EX 26

BEFORE THE UNITED STATES DEPARTMENT OF AGRICULTURE

In Re	:	
MILK IN THE NORTHEAST AND OTHER MARKETING AREAS	:	
	:	DOCKET NO.
	:	
	:	

ADDENDUM TO TABLES AND REPORTS IN SUPPORT OF

TESTIMONY OF GEOFFREY T. VANDEN HEUVEL
IN SUPPORT OF PROPOSALS NUMBERED 1, 10, 19, and 26
AS MODIFIED

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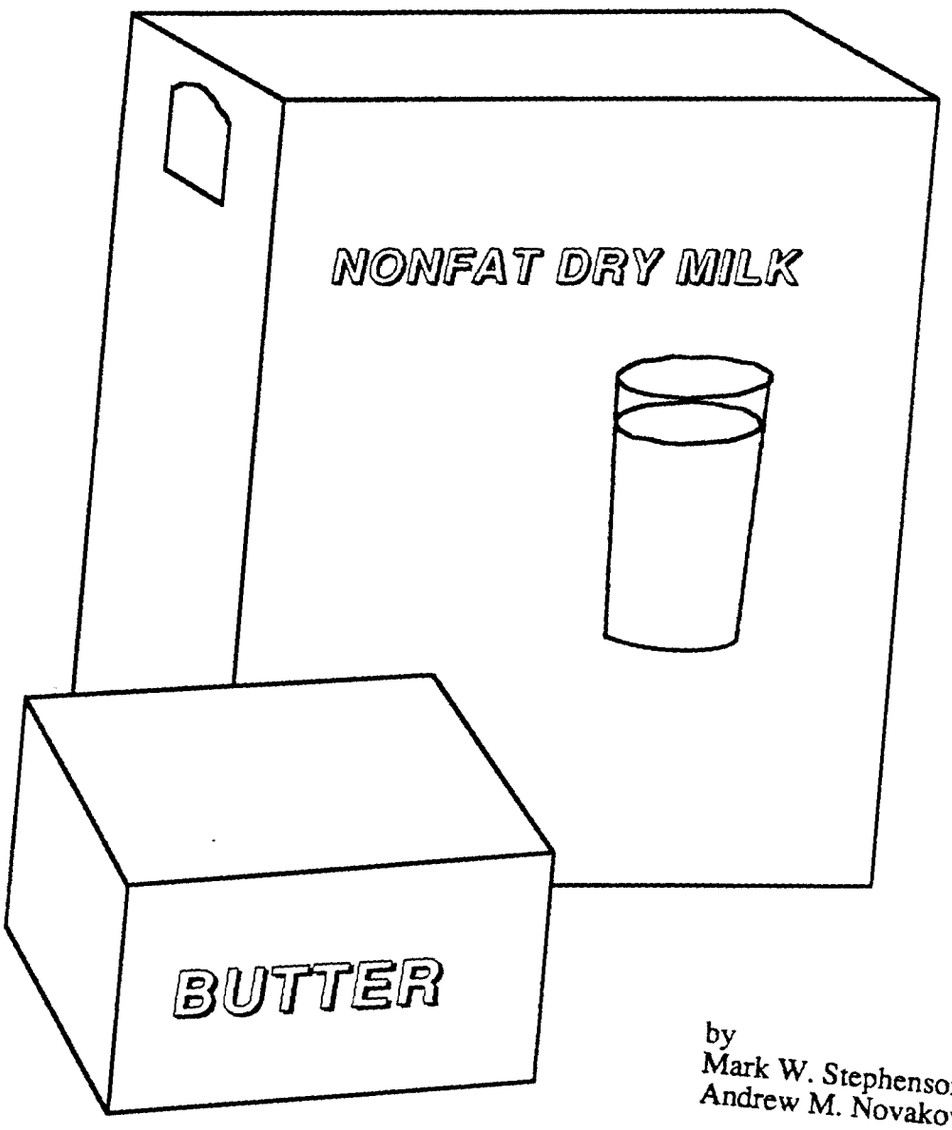
A.E. Res. 89–19

Manufacturing Costs In Ten Butter/Powder Processing Plants



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Appendix B

Calculations of Costs Per Pound and cwt

—Assumptions:

—cwt of raw milk yields 4.35 pounds of butter, 8.69 pounds of NDM and 0.44 pounds of buttermilk powder.

