

# TESTIMONY

of

Greg Dyer

on behalf of

## Saputo Cheese USA Inc.

Consolidated Stabilization and Marketing Plan Hearing

### Post Hearing Brief

April 18, 2015

Mr. Hearing Officer and Members of the Hearing Panel:

Thank you for the opportunity to submit the following post-hearing brief.

I was asked by the panel to provide source references for the charts included throughout my testimony. A revised copy of my testimony incorporating those references is attached. The Wisconsin Whey Study referred to in my testimony is also attached. Additionally, I was asked to provide the statistics supporting the two scatter charts with linear regressions in my testimony. Those statistics follow.

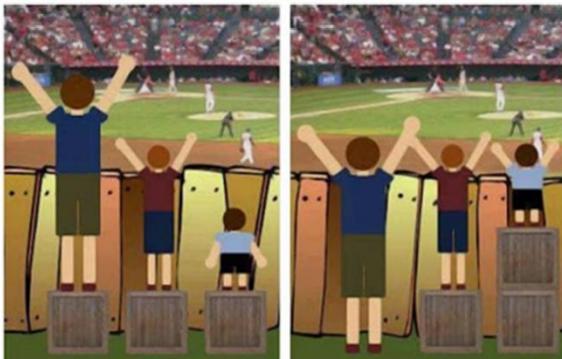
SUMMARY OUTPUT								
Regression Statistics								
Multiple R	0.7967							
R Square	0.6347							
Adjusted R Square	0.6343							
Standard Error	0.1051							
Observations	794							
$y = 0.3749x - 0.0595$ $R^2 = 0.6347$								
ANOVA								
	df	SS	MS	F	Significance F			
Regression	1	15.1879	15.1879	1376.2376	0.0000			
Residual	792	8.7404	0.0110					
Total	793	23.9283						
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	-0.0595	0.0124	-4.8052	0.0000	-0.0838	-0.0352	-0.0838	-0.0352
X Variable 1	0.3749	0.0101	37.0977	0.0000	0.3550	0.3947	0.3550	0.3947
SUMMARY OUTPUT								
Regression Statistics								
Multiple R	0.8982							
R Square	0.8067							
Adjusted R Square	0.8064							
Standard Error	0.1693							
Observations	794							
$y = 0.9365x - 0.159$ $R^2 = 0.8067$								
ANOVA								
	df	SS	MS	F	Significance F			
Regression	1	94.7784	94.7784	3304.8370	0.0000			
Residual	792	22.7135	0.0287					
Total	793	117.4919						
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	-0.1590	0.0200	-7.9668	0.0000	-0.1982	-0.1198	-0.1982	-0.1198
X Variable 1	0.9365	0.0163	57.4877	0.0000	0.9045	0.9685	0.9045	0.9685

One hearing witness testified that higher regulated prices were preferable to premiums because premiums are unreliable. That same witness in response to a panel question, said his cooperative was unable on short notice to renegotiate pricing that was incorporated in contracts of various terms. Since California requires milk sales to be underwritten by contracts, it seems then, that premiums specified by contract are no less reliable than any other element of pricing. In fact, they are typically far less volatile. As contracts are renegotiated, competitive premiums are likely to change as marketing conditions change, just as regulated pricing formulas are open to changes when hearings are called due to changing market conditions.

In response to the Dairy Institute proposal to base the 4b whey factor on the WPC 34 market, another witness suggested that if we wanted to base prices on products that are more widely made and marketed in the state, we should use mozzarella rather than cheddar. The fact is that the bulk of the industry still utilizes the CME cheddar block market as the reference point for pricing cheese sales of most varieties. Therefore the CME block market correlates fairly well with cheese sales of all types. The WPC 34 market also correlates better than dry whey with the whey revenues of most California cheesemakers.

The argument has been made that 1,200 cow California farms situated thousands of miles from the principal consumer markets deserve the same price that 200 cow farms across the rest of the country receive. USDA, Rabobank, and a number of published cost studies confirm that scale is a major determinant in the cost structure of dairies. Large farms are encouraged to produce at prices well below those required by small farms. Customers are not willing to pay a higher delivered price for a product simply because it comes from further away. A fair price is not necessarily an equal price.

## EQUALITY vs. EQUITY



Equality = Sameness  
GIVING EVERYONE THE SAME THING → It only works if everyone starts from the same place

Equity = Fairness  
ACCESS TO THE SAME OPPORTUNITIES → We must first ensure equity before we can enjoy equality

Equity image credit: Please note, this image was adapted from an image adapted by the City of Portland, Oregon, Office of Equity and Human Rights from the original graphic:  
<http://indianfunnypicture.com/img/2013/01/Equality-Doesnt-Means-Justice-Facebook-Pics.jpg>

Also, when comparing minimum regulated prices, account has to be taken of differences in the structure and applicability of the regulated price. The fact that California regulated prices must be paid on all Grade A milk, rather than only on pooled milk received at pooled plants (as in FMMOs), suggests that minimum prices here need to be lower.

One witness suggested that adequate milk supply, without regard to price, is the major determinant in processor investment decisions. The converse of that argument would be that producers should be willing to invest in locations that offer a market for all their milk, without regard to price. For example, his assertion suggests that a producer would elect to sell 100% of his milk at \$9/cwt. rather than sell 90% at \$20/cwt. Neither argument is credible. Raw product cost matters when it comes to making plant investment decisions.

Finally, the fact that the WUD/MPC/CDC proposal would result in a Class 4b price that would remain lower than the Federal Order Class III price is irrelevant. At the end of the day, the milk price must be low enough so that buyers (plants) are able to profitably operate and market their products, otherwise the milk will go unpurchased. Under the WUD/MPC/CDC proposal, the gap between the Class 4b and Class III price would be insufficient for California cheese plants to remain competitive on current sales with their counterparts in the rest of the country.

Thank you for the opportunity to submit this post-hearing brief.

Sincerely,

A handwritten signature in black ink that reads "R. Gregory Dryer". The signature is written in a cursive, slightly slanted style.

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# TESTIMONY

of

Greg Dryer  
on behalf of

**Saputo Cheese USA Inc.**

at the

Consolidated Stabilization and Marketing Plan Hearing

**Sacramento, California**

**April 11, 2016**

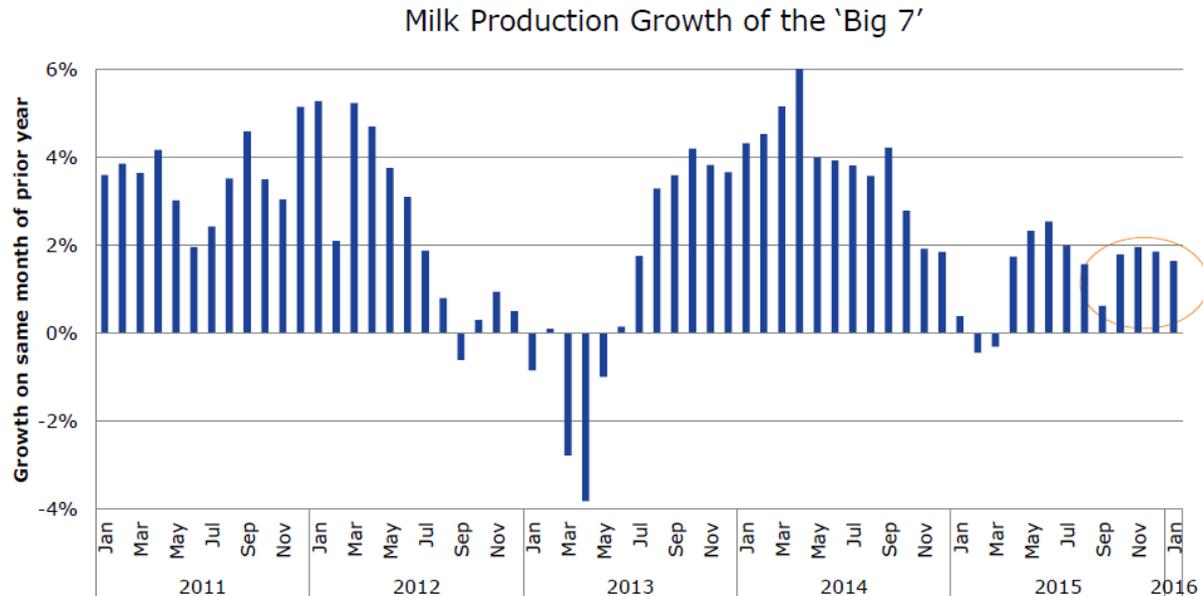
Mr. / Ms. Hearing Officer and Members of the Hearing Panel:

My name is Greg Dryer. I am Senior Vice President of Industry and Government Relations for Saputo Cheese USA Inc. Our company, Saputo Inc., operates seven facilities in the state of California. We employ more than 1,500 people here and purchase a substantial portion of the state's milk production both directly from farmers and from farmer cooperatives. We are very familiar with conditions in other regions from our experience operating 21 facilities in ten other states.

I am here to testify in support of the Dairy Institute of California's proposal to replace the permanent whey scale with one based on the value of liquid WPC 34. We oppose an extension of the temporary whey scale but if an extension is granted, we ask that it be limited to a period not to exceed six months. Six more months is approximately nine and one half months from now and makes the entire duration eighteen months. Anything further could not reasonably be deemed "Temporary".

## World Dairy Situation

This dairy recession is not a California problem. Dairy farmers all over the world are facing the challenge of low prices. Those low prices have been driven primarily by over production.

