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Updated Protein-Standardized Powder Economics

Earlier this year National All-Jersey Inc. (NAJ) analyzed the economics of manufacturing skim milk powder (SMP) and whole milk powder (WMP) from average producer milk and high component milk. NAJ's interest in the issue stemmed from two factors. First, production of SMP and WMP has increased significantly in recent years. Both products have played important roles in the rapid growth of U.S. dairy exports.

Table 1

Production of Milk Powders (1,000 pounds)

Year	Nonfat Dry Milk	Skim Milk	Whole Milk
2011	1,514,410	446,017	65,787
2012	1,764,450	380,672	58,132
2013	1,477,860	630,689	72,053

Second, SMP and WMP are protein standardized, typically to 34% crude protein for the international market. WMP is also standardized for butterfat, and typical Jersey milk has more butterfat than needed for WMP.

The process of manufacturing any milk powder starts by separating cream from skim milk and drying the skim. When the initial milk powder made from the skim portion of producer milk exceeds 34% crude protein, the powder can be extended with lactose or milk permeate until the product mix reaches the 34% level for the export market. Higher protein producer milk results in higher protein powder, thus allowing for more lactose or milk permeate to be used in the standardization process *(Tables 2 and 3)*. Nearly an extra pound of lactose or milk permeate can be used for standardization when the manufacturer begins with Jersey milk. Because lactose and milk permeate are less expensive than the value of the resulting SMP or WMP, a processor's profit potential is greater when beginning with higher protein milk.

NAJ's initial analysis, published in the June 2014 issue of the *Jersey Journal*, was based on 2013 average product prices of $1.71/lb. for SMP, $1.87/lb. for WMP and a butter price of $1.55 *(Table 4)*.

Table 4

Prices	2013 Average	Sept. 2014
Nonfat Dry Milk	1.71	1.42
SMP	1.71	1.42
WMP	1.87	1.92
Butter	1.55	2.85
Class IV Butterfat	1.66	3.25
Class IV NFS	1.52	1.24

Using these prices, the analysis estimated that a product mix of selling bulk cream and SMP from Jersey milk would net a processor an additional $1.10/cwt. profit than the same product mix from average component milk. A product mix of cream and WMP yielded an additional $1.51/cwt. profit from Jersey milk *(Table 5, next page)*.

Table 2

Milk Components (%)

	Average Milk	Jersey Milk
Butterfat	3.74	4.79
True Protein	3.10	3.64
Other Solids	5.70	5.75
NFD Milk		
Crude Protein	35.96	39.24

Table 3

Product Yields (lbs./cwt.)	Average Milk	Jersey Milk	Jersey Advantage
Cream (45% butterfat)	8.21	10.55	2.34
Nonfat Dry Milk	8.72	9.17	0.45
Skim Milk Powder	9.54	10.94	1.40
Added lactose	0.79	1.72	0.93
Whole Milk Powder	13.12	15.19	2.07
Added lactose	0.39	1.27	0.88

In recent months the powder and butter markets have moved in sharply different directions. In September the spot butter price had more than doubled its 2013 average price, it reached a record price of $3.06/lb. on the Chicago Mercantile Exchange (CME). Meanwhile, the nonfat dry milk price, which serves as a proxy for the SMP price, dropped to $1.30 on the same market. There is no spot market for WMP, but USDA's Dairy Market News reported WMP prices averaging $1.92 for September 2014. NAJ decided to rerun the analysis using September 2014 prices to determine how the dramatically changed price relationships between butter and powder prices would impact the profitability of SMP and WMP made from distinctly different types of milk.

The price declines for SMP and WMP lessen the profit potential of being able to use additional lactose in conjunction with Jersey milk because the margin between the cost of lactose and the market price of SMP/WMP is much narrower. By the same token, with butter prices this high, the cost of a pound of butterfat in producer milk ($3.25) far exceeds the value of a pound of WMP ($1.92). Processors would be better off to use all the butterfat in producer milk for butter or bulk cream than to include it in WMP.

The end result *(Table 6)* is that the profit margins for SMP and WMP from both types of milk are eroded. The most severe impact occurs when making WMP from Jersey milk because Jersey milk will yield two more pounds of WMP than average milk. The result is that the net profit for WMP from Jersey milk falls by nearly $3.00/cwt. compared to the 2013 pricing scenario. However, even with taking that hit, the net income from making WMP from Jersey milk remained positive ($3.74/cwt.), and still surpassed the net income of making WMP from average milk by $1.03/cwt.

The returns from making SMP also declined for both milks simply because the value of SMP is significantly less. However, the loss in profit was less severe than WMP because SMP does not include butterfat. The higher cost of producer butterfat to the processors was recouped through the subsequent sales of bulk cream. The Jersey advantage for SMP over average milk came out to be $1.02/cwt. using September 2014 prices.

As expected, the combination of September's record butter prices and lower powder prices eroded the profitability of making SMP and WMP when compared to 2013 price levels. However, the basic milk chemistry that higher protein milk yields higher protein milk powder once again resulted in Jersey milk being more profitable for processors than average milk. While NAJ's analysis should not be considered as exact and does not take into account manufacturing costs, it does show that higher protein producer milk can lead to greater profits when manufacturing protein-based products. Considering the growth in protein-standardized powder production and the importance of the export market to the U.S. dairy industry, higher protein milk is both more efficient and more valuable now and will be in the future.

Table 5

Returns/Cwt. Producer Milk - 2013	Average Milk	Jersey Milk	Jersey Advantage
Cream & SMP	$3.04	$4.14	$1.10
Cream & WMP	$5.08	$6.59	$1.51

Table 6

Returns/Cwt. Producer Milk - Sept. 2014			
Cream & SMP	$2.77	$3.79	$1.02
Cream & WMP	$2.71	$3.74	$1.03

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