—it costs the same to produce a pound of buttermilk powder from buttermilk as it does to produce a pound of NDM from skim milk. Therefore cwt of raw milk yields 4.35 pounds of butter and 9.13 pounds of powder (8.69+0.44).

—Definitions:

AB = annual pounds of butter (production during the June '87–May '88 year)

AP = annual pounds of powder (production during the June '87–May '88 year) where powder refers to NDM and buttermilk powder.

VB = variable costs of producing a pound of butter.

VP = variable costs of producing a pound of powder.

FC = annual fixed costs (daily fixed cost multiplied by 365).

BR = the proportion of milk equivalent processed as butter[31].

PR = the proportion of milk equivalent processed as powder (equal to 1-BR).

CWT = the number of cwt raw milk processed at a plant during the twelve months of the survey[32].

BU = the average percent usage of butter processing capacity (see Figure 4)

$$\text{\$/lb of Butter} = \frac{(AB \times VB)+(FC \times BR)}{AB}$$

$$\text{\$/lb of Powder} = \frac{(AP \times VP)+(FC \times PR)}{AP}$$

$$\text{\$/cwt of Milk} = \left(\frac{FC}{CWT}\right) + (VB \times 4.35) + (VP \times 9.13)$$

$$\text{\$/lb of Butter at 100\% Capacity}^{33} = \frac{\left(\frac{AB}{BU} \times VB\right) + (FC \times BR)}{\left(\frac{AB}{BU}\right)}$$

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[31] This value is used to determine how much of the fixed cost should be charged to butter. It is calculated by first determining the ME for a plant on a butterfat basis (MEb) and the ME on a solids–not–fat basis (MEs). BR is then equal to MEb divided by (MEb+MEs).