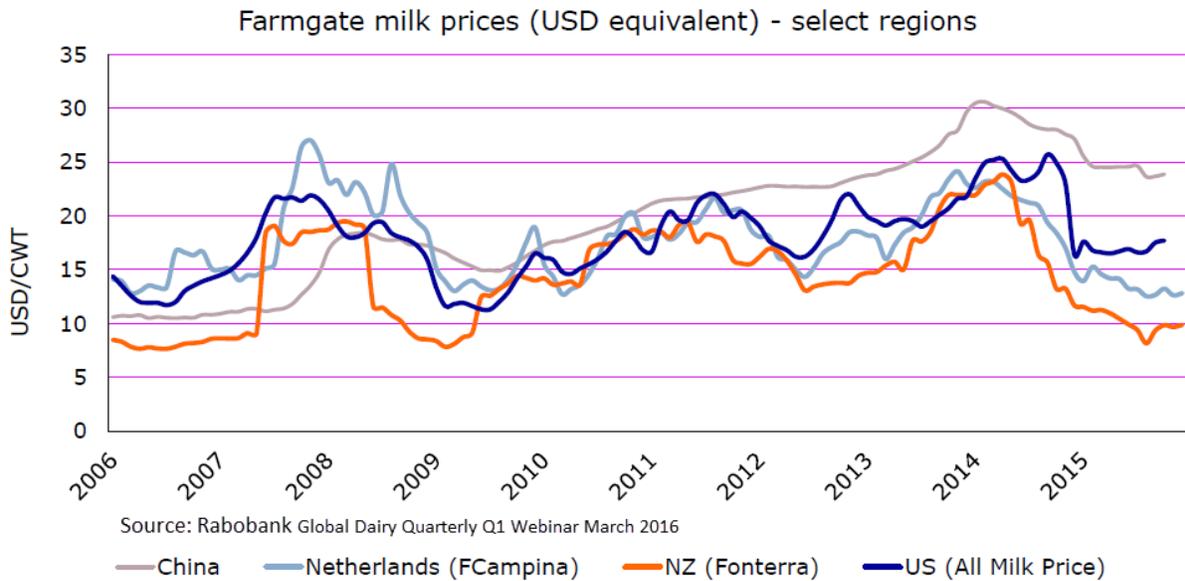
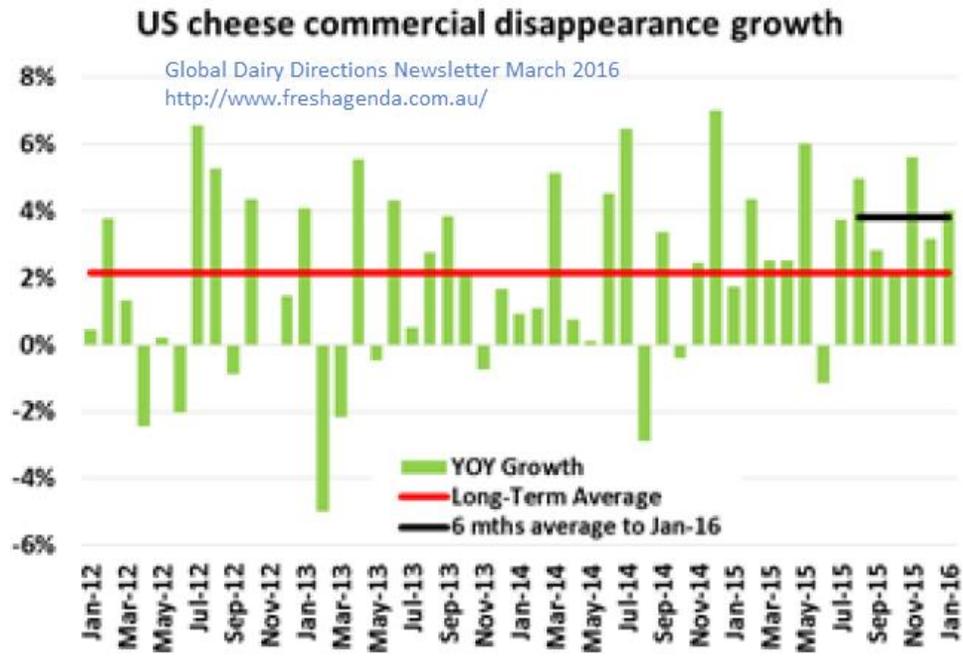


Source: Rabobank Global Dairy Quarterly Q1 Webinar March 2016

Note: includes EU 27, USA, NZ, Australia, Brazil, Argentina, and Uruguay

How is the problem being dealt with around the world? In Europe, the limited assistance the government is providing is funded from general tax revenues while the market continues to function unimpeded. In New Zealand, the government has elected not to intervene and the farmers are feeling the full brunt of the major decline in market prices. Again the market is allowed to function. The market is allowed to function despite the fact that the milk price crisis facing those two major dairy regions is far worse than the one that exists here in the United States. Those governments recognize that the market does and will prevail.

We have a strong domestic market that insulates us to some degree against conditions impacting the rest of the world.

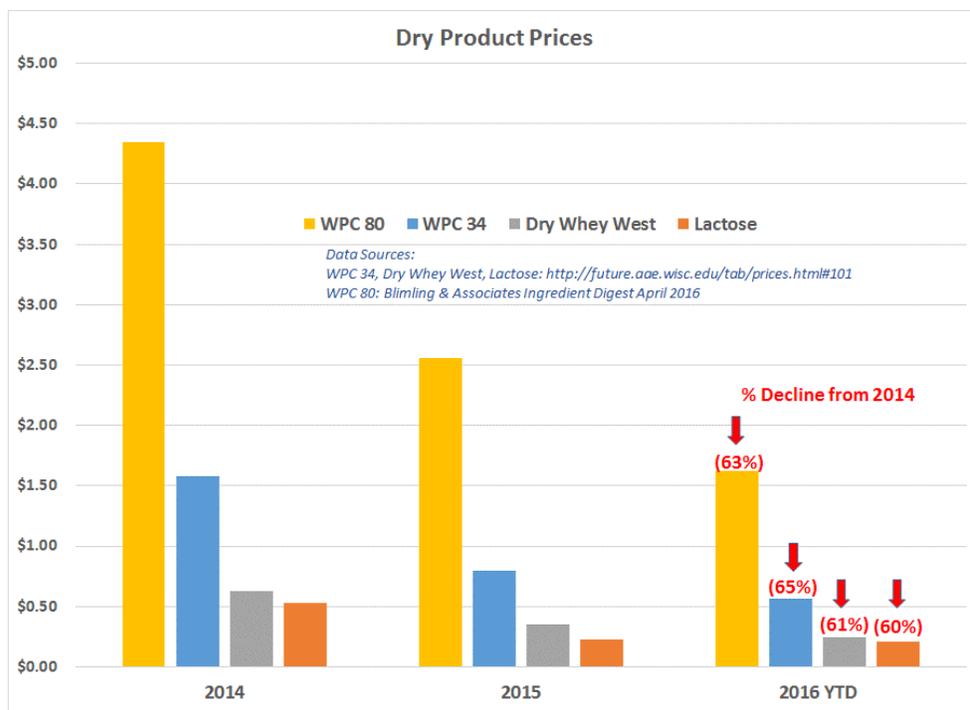


But here in California, when producer margins come under pressure, the solution sought time and time and time again is to petition government to require cheesemakers to pay a higher price than the market will bear. In effect, this suggested solution would subtract from one group's problem and simply add it on to another's.

If the current trend of declining milk production in California continues, the price of milk will inevitably rise. It won't however, rise to the level of the Federal Order price. It will only rise to the point that cheesemakers can continue to justify maintaining their investment here, given those economics that are specific to operating in California. If the government mandates a price above that benchmark, demand for milk will inevitably decline as cheese plants reduce or cease their production here. With cheese representing 46% of California's milk market, it is possible that the farmers would be unable to sell all their milk and could well be worse off than they were before. The market is oblivious to milk production costs or cheese plant profitability. It is relentless in its pursuit of equilibrium, like flowing water seeking a place to settle. Efforts to circumvent it only delay the inevitable.

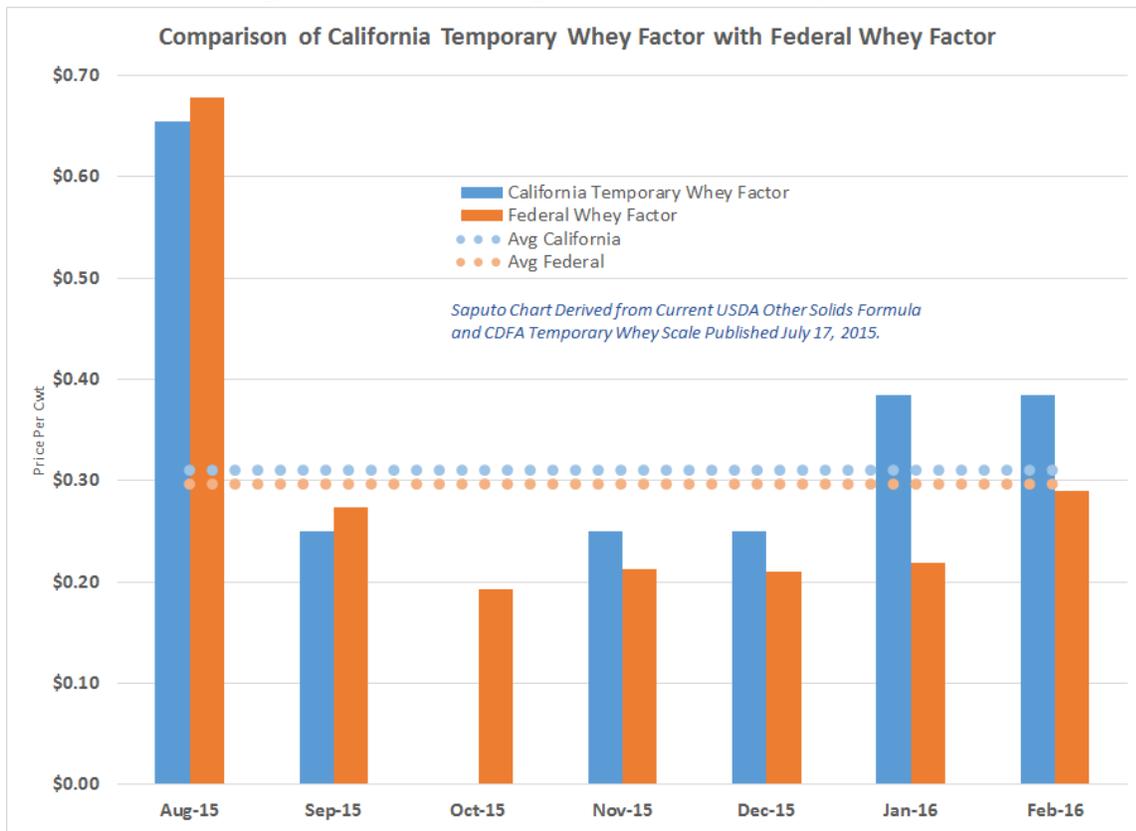
### California's 4b Whey Factor

This hearing is coming at a time when most if not all cheesemakers are not covering costs on their whey byproducts. The chart below shows the movement of whey product market prices since 2014.



Despite negative returns on whey, cheese processors continue to pay producers a milk price that incorporates a positive whey contribution. That distorts the reality.

The current Temporary California Class 4b Whey Factor effective August 1<sup>st</sup>, 2015 through July 31<sup>st</sup>, 2016 has exceeded the Federal whey factor for four of the seven months since its implementation. In fact, on average, it has exceeded the Federal factor for the entire period. Notwithstanding those facts, we are here once again to consider extending or even increasing the California Whey Factor.



## Transporting of whey

Under end product pricing, whey make allowances remain relevant to any discussion revolving around the appropriate value to assign whey in the pricing of milk. California abandoned that type of whey pricing in December 2007 when the high dry whey price created a crisis for the state's cheesemakers. But all the adjustments and debates that have since followed, have centered on a comparison of the California whey factor to that of USDA. The whey make allowance remains a key variable in the Federal whey factor so it must be deemed pertinent to this debate.

Freight Cost Per Lb of Whole Whey @ 6.5% Solids	
Miles	Cost/Lb
10	\$0.009
25	\$0.023
50	\$0.046
75	\$0.069
100	\$0.092
125	\$0.115
150	\$0.138
175	\$0.162
200	\$0.185
<i>Assumptions:</i>	
<i>Cost per loaded mile</i>	<i>\$3.00</i>
<i>Liquid Lbs Per Load</i>	<i>50,000</i>
<i>Cost/Lb = (Miles x \$3.00) ÷ (50,000 x 6.5%)</i>	

Whey make allowances assume that 100% of whey solids are recovered and processed on site in the form of dry whey. There is no provision for whey hauling. That logic is flawed. Whether hauling is paid for by the shipping plant or the receiving plant is irrelevant. It is part of the cost of whey processing. Small to medium sized plants are unable to justify the investment in whey processing. They are forced to transport the whey to those processors who will accept it or dispose of it at a cost. Transporting whey erodes much of its value given the high water content. This transportation cost

issue is not limited to just small operators. Saputo in California for example, has centralized whey processing in one major facility. Over half of the whey processed there is shipped at a substantial cost from four other Saputo facilities. Moving whey 100 miles or more virtually eliminates the potential to generate a profit from it. The Federal make allowance does not provide for the cost of transporting whey.

