	2,501
25,000	12.81	.21	3,126
50,000	25.61	.43	6,249

Management today must delegate. This is not easy; it means decentralization and a manager must condition himself to certain things. He must condition himself especially to accept the ideas and mistakes of others. He must set up a channel to assure controls. This means policies and job specifications must be defined. Goals must be set. Ideas must flow both up and down. Good records and reports are the lubricant of business management. Great cost opportunities probably exist here.

Management today is tending toward a science and this calls for scientific tools. We have been highly encouraged by our use of some of the so-called "modern management" tools such as electric brains, mathematical programming and operations research. These tools do not replace management, but they can aid management and in the process, increase efficiency many fold.

Repairs, Rent, and Depreciation

Many are quite concerned about the costs of repairs, rent, and depreciation. These items account for about 67 cents per hundredweight currently. To put them in this perspective tends to de-emphasize them relative to labor and milk costs. Most of these costs go into machinery and other capital items used to save labor. Thus, it may well be that these items should climb much higher than they are currently.

Capital item purchases in processing plants have often been subjected to a very short pay-back period. With present tax laws and current capital budgeting procedures, such short pay-back periods are probably not realistic. Most of these outlays should probably be evaluated on an annual use cost of about 15 percent of the initial investment. On this basis, a small labor savings can justify a large capital outlay, (Chart 3).

Containers

Containers account for an important part of the price of milk (currently about 70 cents per hundredweight). Moreover, container costs have advanced substantially in recent years. Big arguments rage about the cost-reducing possibilities of a product line of paper and glass as against one which is 100 percent paper. Generally these arguments tend to resolve themselves eventually around the cost control on use of containers, especially as reflected in glass bottle trippage, (Chart 4).

Trippage can vary widely by products and by plants. It should be known within reason for each product in a plant. Rate of returned product can increase paper package cost considerably. The basic cost-reducing steps on containers generally hinge on knowledge of costs and control procedures used. Deposits on glass bottles have often been dropped to compete more favorably with paper. Thus, the most effective means of obtaining high trippage has been lost. In many cases trippage today is extremely low.

It is not unusual for trippage to drop below 10. Costs for glass sky rocket in this area. For example, the annual glass bill for a plant with 50,000,000 pounds volume in glass would approach a quarter of a million dollars if its trippage dropped below 10.

Summary

Cost reduction opportunities exist. In fact, they are legion. Most of them are found in rather simple relationships. Often these individual savings are each small, but the total is impressive. Cost reduction is a continuous process in a plant. However, the widest sweep in cost reduction can often be made by an outsider who is not "so close to the problem".

Any basic evaluation of costs puts high priority on labor reduction. Labor is a large cost and use of labor is often quite unscientific. The range in labor used among plants is wide. Table 2 shows the approximate labor force for various plant sizes in Indiana. Also, it shows the range for the number of employees in different departments in different plants. This table should prompt some speculation on the tremendous cost savings possible in this area alone.

Table 1. COSTS AND MARGINS FOR SELECTED DAIRY FIRMS: Per 100 pounds of milk and cream processed, for selected periods.

Account	1953	1955	1957	1958 Jan.-Mar.	1958 Apr.-June
	Dol.	Dol.	Dol.	Dol.	Dol.
Net sales	11.12	10.95	11.15	11.01	10.96
Cost of raw materials:					
Raw milk and cream	5.43	5.12	5.14	5.22	4.81
Other	.90	.94	.87	.82	.97
Total	6.33	6.05	6.01	6.04	5.78
Gross Margin	4.79	4.91	5.14	4.97	5.18
Operating Cost:					
Salaries, wages, and commissions 1/	2.19	2.28	2.50	2.51	2.56
Containers	.62	.70	.71	.70	.70
Operating supplies	.32	.32	.29	.30	.29
Repairs, rent, and depreciation	.52	.60	.67	.66	.67
Taxes	.06	.06	.06	.06	.06
Insurance	.02	.04	.04	.04	.05
Services	.19	.18	.17	.15	.17
Advertising	.15	.18	.18	.17	.19
General	.13	.14	.15	.15	.15
Total	4.20	4.50	4.77	4.73	4.84
Net margin 2/	.59	.40	.37	.24	.34
Firms reporting	51	83	80	80	80

1/ Includes State unemployment, Federal old age, workmen's compensation, and employee benefits.
2/ Net returns to owners before income taxes.
Source: U. S. Department of Agriculture.