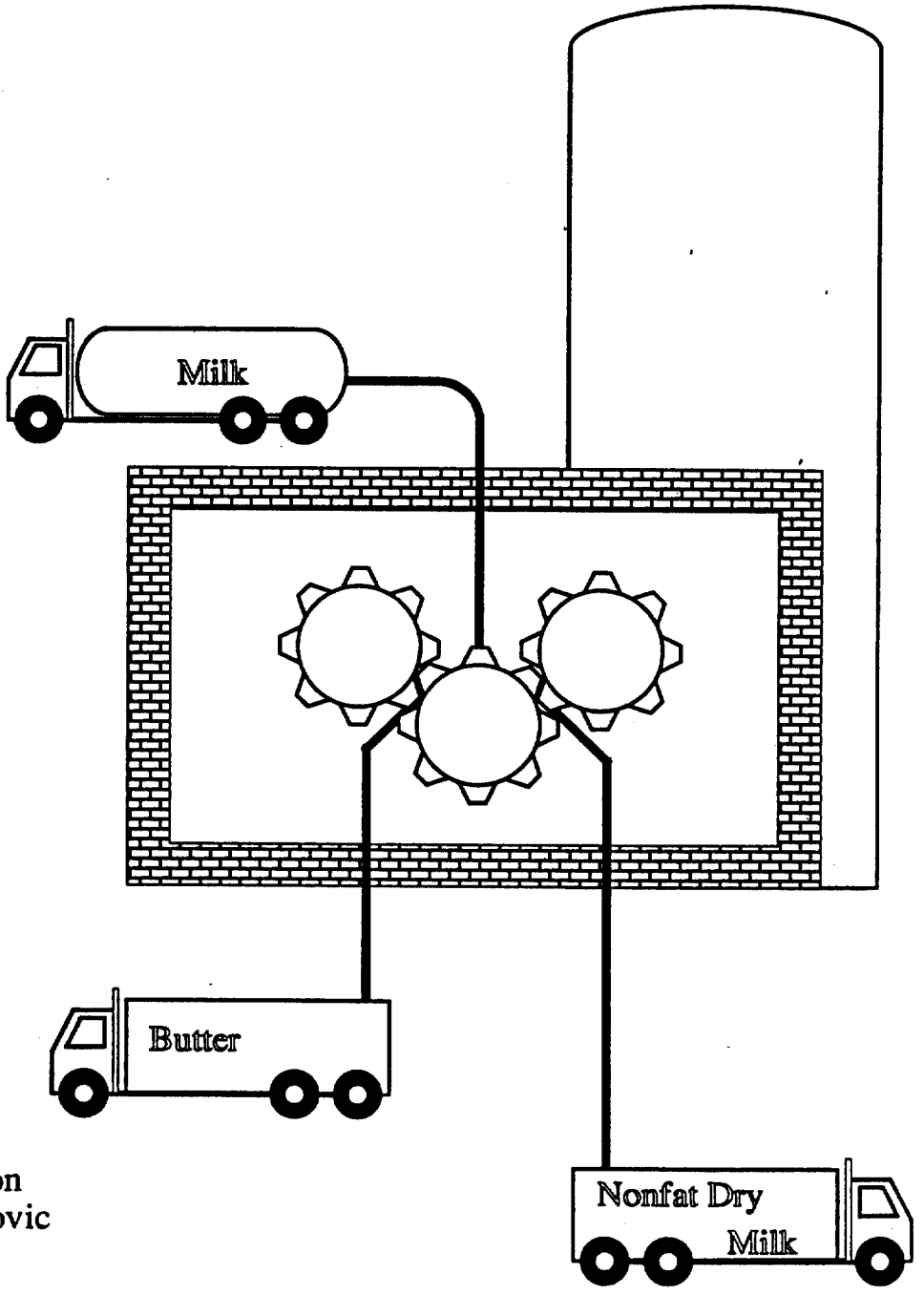
[32] This was a judgement call for any particular plant. It was based on the average milk equivalent processed at the plant during the twelve months of the study. The result does not appear to be overly sensitive to an incorrect judgement within the bounds of MEb and MEs.

[33] The $/lb of powder at 100% capacity can be calculated by making the appropriate substitutions.

June 1990

A.E. Res. 90–6

Determination of Butter/Powder Plant Manufacturing Costs Utilizing an Economic Engineering Approach



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Product Assumptions, Theoretical Yields And Plant Volumes

It is necessary to make some assumptions regarding the composition of raw milk and the products manufactured from it. Although milk is a complex fluid with many identifiable fractions, there are only three that are important to a butter/powder plant: butterfat, solids–not–fat (hereafter referred to as "SNF") and water. Total solids are equal to butterfat + SNF. Table 2 shows the product assumptions that are used in this study.

Table 2. Assumed Composition of Products

Product	%BF	%SNF	%Moisture
Raw Milk[7]	3.71%	8.70%	87.60%
Skim Milk	0.20%	9.02%	90.78%
Cream	40.00%	5.37%	54.63%
Butter	80.50%	1.60%	17.90%
Buttermilk	0.60%	9.10%	90.30%
Bulk Condensed Milk	0.78%	35.22%	64.00%
Bulk Blends	22.00%	25.51%	52.49%
NDM	2.10%	94.70%	3.20%
Buttermilk Powder	5.99%	90.81%	3.20%

These product values can be used to determine theoretical yields in butter/powder plants. In practice, the theoretical yields are not achieved and butterfat losses approach 2% while SNF losses are approximately 0.6%. Figure 1 is a diagram of major processing events in a butter/powder plant and the theoretical yields from a hundredweight (cwt) of raw milk along the production path. The diagram illustrates the possible inputs and outputs which are discussed in this report. For any plant or any given point in time, only parts of this process flow may be observed.