In 2012, a consortium of Wisconsin industry leaders, known as the Wisconsin Whey Opportunities Working Group, collaborated to survey the volume and processing of cheese whey in Wisconsin. The Working Group included:

- United States Department of Agriculture National Agricultural Statistics Service
- University of Wisconsin – Madison College of Agricultural and Life Sciences
- Wisconsin Center for Dairy Research
- Wisconsin Cheese Makers Association
- Wisconsin Department of Agriculture, Trade and Consumer Protection
- Wisconsin Economic Development Corporation
- Wisconsin Milk Marketing Board

Of the 125 cheese plants surveyed, half did not process their whey and **72%** shipped their whey in liquid form to other plants for further processing. *Source of table: 'Wisconsin Whey Study' Attached.*

Wisconsin Cheese Plants Whey Handling 2011	Plants	%
Disposal	22	17.6%
Sold Whole whey	41	32.8%
Unprocessed	63	50.4%
Water removed by R.O./Evap	14	11.2%
Concentrated by UF	23	18.4%
Limited processing	37	29.6%
Limited or unprocessed	100	80.0%
Dried as Sweet whey or WPC 34 etc	15	12.0%
Dried as WPC 80/90	10	8.0%
Grand Total	125	100.0%

The Wisconsin study is relevant to California because Wisconsin has many more whey processing options for cheese companies than does California. It gives an indication of the extent to which whey must be transported before it is ultimately dried in some form. It clearly demonstrates some of the major shortcomings in the Federal whey factor. Many plants concentrate the whey prior to shipping, not because there is significant economic benefit, but because it is logistically impossible for shipping and receiving facilities to handle the number of trucks required to carry that volume of dilute liquid. Transportation savings from the reduced number of concentrated loads are almost entirely offset by the cost of installing and operating concentration systems. Those operating costs include energy, membrane replacement, cleaning chemicals, waste treatment, and labor among others. A whey processor's cost savings from receiving a concentrated product at the whey processing plant are negligible at best.

### **Not all whey is processed**

The Federal whey make allowance assumes that 100% of cheese whey solids are recovered and processed on site in the form of dry whey. The American Dairy Products Institute publishes an annual report called, "*Dairy Products Utilization and Production Trends.*" It contains a schedule which attempts to account for all whey solids produced called, "*Estimated U.S. Fluid Whey & Whey Solids Production (by Type) and Resulting Quantity of Whey Solids Further Processed.*" That schedule which follows accounts for just 53% of whey solids in 2014, the most recent year reported. While the accuracy of that estimate may be debatable, it clearly demonstrates the fallacy of the assumption all whey solids are captured and sold. Also, of the whey solids that are processed and sold, many are not sold profitably.

**Estimated U.S. Fluid Whey & Whey Solids Production (by Type) and  
Resulting Quantity of Whey Solids Further Processed  
(millions of pounds)**

	<u>2002</u>	<u>2004</u>	<u>2006</u>	<u>2008</u>	<u>2010</u>	<u>2011</u>	<u>2012</u>	<u>2013<sup>1</sup></u>	<u>2014<sup>2</sup></u>
<u>Sweet-type Whey Production</u>									
Cheese Production <sup>3</sup>	8,547	8,873	9,525	9,913	10,443	10,595	10,886	11,102	11,450
Calculated Fluid Whey <sup>4</sup>	76,923	79,857	85,725	89,217	93,987	95,355	97,974	99,918	103,050
Calculated Whey Solids <sup>5</sup>	4,615	4,791	5,144	5,353	5,639	5,721	5,878	5,995	6,183
<u>Acid-type Whey Production</u>									
Cottage Cheese Production <sup>3</sup>	748	779	778	714	719	704	709	678	671
Calculated Fluid Whey <sup>4</sup>	4,488	4,674	4,668	4,284	4,314	4,224	4,254	4,068	4,026
Calculated Whey Solids <sup>5</sup>	269	280	280	257	259	253	255	244	242
Total Whey Production (fluid basis):	81,411	84,531	90,393	93,501	98,301	99,579	102,228	103,986	107,076
Total Whey Production (solids basis):	4,884	5,071	5,424	5,610	5,898	5,974	6,133	6,239	6,425
<u>Whey Solids Further Processed</u>									
A - Concentrated Whey Solids	108	92	102	104	89	99	81	89	92
B - Dry Whey									
- Human Food	1,041	949	1,064	1,024	961	951	946	916	856
- Animal Feed	74	86	46	58	52	59	53	37	14
C - Modified Dry Whey Products									
- Reduced Lactose & Minerals Whey	125	85	92	89	85	88	90	90	93
- Whey Protein Concentrate	313	356	428	443	428	431	459	498	538
D - Whey Solids in Wet Blends	38	-	-	-	-	-	-	-	-
E - Whey Solids Utilized for Lactose <sup>6</sup>	901	1,065	1,182	1,192	1,453	1,600	1,642	1,665	1,813
Total Whey Solids Further Processed (A+B+C+D+E) <sup>7</sup> :	2,600	2,633	2,914	2,910	3,068	3,228	3,271	3,295	3,406
Total Whey Solids Further Processed as % of Total Whey Production (solids basis):	53.2%	51.9%	53.7%	51.9%	52.0%	54.0%	53.3%	52.8%	53.0%

<sup>1</sup> Revised.

<sup>2</sup> Preliminary.

<sup>3</sup> USDA/NASS.

<sup>4</sup> Whey Production: approximately 9 lb/1 lb cheese produced (except Cottage).

approximately 6 lb/1 lb Cottage Cheese produced.

<sup>5</sup> Average total solids content of whey: 6.0% 1990 thru 2014.

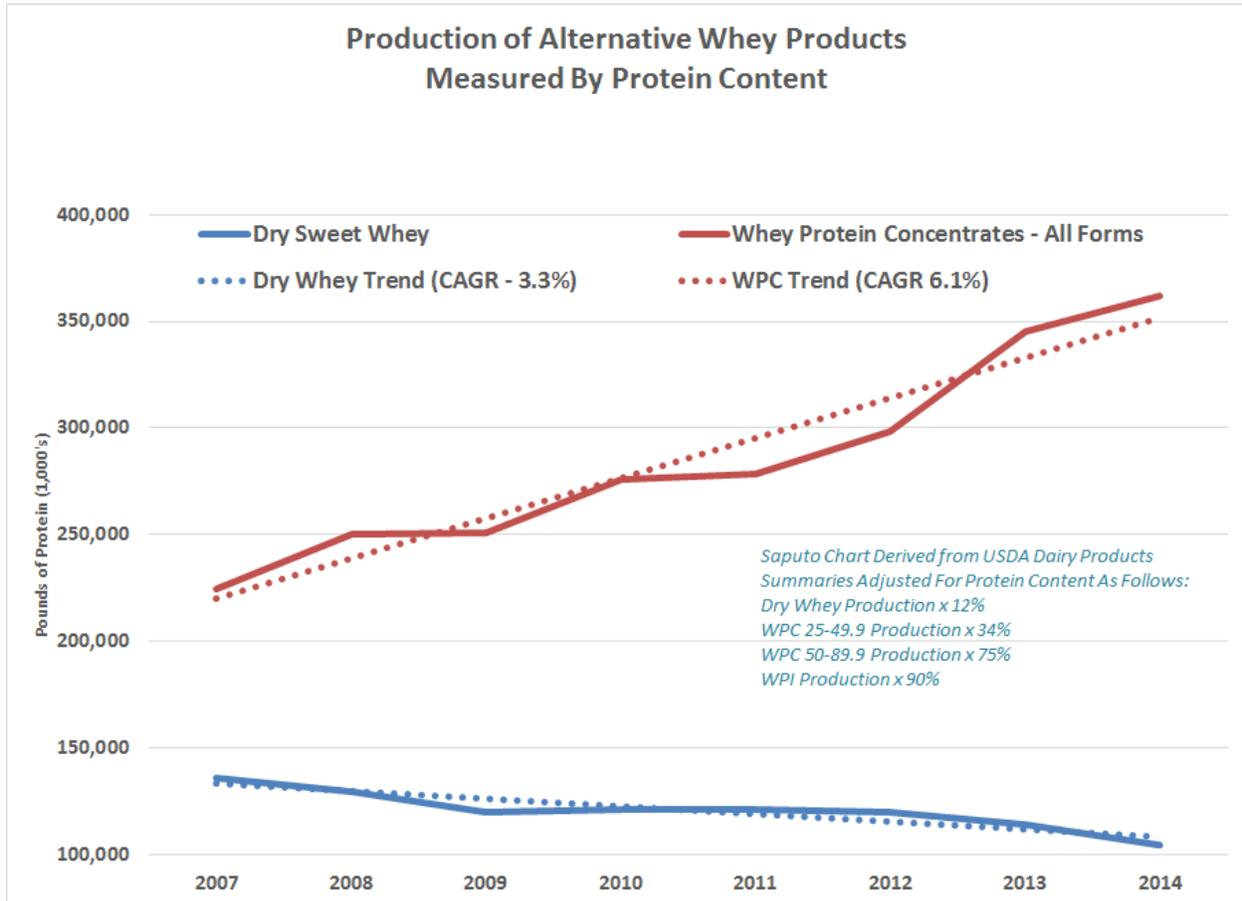
<sup>6</sup> Approximately 1.6 lb whey solids utilized/1 lb lactose produced.

<sup>7</sup> Does not include whey permeate, whey protein isolate and other whey fractions.

## Dry Whey is not a good barometer of the value of whey to cheesemakers

The USDA Class III dry whey factor has been held up as some kind of gold standard for calculating whey's contribution to the value of milk. The fact is that the dry whey price is an inherently bad predictor of the value of whey to most cheesemakers. Very few have the desire or the requisite economic justification to produce dry whey. National dry whey production has been declining for years at the same time cheese production has been increasing. California has just one plant that consistently dries whey.