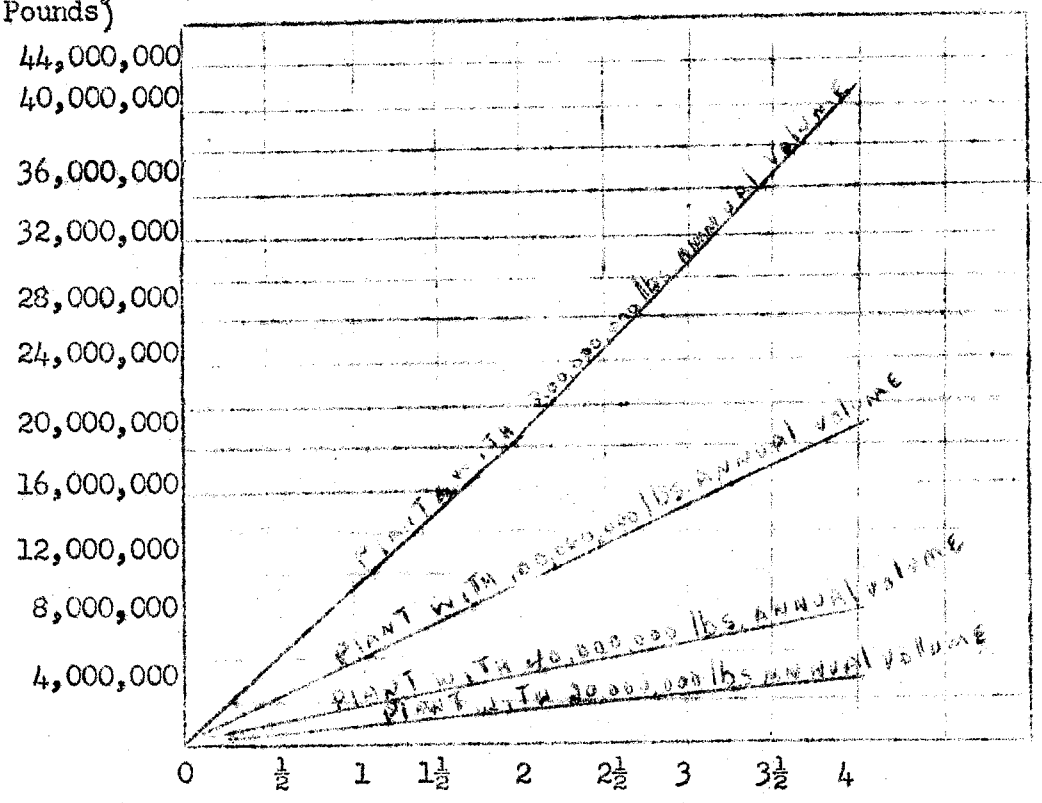
Table 2. Number of people employed in 107 fluid milk plants in Indiana, 1957, by departments.

	Daily Plant Volume					
	Over 100,000 lbs.	50,000 to 99,999 lbs.	20,000 to 49,999 lbs.	10,000 to 19,999 lbs.	5,000 to 9,999 lbs.	Less than 5,000 lbs.	Average of all Plants
	(No. of Employees)						
	Ave. Range	Ave. Range	Ave. Range	Ave. Range	Ave. Range	Ave. Range	Ave.
Administrative & clerical	24 5-42	12 6-22	7 2-17	3 1-6	2 1-4	1 0-2	6
Plant	69 30-106	31 10-70	19 6-48	9 4-33	4 1-10	3 1-5	16
Distribution	131 63-195	37 14-79	30 3-74	11 3-26	6 2-15	3 1-6	23
Total	224 98-343	80 30-176	56 11-139	23 8-65	12 4-29	6 2-13	45

Source: Dairy Marketing Information, Purdue University, January 1958.