[7] These values are the weighted average component levels for the Upper Midwest in 1985 according to USDA staff paper 86–01 entitled "Upper Midwest Marketing Area—Analysis of Component Levels in Individual Herd Milk at the Farm Level, 1984 and 1985".

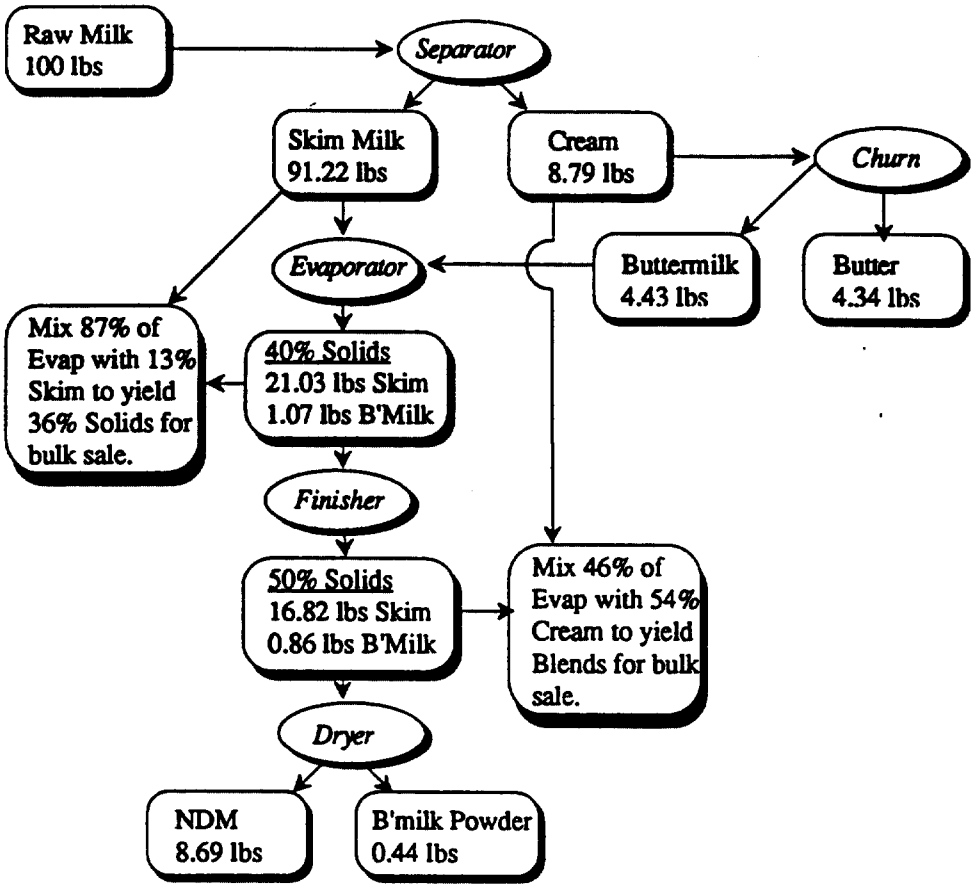

Figure 1. Theoretical Product Yields from cwt of Raw Milk

Using these theoretical yields and the model plant input and output mixes from the section entitled "Models and Plant Sizes", a table of plant product volumes can be generated. Table 3 shows the throughput that is used by the engineering firm as the bases to design the model plants.

CDFA
California Department of Food and Agriculture

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BUTTER AND POWDER YIELDS

The current Class 4a pricing formula incorporates two yield factors:

BUTTER:	1.2 lbs. of butter produced per lb. of butterfat
NFDM:	0.99 lbs. of NFDM produced per lb. of SNF

The NFDM yield factors has been analyzed and recalculated several times since it was introduced into milk pricing formulas. The NFDM yield was set at 0.96 from 1968 to 1972. The yield factor was increased to 1.00 from 1972 to 1977 and then decreased to 0.99 from 1977 to present. Although the butter yield factor of 1.2 has been analyzed regularly, it has never been changed since it was adopted in 1955. The current yields of 1.2 for butter and 0.99 for NFDM were assessed and verified in 1990 using receipts and usage information obtained from two butter–powder operations.