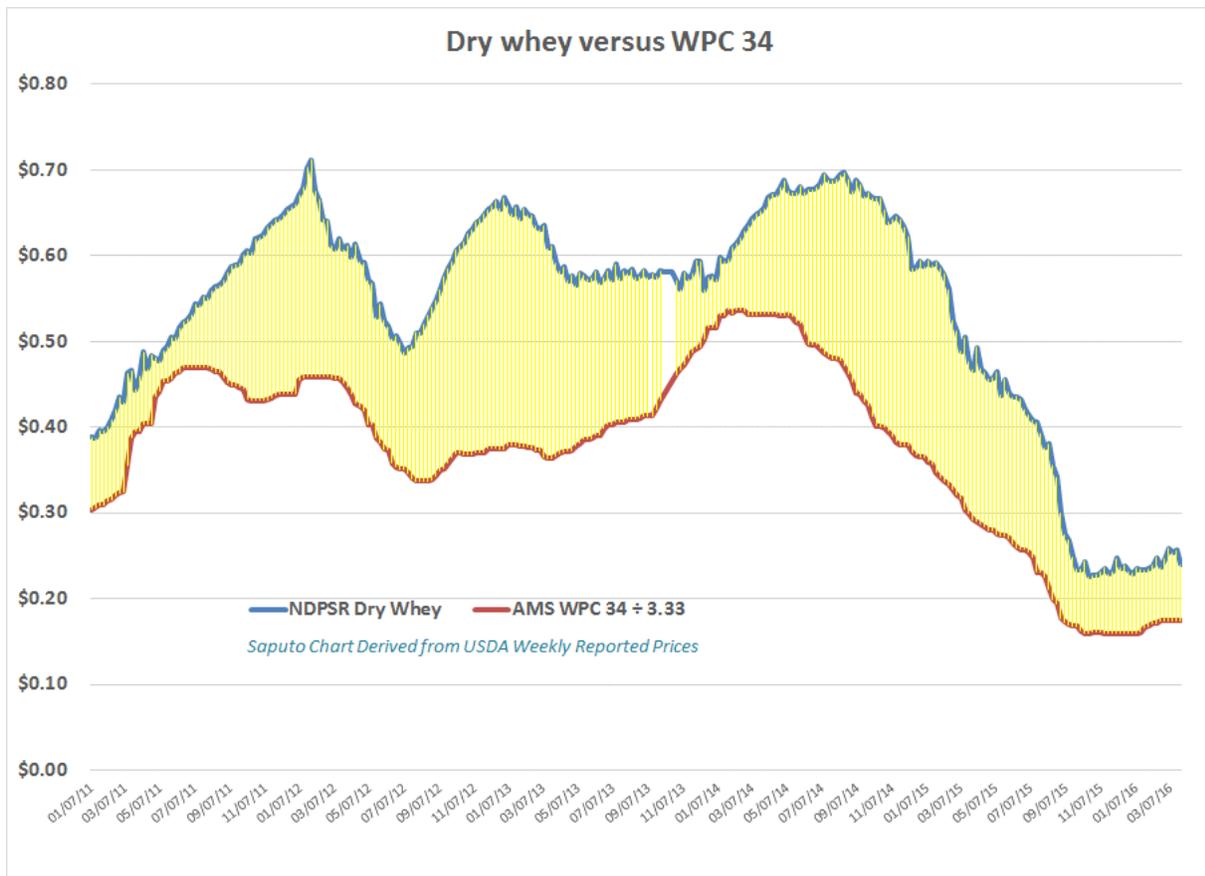
The USDA theory has been that dry whey is well suited to serve as the lowest common denominator in a formula designed to establish the minimum value for milk. While that may be true at times, it is far from true much of the time. Most cheesemakers who are able to process their whey have chosen to make some form of concentrated whey protein.



It is not practical for them to build in an “either or” capability. That is, to be able to switch between dry whey and WPC depending on which happens to be most profitable at the moment. In the production of whey protein concentrate, between 70 and 90 percent of the whey solids are separated from the true protein, depending on the protein concentration of the WPC produced. Those solids are referred to as “lactose permeate”. The production of dry whey captures 100% of the solids. There is no lactose permeate byproduct. When the price for dry whey is high, 100% of the solids, including the lactose permeate solids, return that same high value. When making WPC, the lactose permeate byproduct must be dealt with. It can either be further processed into lactose, dried as deproteinized whey (DPW), sold as liquid feed, or disposed of.

Producing lactose is no walk in the park. It takes between 1.6 and 1.9 pounds of permeate solids to produce 1.0 pound of saleable lactose. The byproduct of lactose production, “mother liquor”, captures 40 to 50% of the permeate solids and is a very high strength waste product and an environmental nightmare. Deproteinized whey (DPW) is difficult and costly to dry given its low solids content and high concentration of lactose. While costing more to produce, it typically returns a lower value than dry whey because of its drastically lower protein content. Selling lactose permeate as liquid feed requires concentrating the solids and most often returns less than the cost of concentrating. Disposal of permeate is a very costly undertaking if at all possible given environmental constraints.

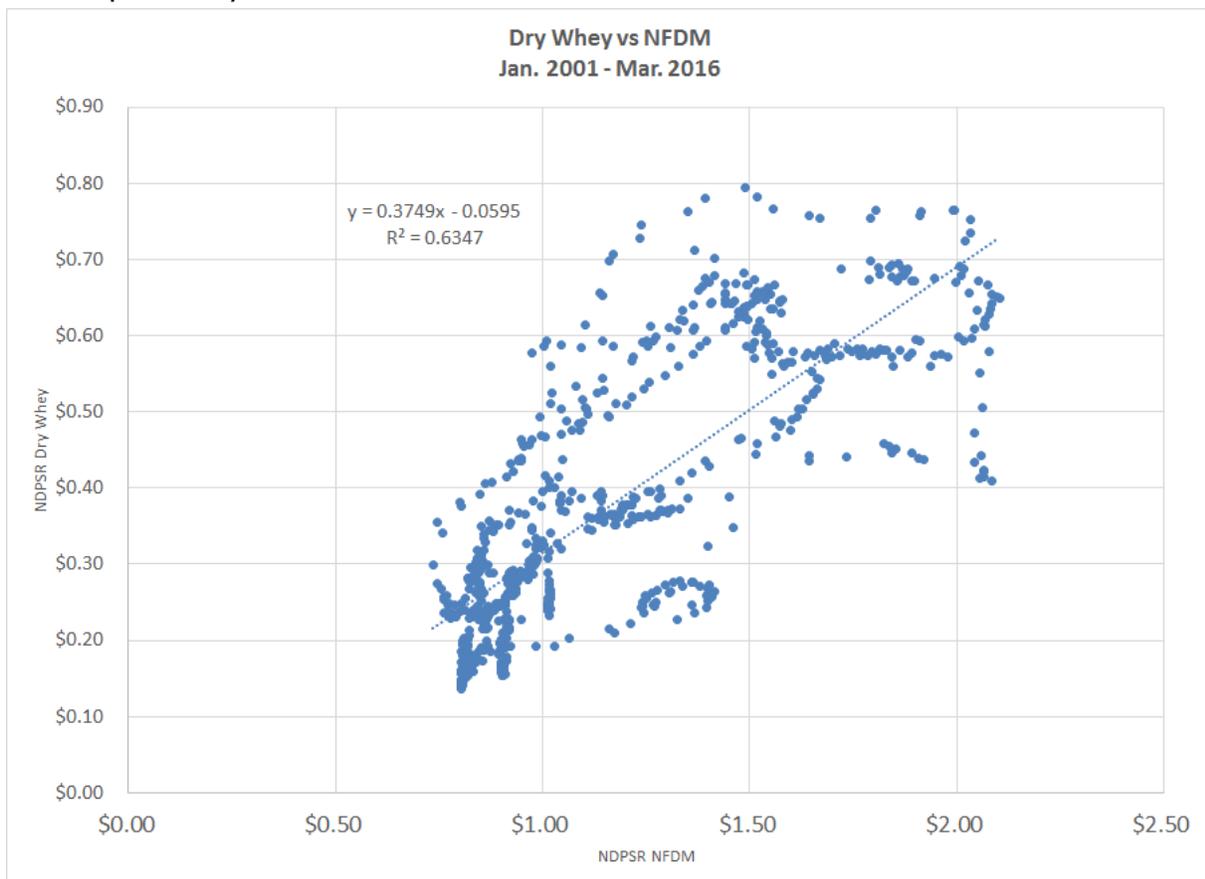
Consider a manufacturer of WPC 34. At that concentration, roughly 30% of the whey solids are converted to a saleable protein product. To equate then with dry whey, the price of WPC 34 must be 3.33 times (1 / 30%) that of dry whey if you assume the ability to break even in disposing of the lactose permeate. Following is a chart comparing the

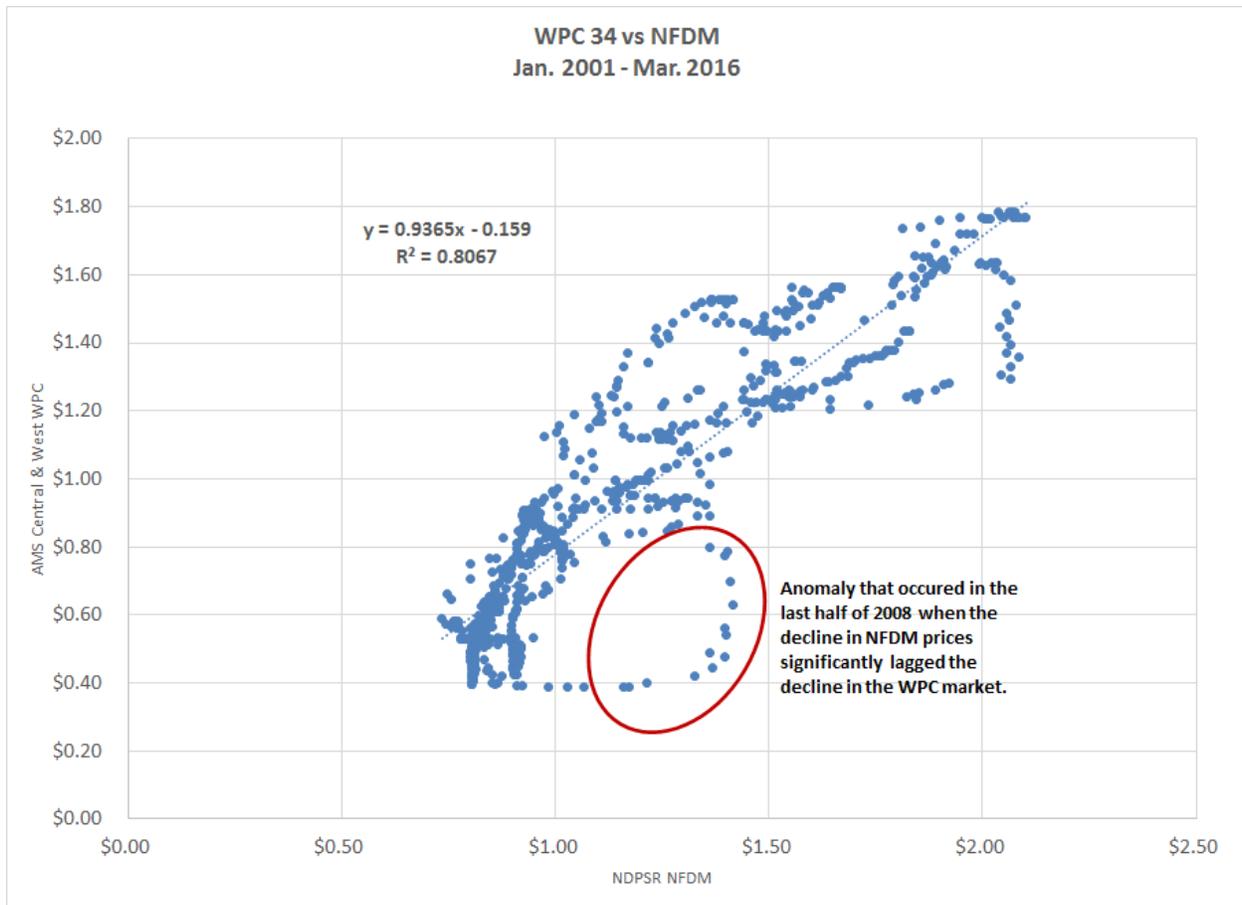


National Dairy Product Sales Report (NDPSR) dry whey price with the WPC 34 market divided by 3.33. In the past five plus years, the dry whey price is always higher.

That means you must be able to generate a profit on lactose permeate sufficient to overcome the price differential to afford what the federal order whey formula adds to your cost of milk. Even for the most efficient large scale processors that is not feasible much of the time.