Chart 1: Sales Increases vs. Butterfat Loss Reduction as a Means of Increasing Net Profits in a Milk Plant

How to Use: Locate your fat loss on the bottom of the chart. Look directly above to the diagonal line approximating your annual volume. Then by looking across to the left side of the chart, you find the annual volume increase necessary to offset such a fat loss. (Based on data from records of Edward B. McClain Co., Memphis, Tenn.)

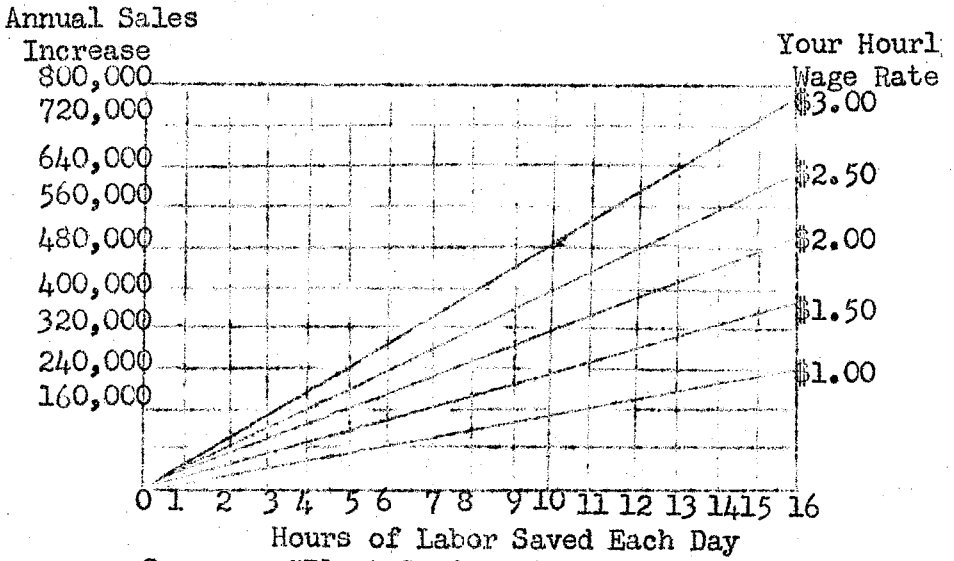


Source: "Butterfat is Money", Charles E. French The Milk Dealer, January 1957.

Chart 2: Sales Increases vs. Labor Savings As a Means of Increasing Net Profit in a Fluid Milk Plant

How to Use: Find labor saved per day on bottom of chart. Look directly above the diagonal line representing your wage scale. Then by looking across to the left of the chart you will find the sales increase necessary to give a comparable increase in net profits.

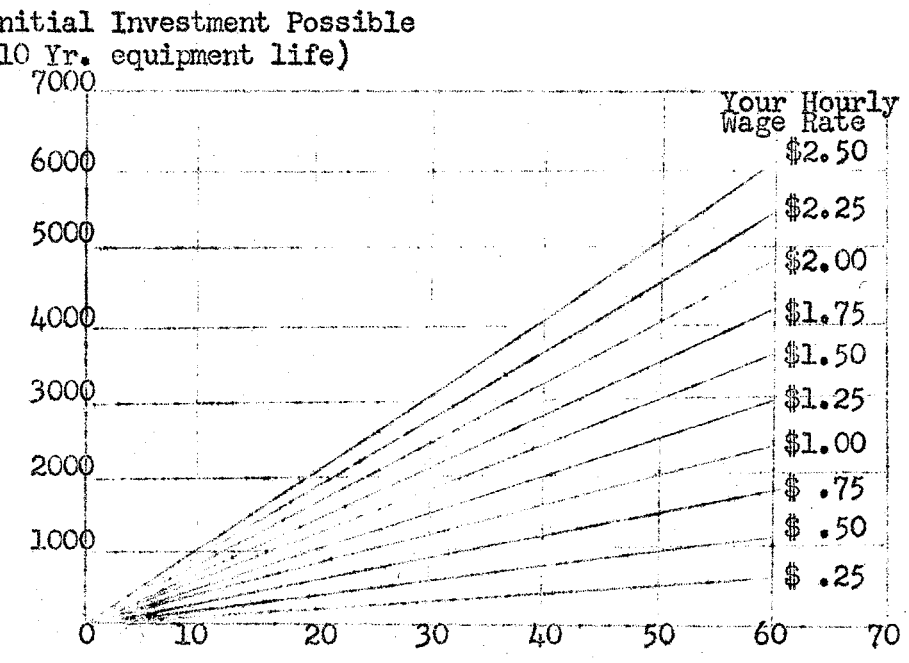
Note-Net profit per dollar of sales equal 2.28 cents.