The Department has received requests from the industry to review plant information that could be used to calculated yield factors and determine if the current factors continue to be appropriate. While the California Department of Food and Agriculture collects product yield data directly from most Cheddar cheese plants, it does not collect yield data from butter–powder plants. Thus, product yields have been computed from receipts and usage information obtained from the Department's plant cost studies.

Most of the butter–powder plants in California manufacture multiple products and buy and/or sell large quantities of cream, condensed skim and condensed buttermilk. Consequently, tracking milk components entering the plant as milk or some intermediate product and exiting the plant as finished and packaged products or as a plant loss is complex. The procedure used to obtain the yields simplifies plant receiving, processing and packaging activities, and the resulting figures should be treated as unrefined estimates of butter and powder yields.

Using 1996 receipts and usage figures from nine powder plants and eight butter plants, estimates of product yields were computed (Table 1). The yield factors accounted for losses of milk components within each plant. In 1996, these nine powder plants processed 95% of NFDM produced in California, and the eight butter plants processed 95% of the butter produced in California.

Butter yields among the eight plants showed little variability and were similar to the current yield factor of 1.2. The yield factors for powder, which included both NFDM and BMP, were similar among the nine powder plants (range: 1.0111 to 1.0406). However, individual yields for NFDM and BMP were more variable.

The current yield factor considers both NFDM and BMP, and the powder yield in Table 1 is consistent with that view. However, there may be some interest in the breakdown of total powder yield into NFDM yield and BMP yield. Seven of the nine powder plants processed BMP. Two

Table 1. Butter and Powder Yields for California Processing Plants

	Butter Yield[1]	Fat Loss[2]	Powder Yield[1,3]	SNF Loss[4]
Number of Plants	*8*	*8*	*9*	*9*
Weighted Average	*1.2213*	*1.56%*	*1.0239*	*2.13%*
Low	*1.2079*	*1.00%*	*1.0111*	*1.11%*
High	*1.2341*	*2.41%*	*1.0406*	*4.16%*

[1]"Yield" refers to the amount of product obtained from a unit of fat or SNF.
[2]"Fat Loss" is the difference between the fat received at the plant and the fat contained in finished products, i.e., fat that is unavailable for use in finished products.
[3]"Powder Yield" is the sum of the individual plant nonfat dry milk and buttermilk powder yields.
[4]"SNF Loss" is the difference between the SNF received at the plant and the SNF contained in finished products, i.e., SNF that is unavailable for use in finished products.

of the seven plants produced considerably higher percentages of BMP than the other five plants, a result of receiving large quantities of cream. If these two plants were included in the analysis, the considerable variations in NFDM and BMP production would not allow for meaningful and representative yield estimates of individual powder products obtainable from farm milk. Consequently, these two plants were omitted. The five remaining plants accounted for 67% of the NFDM and 61% of the BMP processed in California in 1996.

Among the five plants included in the calculation, the yield for NFDM ranged from 0.9309 to 0.9815 and the yield for BMP ranged from 0.0406 to 0.0749 (Table 2). Using an average weighted by production volume, the five plants obtained 0.9736 pounds of NFDM and 0.0521 pounds of BMP from 1 pound of SNF.

Table 2. Powder, NFDM and BMP Yields for Select California Processing Plants[1, 2, 3, 4]

	Powder Yield	NFDM Yield	BMP Yield
Number of Plants	5	5	5
Weighted Average	1.0252	0.9736	0.0521
Low	1.0111	0.9309	0.0406
High	1.0406	0.9815	0.0749

[1]"Yield" refers to the amount of product obtained from a unit of fat or SNF.
[2]"Powder Yield" is the sum of the individual plant nonfat dry milk and buttermilk powder yields.
[3]"NFDM" = nonfat dry milk.
[4]"BMP" = buttermilk powder.