Dry whey does not correlate well with other whey alternatives. It tends to follow trends in the feed industry rather than those affecting the food industry. Those two can easily fall out of sync. Following are charts that plot NDPSR dry whey and AMS WPC 34 prices against that of NDPSR NFDM since 2001. The correlation of dry whey with NFDM is very poor, with an R<sup>2</sup> factor of .6347 while the R<sup>2</sup> for WPC 34 is much better at .8067. Utilizing WPC 34 value in the Class 4b whey factor would prevent crises like that of 2007 when the West dry whey market exceeded \$0.80 per pound. It is more representative of the value obtainable by those fortunate enough to find an outlet for their liquid whey.





## Make Allowances

The current FMMO they make allowance in the Class III formula is \$0.1991. It hasn't changed since it was implemented in October 2008, over seven years ago. The data used in the allowance came from a 2007 hearing, which had relied on even older (2005) data. In November 2007, the last California Class 4b whey make allowance was \$.2670, \$.0679 higher than the FMMO. That was based on a manufacturing cost study result of \$0.2673 for 2004. For 2005 the study yielded \$0.2851 and 2006 produced \$0.3099. To argue now for the adoption of the Federal whey factor or its equivalent is simply a transparent attempt at a major price increase without any substantiation. California costs are substantially higher.

## California is unique

The fundamental issue in this and all these hearings is that the situation in California is unique to California. Costs are higher here. Farms and plants are bigger here. Regulation is more intensive here. The distance to markets is greater here. California, given its importance in dairy, warrants its own milk pricing system. If California instead insists on joining the federal system, it may well end up serving as the point of reference for the rest of the country rather than the opposite. Dr. Mark Stephenson testified the following at the recent Federal Order Hearing:

*The concern with a California FMMO is that our current product price formulas may not set the Class III minimum price low enough to allow the western markets to clear on a regular basis. Higher transportation costs and additional surplus milk supplies suggest that the competitive price difference between the major cheese producing regions of the country has grown. Two solutions present themselves to assure orderly markets. One is that the minimum price be calibrated to be just below the lowest value of milk in the country. The other is that regional manufacturing prices differ by enough to reflect the geographic market values.*

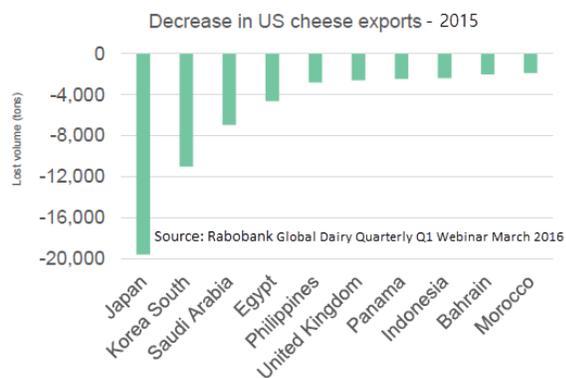
*The problem with a flat, but lower, minimum price is that the price may be so low in the higher value regions of the country as to be meaningless if premiums are asked to carry too much of the value. A better solution may be to reflect the regional price variation with a price surface as we do with Class I milk.*

Stephenson clearly acknowledges California's uniqueness and recommends a regional price rather than a lower national price surface. We already have a California price. We need only to fix the whey factor. The Dairy Institute proposal accomplishes that.

## Summary

The current spate of low prices and stressed margins has resulted from a global milk supply imbalance. It is not a problem unique to California.

Milk production in New Zealand and the EU has been running about 5% above the previous year in recent months. The global situation has applied pressure to U.S. dairy exports which in turn has led to depressed prices here.



To this date, neither Europe nor New Zealand have chosen to bail out their industries.

Instead they are allowing the imbalance to resolve itself naturally sooner rather than later.

The global dairy recession most notably has undercut the market for whey products. Prices have fallen from 2014 levels by 60% or more in most instances. The whey profits that once existed to bolster milk prices are no longer. California producers have been receiving more than the Federal Order Whey Factor since the Temporary Whey Scale went into effect on August 1, 2015. Realistically, the milk price in California will remain lower than the Federal price unless the state's operating cost structure changes, the export market becomes more lucrative than the domestic one, or the industry downsizes to match the demand from just the Western region.

According to CDFA, California lost 32 farms or 2.18% of its total in 2015. For 2014, the number was 26 farms or 1.74%. Nationally, 2.7% of dairy farms were lost in 2015 and 3.5% in 2014. California has been well below the national average. It ranked 34<sup>th</sup> and 30<sup>th</sup> in farm losses among the 50 states according to USDA statistics for 2014 and 2015. If the situation for dairy producers in California is untenable, then what it must be for the majority of other states who are losing more farms?

We manufacture cheese in California because we want to. Our customers buy our products because they want to. Cooperatives and farmers sell us their milk because they want to. That is how the free market functions. But this debate is about seeking a price that cheesemakers must pay because they have to. That is not how a free market operates and the market will always prevail in the end.

We support the proposal from the Dairy Institute of California with a whey scale based on the value of liquid whey tied to movements in the price of WPC 34. Proposals to mimic the Federal system should be summarily rejected. That is the same type of system California discarded almost ten years ago. The Federal Order system is obsolete.

# Wisconsin Whey Study



Wisconsin Whey Opportunities Working Group  
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## Opportunities for the Wisconsin Whey Industry

**April 17, 2013**

# Wisconsin Whey Study

## Industry Opportunities



### TABLE OF CONTENTS

EXECUTIVE SUMMARY .....	3
WHEY PROCESSING OVERVIEW.....	4
2012 SURVEY RESULTS: HOW CHEESE PLANTS HANDLE WHEY.....	9
STUDY OF RETURN ON INVESTMENT MODELS .....	16
RECOMMENDATIONS .....	20
MOVING FORWARD.....	22
APPENDIX A: WHEY PURCHASERS DIRECTORY.....	23

### EXECUTIVE SUMMARY

Whey represents an economic opportunity for Wisconsin cheese manufacturers of all sizes, yet many small and medium-sized cheese businesses have not explored the technologies and markets to prepare an optimal product for sale. In response to this need, a consortium of Wisconsin industry leaders, known as the Wisconsin Whey Opportunities Working Group, collaborated in 2012 to research the current volume and processing of cheese whey in Wisconsin, the many regional requirements for whey, and the return on investment for cheesemakers considering whey handling and processing improvements. Participating organizations in the Wisconsin Whey Opportunities Working Group included:

- United States Department of Agriculture National Agricultural Statistics Service
- University of Wisconsin-Madison College of Agricultural and Life Sciences
- Wisconsin Center for Dairy Research
- Wisconsin Cheese Makers Association
- Wisconsin Department of Agriculture, Trade and Consumer Protection
- Wisconsin Economic Development Corporation
- Wisconsin Milk Marketing Board

The consortium conducted an in-depth survey of nearly three-quarters of the State's 121 whey processors, personal interviews with 15 of the largest whey processing companies, and four specific return on investment models for cheese manufacturers considering processing whey.

Information gathered through this work illuminates the need for cheese makers and whey processors to identify and act upon economic opportunities associated with whey processing, thereby ensuring Wisconsin maintains its competitive advantage at the forefront of this rapidly growing sub-sector. As a result of this research, the Wisconsin Whey Opportunities Working Group developed seven specific recommendations to further develop the economic opportunity presented by Wisconsin whey, and compiled a Whey Purchasers Directory to aid the industry.

Special thanks to the USDA National Agricultural Statistics Service – Wisconsin Field Office, as well as Kelton Greenway and Rich Scheuerman, expert consultants for the former Dairy Business Innovation Center, who conducted and analyzed the bulk of the research included in this report.

## WHEY PROCESSING OVERVIEW

### INTRODUCTION

As the largest cheese producer in the nation, Wisconsin is also the largest whey producer. On a state-wide level, the whey production and processing sub-sector accounts for more than 16,300 jobs per year, with indirect economic benefits extending to surrounding rural communities, as most producers and processors are located in rural areas.

On a global level, demand for whey-based protein products remains strong with export growth averaging 7 percent a year, and prices hovering near a five-year high level. In 2012, while the United States increased its share of the world cheese trade, it lost share on butterfat and whey products. And, while Wisconsin produces the most whey, both California and Idaho continue to export more of what they do produce.

The highest value of whey is in food ingredients and pharmacological applications, including use as additive nutrients in the dietetic and health food sectors. This results from removing the lactose and producing whey protein concentrate (WPC), which typically ranges from 34 percent to 80 percent protein in the dry matter. When the protein composition exceeds 90 percent, the product is termed whey protein isolate (WPI).

The lowest-value use of whey is land-disposal. This yields zero or negative value to the cheese maker. Two factors underscore the need for cheese makers to minimize or eliminate whey land spreading. The first is that domestic environmental regulations for land-spreading whey are restrictive and likely to become more so. The second factor is that the value of whey is now reflected in gate prices for milk (paid to the farm) so cheese makers not recovering that value are at a financial disadvantage. Aside from general industry benefits, cheese makers need to effectively evaluate whey handling alternatives in order to optimize their own profitability, remain competitive in the future, and reduce negative environmental impacts.

For cheese makers, value-added whey usage alternatives include:

1. Whey as an food ingredient through further refinement.
2. Whey as a feed source for farm livestock.
3. Whey as feedstock in biodigesters producing energy.

Each of these alternatives may deliver greater business sustainability and growth in the dairy value chain. For whey processors, the availability and value of whey is dependent on what the cheese maker does. A steady supply of quality product assures the value chain is optimized from farm to ultimate usage or export.

Assessing how cheese makers currently handle whey and developing tools to help move them up the value chain is vital to growing the industry. In addition, examining the connection between cheese makers and whey processors is essential to identifying economic opportunities and ensuring Wisconsin maintains its competitive advantage at the forefront of this rapidly growing sub-sector.

Therefore, in 2012, with input from the Wisconsin Agricultural Statistics Service, 15 major whey processors were identified for field visits or phone interviews to learn more about these companies' business challenges and opportunities. It should be noted these 15 processors represent the vast majority of whey processed in the State, and as Wisconsin is the largest whey producing state in the nation, these processors represent the largest concentration of whey processing in the country. A snapshot of companies participating in the survey reveals:

- 7 processors have captive whey processing plants tied to their company's cheese operations. They do not receive whey from other cheese plants.
- 5 processors have captive plants and purchase supplemental whey from other cheese plants.
- 3 processors are not affiliated with a cheese plant and purchase all whey from others.

### WISCONSIN WHEY PRODUCTS

Whey products manufactured in Wisconsin range from basic dried sweet whey to highly refined whey protein isolates. Drying whole sweet whey is a streamlined process that leaves no by-products other than the water removed through evaporation. On the other hand, a processor choosing to produce concentrated whey protein products must install more complex fractionating equipment. Removing lactose from whey allows production of whey protein concentrate (WPC) with compositions typically range from 34 percent to 80 percent protein in the dry matter. When protein composition exceeds 90 percent, the product is termed whey protein isolate (WPI). Product values increase as protein composition rises, and yields drop dramatically at higher protein levels. There is a trend of increasing production of 80 percent protein WPC and WPI. In addition, some whey processors have developed non-traditional value-added products. Very little was divulged by processors manufacturing these products, but their existence is known. It is expected that ongoing R&D efforts will be focused on higher-value uses of whey and whey fractions.