Source: "Plant Savings in the Profit Picture", Charles E. French, American Milk Review, June 1956.

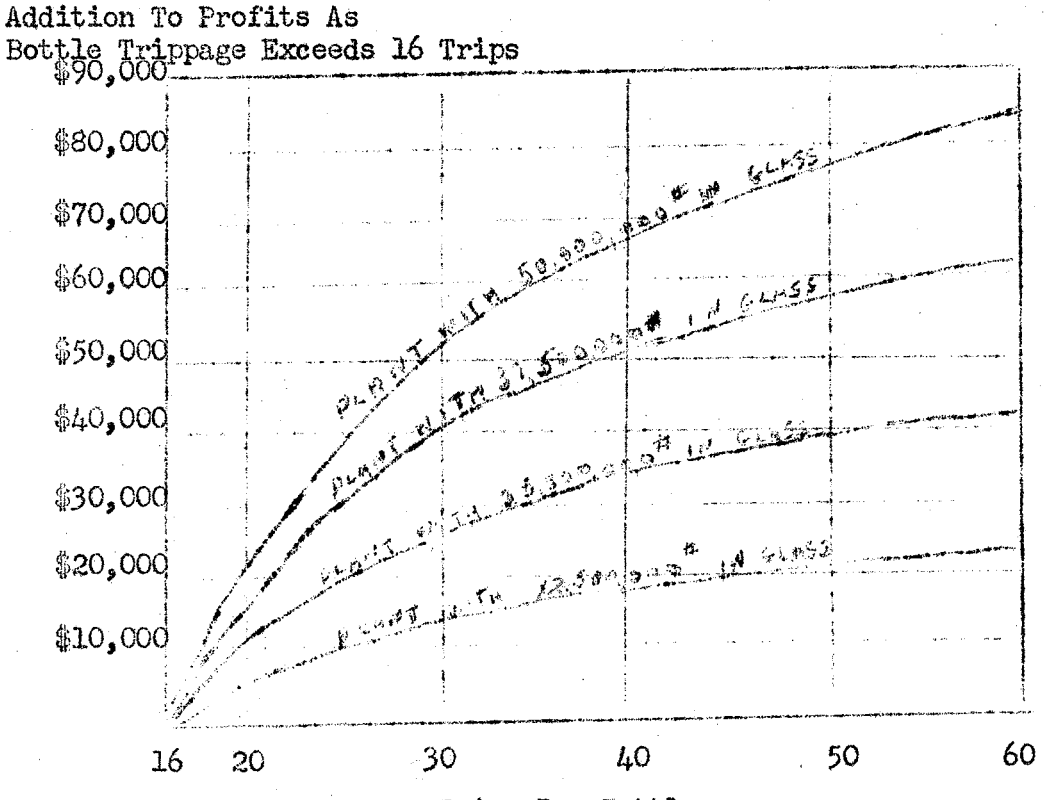
Chart 3: Labor Savings vs. Initial Investment

How To Use:
Find your time savings on the bottom of the chart, look directly above this to the diagonal line labeled with your hourly wage rate; then by looking directly across to the left of the chart you will find how much you can spend for labor-saving equipment and yet break even.



Source: "Will Labor Saving Methods Pay?", Charles E. French, Economic and Marketing Information for Indiana Farmers, January 195

Chart 4: Bottle Trippage and Plant Savings in a Fluid Milk Plant



Source: "What's Your Bottle Trippage?", Charles E. French, Cordially Yours, August 1957.