Processors manufacturing whey proteins must deal with large volumes of whey permeate, a process byproduct. Whey permeate contains a high percentage of lactose. Several Wisconsin whey processors refine whey permeate into dry lactose products. Some whey permeate is also dried whole. Much of the remaining permeate produced by major Wisconsin whey processors is directed to animal feeding in liquid form. Wisconsin also produces a significant quantity of acid whey from the manufacture of cream cheese, ricotta and Greek yogurt, which historically has only been usable as animal feed.

### BACKGROUND

Processing fluid whey by-product from cheese production into a variety of value-added products is a large and critical part of Wisconsin's dairy industry. This processing provides a controlled, environmentally safe method of whey disposition while offering revenue streams to cheese plants and whey processors. Following decades of relatively stable whey product prices, Wisconsin's dairy industry has dealt with increased whey price volatility during the past five years. This new era of whey price volatility was created primarily by the development of new markets for whey proteins and a surging export demand for whey products, in large part fueled by a weak dollar. The price swings of value-added whey products have added to the overall price volatility faced by Wisconsin's dairy industry.

Wisconsin cheese plants range in size from very large to tiny. Unfortunately, not all cheese plants share the same values from whey processing. Smaller cheese plants face significant barriers to entering the whey processing business. These include low whey volumes, high capital equipment costs, high transportation costs and increasing quality requirements. Under the Federal Order system, a Class III price is established monthly. This is the minimum price that cheese plants are required to pay for milk used for making cheese. The Class III price formula is derived from current market values for butterfat and protein, plus an additional value based on the current dry whey market price. Spiking dry whey values in late 2011 and early 2012 pushed up Class III prices, forcing Wisconsin cheese plants to pay higher milk prices. This situation placed smaller plants at a greater competitive disadvantage due to the limited value they were able to extract from their whey. The January 2012 Class III price was \$17.05. Of this amount,

the whey solids value was \$2.86, 16.8% of the total. By June of 2012, the Class III price had dropped to \$15.63. The whey solids value fell to \$1.77, 11.3% of the total.

It should be noted that due to Wisconsin's practice of paying dairy farmers premiums above minimum Class III milk prices, actual payment prices were much higher than the Federal Order calculated minimum prices. Those cheesemakers in the State competing on a national basis saw their historical competitive cost disadvantage to states not participating in the Federal Order system, notably California and Idaho, grow substantially larger, as the California state order capped the whey value component of the cheese milk price and Idaho's milk price is unregulated.

### **OUTREACH OBJECTIVES**

The objectives of this whey processor outreach included:

1. Identify the major Wisconsin whey processing companies and learn their challenges and opportunities.
2. Gain an understanding of how whey is utilized in Wisconsin and identify trends that will lead to future utilization decisions.
3. Explore current and future capacities of whey processors relative to their interest in receiving additional sources of whey products from other producers.
4. Identify quality and certification requirements of companies interested in additional whey product sources.
5. Develop recommendations for the industry to enable greater whey utilization and increased economic returns.

### **CONFIDENTIALITY**

The 15 whey processors included in this outreach range from single plant operations to large multiple plant companies. In accordance with confidentiality policies designed to protect sensitive business information, no specific whey processing companies are identified in this report. Major themes of individual discussions are summarized.

### **MAJOR THEMES**

During discussions with major Wisconsin whey processors, a group of recurring themes regarding Wisconsin's whey processing business developed, including:

1. Major whey processors can be divided into three categories:
  - a. Companies processing whey only from cheese plants they own.
  - b. Companies primarily handling whey from cheese plants they own, with supplemental whey solids purchased from other companies.
  - c. Stand-alone whey processors with 100 percent purchased whey solids.

2. Processors buying whey solids from other companies are generally interested in procuring additional sources that are appropriate to their specific needs. The most desirable sources are uncolored whey from American-style cheese and solids condensed through Reverse Osmosis (RO).
3. Processors buying whey typically pay using a formula based on the market value of their primary final product. Most companies base liquid whey pricing on either dry sweet whey or dry WPC markets. As the market for procuring raw whey becomes more competitive, raw whey purchasers are sharing more of the whey value with their suppliers.
4. Overall, Wisconsin whey processors have underutilized capacity. This situation generates intense competition for limited volumes of choice supplies. Pricing competition for whey solids, including freight factors, has made a significant negative impact on processing plants' returns on investment.
5. Some whey processors believe whey-supplying cheese plants do not appreciate the risk involved to invest large amounts of capital in whey plants. Whey processors must develop markets for products and risk losing money in weak markets. They expect their investment to be rewarded when markets are profitable. Cheese plants with very little investment in whey processing should not expect significant returns from their whey stream.
6. Many surveyed whey processors referenced the high quality standards their customers require for finished products. This is particularly true for whey-based products made for the infant nutrition industry. In addition, most finished products must be certified Kosher and Halal, which means raw whey must also meet those criteria.
7. Processors buying whey solids see several major obstacles when evaluating whey solids from potential suppliers:
  - a. Small cheese companies may not have enough whey volume to assemble a tanker load. This makes transportation very expensive per pound of whey solids.
  - b. Small cheese companies justifiably focus most of their attention on cheese. Investment in whey handling and quality is minimal. This results in low quality whey that has little value to a processor that is making high quality, value-added products.
  - c. Whey quality problems include bacteriological issues from unsanitary handling and lack of cooling, contamination with various specialty cheese flavors, contamination with salt from drippings and brine, added color and inconsistent mineral profiles.
8. Whey processors generally feel that growth in whey processing will continue to trend toward higher protein WPCs and whey protein isolates. There is some interest in additional lactose production and permeate drying, especially considering that large volumes of liquid permeate are currently directed to animal feeding.
9. Whey processing business challenges include:
  - a. Securing a stable volume of suitable whey solids supplies at reasonable prices.
  - b. High capital cost requirements to build and expand whey plants.
  - c. Costs of regulatory compliance: DNR, FDA, OSHA, etc.

- d. Whey product market volatility.
  - e. Growing whey processing capacity to meet increasing cheese production (particularly at captive plants).
10. Several processors believe whey component values should be dropped from the Class III price formula and/or cheese plants should reevaluate their milk procurement premium programs in light of Wisconsin's competitive cost disadvantage to other major cheese producing states.

### RECOMMENDATIONS TO CHEESE PLANTS

Through discussions with Wisconsin's major whey processors, it was determined that several companies have additional processing capacity. Whey processors believe the market for raw whey is very competitive due to multiple buyers bidding for limited available volumes. Processors acknowledge that some supplies of whey are "stranded" without a market due to several factors. The following recommendations to cheese plants are intended to address issues that will enable greater whey utilization and increased economic returns.

1. **Address Whey Volume Constraints**

Very small cheese plants may not have sufficient volume to assemble a tanker load of raw whey from one day of cheese production. Shipping whey in small volumes is more expensive per pound of whey solids. A small plant can consider cooling whey and combining volume from two production days in order to reduce transportation cost.

2. **Assure Effective Skimming**

Few whey processors are able to receive whey that has not been skimmed. Keeping the cheese plant's whey separator operating in good repair is critical to assure ongoing whey shipments. For those cheese plants not skimming their whey, the sale of whey cream can be a significant contributor to the plant's bottom line.

3. **Cooling**

By quickly cooling raw whey to less than 45 degrees F after separation, the cheese plant is able to extend processing shelf life by several days. In addition to meeting regulatory requirements, this practice provides additional flexibility and value to the whey processor. Cheese plants without adequate cooling can improve their whey marketing position by upgrading their cooling capacity.

4. **Contamination**

Whey processors need the best whey to produce high quality products. They have difficulty utilizing whey that is contaminated with various specialty cheese flavors and salt drippings. Other problems come from added color and curd wash water. Cheese plants that minimize all of these non-whey components will find greater demand for their raw whey.

5. **Sanitation**

Just like cheese, whey needs to be handled in a sanitary manner to reduce bacteria growth and assure the most marketable quality. Whey transfer lines, equipment and process tanks must be cleaned daily. Cooled whey holding tanks need to be emptied and cleaned every 72 hours.

6. **Certifications**

Most whey processors require Kosher, Halal and E.U. quality certification for the whey they purchase. Cheese plants that can offer these certifications will have more success marketing their whey.

## 2012 SURVEY RESULTS: HOW CHEESE PLANTS HANDLE WHEY

### INTRODUCTION

To better understand how cheese plants are disposing of or utilizing their whey and how that impacts their business, a survey of all Wisconsin cheese plants was conducted in mid-2012 by the Wisconsin Agricultural Statistics Service in cooperation with the Wisconsin Department of Agriculture, Trade, and Consumer Protection. An initial mailing of the survey to 121 cheese plants took place in late May 2012. Plants that produce cream cheese, goat's milk cheese, or sheep's milk cheese, as well as plants that only produce whey products, were excluded from the sample. To gain a higher response rate, a second mailing took place in June. Follow-up contacts, in person or over the phone, were also made in July and August. As a result, 73 percent of surveys were completed.

### 2011 WHEY STREAM

Plants were asked to report the annual volume of whey generated by their plant and revenue received by category. For plants that did not report, whey volume was estimated based on the plant's cheese production. Plants reporting minimal processing were assumed to produce reverse osmosis concentrated whey at 12 percent solids. Plants reporting limited processing were assumed to produce liquid whey protein concentrate at 10 percent solids. For commodity and value-added plants, volumes were not estimated, as the products made in those categories can be quite varied in solids content.

**Annual volume of whey generated and price by level of processing  
Wisconsin cheese plants, 2011**

Level of processing	Plant Count <sup>1</sup>	Annual volume (thousand lbs.)		Price per pound (\$)	
		Wet	Dry	Wet	Dry
Disposal	22	69,950			
Sold whole for processing	41	2,746,630		0.0103	
Minimal processing <sup>2</sup>	14		220,100		0.2756
Limited processing <sup>3</sup>	23		250,240		0.5370
Commodity processing <sup>4</sup>	15				
Value-added processing <sup>5</sup>	10				

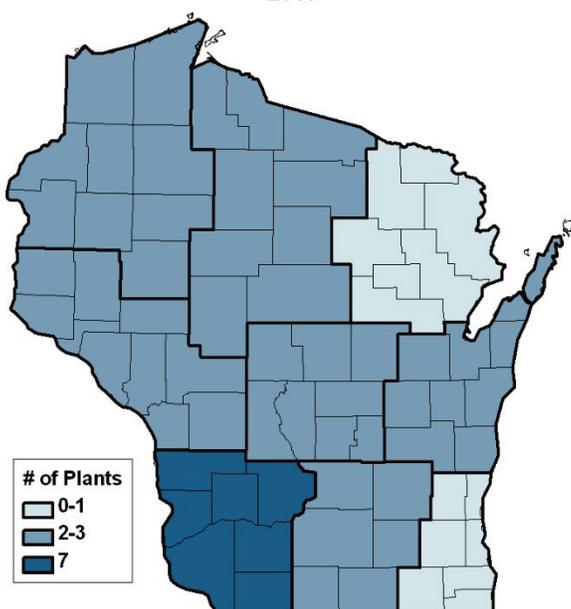
<sup>1</sup>Plant count total is greater than the 121 plants in the sample, as some plants reported whey in more than one category. <sup>2</sup>Only water removed from skimmed whey (RO, evaporation) and then sold to another plant for further processing. <sup>3</sup>Concentrated by UF and then sold to another plant for further processing. <sup>4</sup>Dry sweet whey, dry WPC 34, etc. <sup>5</sup>Higher WPC's, WPI's, etc.

Approximately half the plants in the state do not process their whey at any level. They either dispose of it by dumping or land application, or sell it whole to another plant for processing. Given that Wisconsin produced 2.63 billion pounds of cheese in 2011, however, the volume of whey disposed of or sold whole accounts for only about one-tenth of the total volume of whey generated. Plants that dispose of their whey are located throughout the state, but the heaviest concentration of these plants is in the southwestern portion of the state. Plants that sell their whey whole for further processing are primarily in the southern half of the state with the highest concentration in south central Wisconsin.

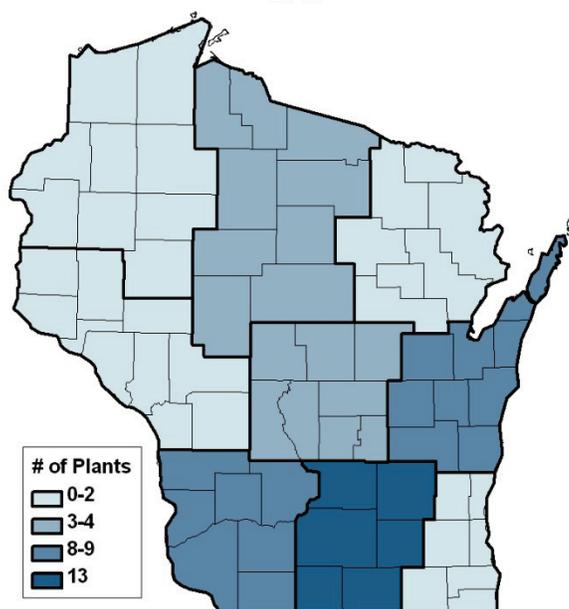
As stated previously, volumes for commodity and value-added processing of whey were not estimated. There is not much data available elsewhere on volumes of dry whey products produced primarily due to protecting the confidentiality of the few plants that produce these products. Some figures for 2011 are available, however. Production of human grade dry whey in Wisconsin in 2011 totaled 294 million pounds, human grade whey protein concentrate (WPC) totaled 83.0 million pounds, and total lactose (human and animal grade) production was 188 million pounds.

As expected, the higher the level of processing, the greater the price received for the whey. In comparison, the NASS dairy product pricing series shows that, nationally, extra grade dry whey sold for as low as \$0.3884 to as high as \$0.6707 per pound in 2011.

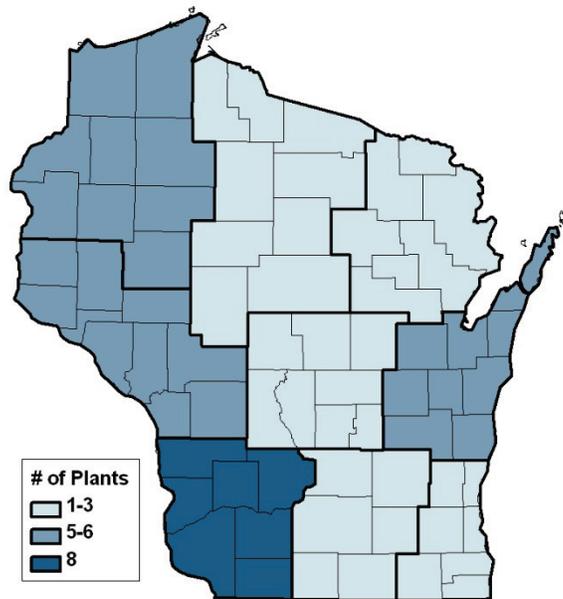
Location of Wisconsin cheese plants disposing of whey 2011



Location of Wisconsin cheese plants selling whey whole for processing 2011

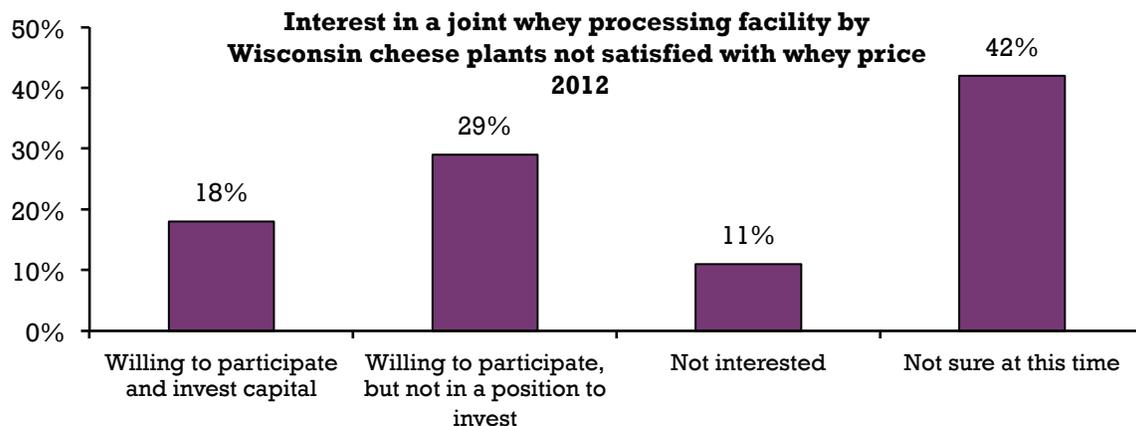


Location of Wisconsin cheese plants selling minimal or limited processed whey 2011



### SATISFACTION WITH VALUE OF WHEY AND BARRIERS TO GAINING HIGHER RETURNS

When asked if they are satisfied with the value they receive from their whey, 47 percent of respondents reported that they are not satisfied. Of those not satisfied, 89 percent indicated that the inability to capture a higher value for their whey has a significant impact on their business. One idea to help plants gain greater returns on their whey would be to build a joint whey processing facility. Almost one-fifth of the unsatisfied plants indicated they would be willing to participate and invest capital in such a project, and these plants are all located in the central or east central parts of the state. Additionally there were many plants in the southwestern and south central regions that were interested but not able to invest at this time or weren't sure if they would be interested in this project.

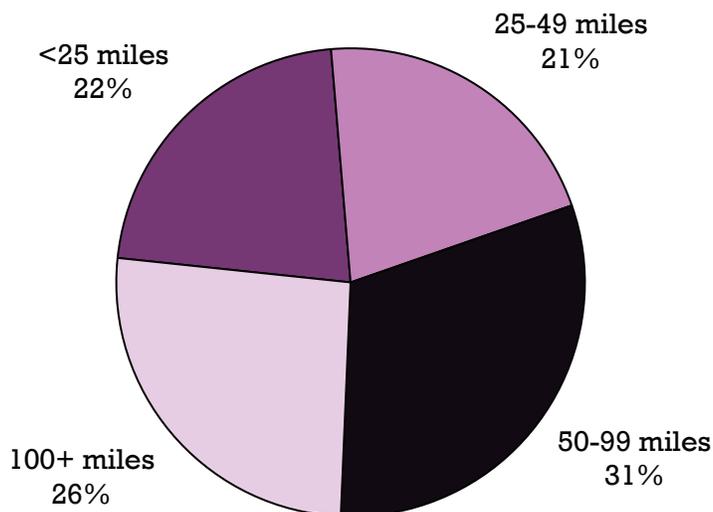




### SHIPPING WHEY

Most cheese plants, 72 percent, ship whey solids to another plant for further processing. The average distance this whey is transported ranges widely with one-fifth of plants shipping fewer than 25 miles and one-quarter shipping more than 100 miles.

**Average distance whey is transported for further processing  
By percent of plants, Wisconsin, 2012**



**Average distance whey is transported by level of processing, Wisconsin, 2012**

Level of processing	<25 miles	25-49 miles	50-99 miles	100+ miles
	Percent of plants			
Sold whole for processing	29	21	32	18
Minimal processing	17	17	41	25
Limited processing	6	17	30	47
Commodity processing	14	29	43	14

### ACCEPTING WHEY FROM OTHER PLANTS

Only 8 percent of respondents reported accepting whey from other plants. All of these plants require incoming whey to be minimally processed in some way, such as skimmed, cooled, concentrated, or preserved, but the requirements vary from plant to plant. In addition, 57 percent of these plants require USDA and halal certifications, and 71 percent require kosher certification. None of the plants that accept incoming whey reported segregating whey based on whether it is organic, grass-based, goat, or sheep.

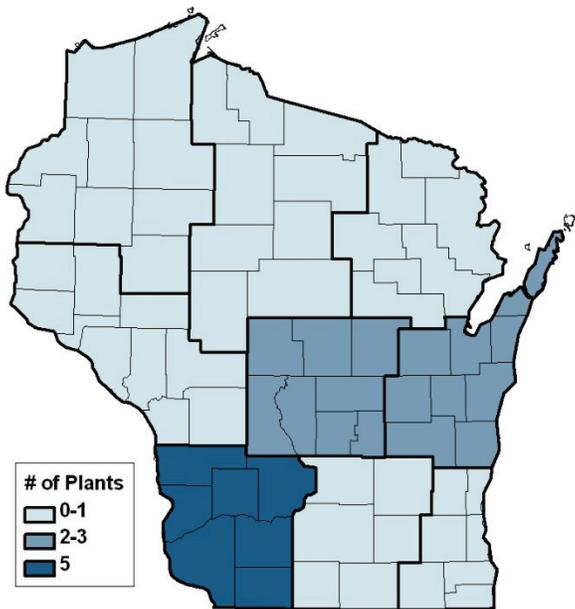
### ADDITIONAL CAPACITY

Few respondents, 17 percent, reported having capacity to process additional whey solids. Of these plants:

- 29 percent do not know or did not state the amount of additional capacity
- 21 percent have fewer than 1,000,000 pounds of additional capacity
- 50 percent have 1,000,000 to 49,999,999 pounds of additional capacity

No plants reported additional capacity of more than 50 million pounds of whey solids. The greatest concentration of plants with additional capacity is in southwestern Wisconsin. Interestingly this coincides with the region where the greatest number of plants was disposing of their whey.

Wisconsin cheese plants with additional capacity to process whey solids 2012



### **CHEESE PLANT CONCLUSIONS**

Approximately half the plants in the state do not process their whey at any level. They either dispose of it by dumping or land application, or sell it whole to another plant for processing. Of the plants that do process whey, only 17 percent of those responding to this survey report having the capacity to process additional whey solids and adding value to their processing facility. Nearly half of all plants in the state are not satisfied with the value they receive from their whey, with nearly 90 percent indicating that the inability to capture a higher value for their whey has a significant impact on their business. In order to help cheese plants gain greater returns on their whey, those in geographical proximity to one another should consider a joint whey processing facility, as almost one-fifth of the unsatisfied plants indicated they would be willing to participate and invest capital in such a project.

### **WHEY PROCESSOR CONCLUSIONS**

The whey processing industry in Wisconsin has become consolidated in a very similar fashion to cheese manufacturing. The number of companies engaged in large scale whey processing is very limited. Several major whey processors depend entirely on purchased whey product sources from cheese plants. Other processors supplement their own whey with outside purchases. Most small and medium size cheese plants sell whole whey or limited processed liquid whey products to the major processors. They market liquid whey products to the major whey processors using an active network that has developed over many years.

Three drivers emerge for the future growth in Wisconsin whey processing.

1. The most significant growth will take place as major cheese manufacturers expand their whey operations in step with additional cheese production.
2. The utilization of “stranded” whey supplies from smaller plants: cheese plants with unutilized whey will need to address several economic and quality issues in order to attract a market and gain a positive return.
3. Dried permeate and lactose production could significantly increase. For this to happen, markets will need to encourage companies to build facilities for processing the large volume of liquid whey permeate that is currently land applied or directed to animal feeding.

The major companies at the heart of Wisconsin’s whey processing industry are continually looking to improve returns from the cheese by-product. Much focus is placed on evaluating potential returns of investing in the production of higher value products. International markets and the development of export sales have offered added value and sales growth while contributing to price volatility. Wisconsin whey processors with additional capacity are very interested in procuring whey supplies. This has increased the competition for liquid whey products from cheese plants. Smaller cheese plant operators have the opportunity to realize reasonable returns for their liquid whey products. This return depends on their ability to supply the desirable, high quality whey that the major processors demand. By working closely with key whey processors, smaller cheese plant operators can participate in the expansion of Wisconsin’s whey industry.

## A STUDY OF RETURN ON INVESTMENT MODELS

### INTRODUCTION

As part of this overall Wisconsin Whey Study, a report was conducted to identify potential returns on investment (ROI) for small and medium cheese plants if they invested in additional whey processing. Four whey processing models were identified. For each model, estimated capital costs, operating costs and revenue streams were compiled as input for financial analysis. The financial analysis shows the ROI for each model under multiple plant-specific business variables. The intent of this analysis is to assist cheese plants in evaluating whey processing options leading to sound financial decisions.

### BACKGROUND

Wisconsin cheese plants have a tremendous range in size, yet all plants need to effectively convert their milk into value-added products. Under the Federal Order system, a monthly minimum Class III milk price is established. The Class III price formula includes a value based on the current dry whey market price. Smaller cheese plants face significant barriers to entering the whey processing business, including low whey volumes and high capital costs. This situation places smaller plants at a competitive disadvantage due to the limited value they are able to extract from their whey. The ability to realize greater value for their whey byproduct could make a significant financial impact for small cheese manufacturers.

### PLANT AND PROCESS MODELS

The focus of this return on investment study is small and medium size cheese plants. These plants typically have limited whey processing capabilities. For the purposes of this study, plant size is defined by the volume of whey produced, as outlined below:

- Small plant: Produces a total of >40,000 whey over two consecutive production days
- Medium plant: Produces >100,000 pounds whey per production day

The four process models studied include:

#### **Model No. 1**

Small plant; add equipment to skim whey, sell cream, cool and ship whey

#### **Model No. 2**

Medium plant; add equipment to cool and ship whey

#### **Model No. 3**

Medium plant; add equipment to RO concentrate, cool and ship 18 percent solids whey

#### **Model No. 4**

Medium plant; add equipment to UF whey, cool and ship liquid WPC, ship permeate

Certain assumptions have been made in creating the models. These include:

- Medium plants are already skimming whey and selling whey cream
- Medium plants have a DNR permit that would allow for the discharge of polished RO permeate
- All plants have existing space for equipment installation, no building costs were included.
- Plants use 480 volts and pay \$.08/kwh. 1 applied horsepower uses 1 kw/hour
- Prices are for used equipment where it is generally available
- Whey cream price: \$1.60/pound butterfat
- Raw whey price: \$.25/pound solids
- Cold whey incremental price differential: \$.10/pound solids
- RO concentrate incremental whey price increase: \$.10/pound solids
- WPC-35% price: \$1.00/pound solids (\$2.86/pound protein)
- Permeate price: \$.05/pound solids

### RESOURCES

In order to assure valid study data, industry suppliers were asked to be resources for costs. We thank these companies for providing valuable information regarding their specific areas:

- Alcam Creamery Co.
- Bytec, Inc.
- Darlington Dairy Supply Co., Inc.
- Filtration Engineering
- International Machinery Exchange
- Membrane Process & Controls, Inc.
- ProChemicals, LLC
- Relco, LLC
- Separators, Inc.
- Ullmer's Dairy Equipment

### MODEL NO. 1 SUMMARY

Description: small plant; add equipment to skim whey, sell whey cream, cool and ship whey.

Whey returns are negative for a small plant that is disposing of its unseparated whey. The plant can consider installing a separator, cream tank, whey cooling system, associated tanks and lines. This would enable the plant to capture revenues from whey cream and cold raw whey sales.

The financial analysis shows that a capital investment of \$159,500 is needed to equip the small plant for skimming whey and shipping both cold whey cream and cold whey. The small plant receiving 50,000 pounds of milk per week could see incremental profits (excluding depreciation) of \$49,622 per year. This equals a return on investment (ROI) of 20 percent. If the milk volume per week increases to 150,000 pounds, the ROI becomes 64 percent.

Note: the financial results of Model No. 1 are sensitive to changes in the whey price and volumes.

### MODEL NO. 2 SUMMARY

Description: medium plant; add equipment to cool and ship whey.

Whey returns are negative for a medium plant that is disposing of its separated whey. If the whey is sold warm (e.g., for animal feed), the price received may be lower than cold whey (e.g. for human food use). If the plant cools the whey, it gains the ability to negotiate higher prices. In order to ship cold whey, the plant can evaluate the addition of a whey cooling system, associated tanks and lines. This would enable the plant to market their whey to a variety of processors.

The financial analysis shows that a capital investment of \$125,100 is needed to equip the medium plant to ship cold whey. The medium plant receiving 250,000 pounds of milk per week could see incremental profits (excluding depreciation) of \$40,909 per year. This equals a return on investment (ROI) of 22 percent. If the milk volume per week increases to 1,000,000 pounds, the ROI becomes 97 percent.

Note: the financial results of Model No. 2 are sensitive to changes in the incremental price increase for shipping cold whey and volumes.

### MODEL NO. 3 SUMMARY

Description: medium plant; add equipment to RO concentrate, cool and ship 18% solids whey.

A medium plant currently shipping raw whey may have enough volume to justify minimal whey processing. The installation of a RO system, a concentrated whey cooling system, associated tanks and lines could generate higher sales revenues because the whey is concentrated.

The financial analysis shows that a capital investment of \$361,600 is needed to equip the medium plant to RO concentrate and ship cold 18 percent solids whey. The medium plant receiving 750,000 pounds of milk per week could see incremental profits (excluding depreciation) of \$122,048 per year. This equals a return on investment (ROI) of 22 percent. If the milk volume per week increases to 2,000,000 pounds, the ROI becomes 67 percent.

Note: the financial results of Model No. 3 are sensitive to changes in the incremental price increase for shipping concentrated whey and volumes.

### MODEL NO. 4 SUMMARY

Description: medium plant; add equipment to UF whey, cool and ship WPC, ship permeate.

A medium plant currently shipping whey may have enough volume to justify limited whey processing. The installation of a UF system for liquid WPC, a WPC cooling system, and associated tanks and lines could generate higher total sales revenues from WPC and permeate sales.

The financial analysis shows that a capital investment of \$349,600 is needed to equip the medium plant to UF whey, ship cold liquid WPC and ship permeate. The medium plant receiving 1,000,000 pounds of milk per week could see incremental profits (excluding depreciation) of \$114,426 per year. This equals a return on investment (ROI) of 22 percent. If the milk volume per week increases to 3,000,000 pounds, the ROI becomes 75 percent.

Note: the financial results of Model No. 4 are very sensitive to changes in the WPC price and volumes.

### **RETURN ON INVESTMENT ANALYSIS CONCLUSIONS**

This return on investment study found that attractive financial returns are possible for small and medium cheese plants that install additional whey processing. The volume of milk required to provide an acceptable return on investment (ROI) of 20 percent increased as whey processing became more complex. Cheese plants shipping significant volumes of whey are very likely to find strong demand and competitive product pricing that would reward their decision to install additional whey processing.

Cheese plants wishing to use the results of this study for their own planning are advised that their individual circumstances will be different from the assumptions made in this study. The financial analysis tools used in this study provide the flexibility to input values that are accurate for a specific business model. Plant operators are encouraged to seek professional assistance when evaluating the potential financial benefit of additional whey processing (see Recommendations at the end of this report).

### RECOMMENDATIONS

The following recommendations from the Wisconsin Whey Opportunities Working Group represent next steps that should be taken to develop further the economic opportunity presented by Wisconsin whey.

1. Create a long-term goal to eliminate land disposal of saleable whey or other co-products. Within 10 years, all saleable whey produced in Wisconsin should go to value-adding purposes, such as: food, animal feed or energy production (returning at least the whey value inherent in the cheese milk price).
2. A lack of advanced technical knowledge on whey processing within some dairy companies is an important barrier inhibiting their interest in producing valued-added products. Create new supports for small and medium-sized cheese plants to move from whey disposal to minimal processing or to value-added processing of whey.
  - a. Education: (1) specific training programs on advanced whey processing and (2) workforce development assistance. Partners could include Wisconsin Center for Dairy Research (CDR), Wisconsin Cheese Makers Association (WCMA), Wisconsin Milk Marketing Board (WMMB), and Wisconsin Department of Workforce Development (DWD).
  - b. Financial: (1) micro-grants to link whey producers with financial and technical advisors on possible options, (2) capital investment grants, or access to capital, to help with the purchase of new equipment (e.g., cooling, membrane filtration). Partners could include Wisconsin state or local government, and regional economic development support.
  - c. Industry awareness: statewide and regional workshops to explore technical and financial options for these plants. Industry partners could include CDR, WCMA, and WMMB.
3. Research (key partner is CDR) technical issues that limit the maximum utilization of whey and whey permeate, including:
  - a. Economically viable cooling systems for whey from small plants.
  - b. How to add flavors or spices to cheese without contaminating the whey (best practices).
  - c. How to color cheese without coloring the whey.
  - d. How to handle difficult whey/co-products, such as, acid whey or Greek yogurt whey and permeate.
  - e. Options for handling small whey volumes, pooling, storage and delivery options.
  - f. Find economically feasible options to process whey permeate into value-added products (food and fuel).
4. Compile statistics on the utilization of whey and whey permeate in Wisconsin to inform decisions on strategies to improve the whey sector and to delineate change over time.
  - a. Collect annual statistics on the production of raw whey, processed whey products and by-products such as whey permeate, for the Wisconsin whey industry. Key partners include Wisconsin

Department of Agriculture, Trade and Consumer Protection (DATCP), and National Agriculture Statistics Service (NASS).

- b. Catalog resources available to cheese makers and whey processing plants in the WI dairy industry. Key partners include DATCP, Division of Agriculture Development.
5. Create best practice parameters for shipment of raw whey. Ultimate goal is to have all whey shipped at refrigeration temperature for best quality whey products, and to minimize food safety concerns.
  - a. The dairy industry, CDR and DATCP- Division of Food Safety, should create parameters for safe shipment of warm whey. These parameters could be used by dairy plant operators to apply to DATCP-Department of Food Safety for a variance from requirements in ch. ATCP 80.22. In the future, these parameters may be the basis for amending existing dairy plant regulations.
  - b. Parameters may include: 1) time and temperature limits for non-refrigerated whey between whey generation at the shipping plant and whey processing or cooling at the receiving plant, 2) pH of the whey and any processing steps that may prevent lactic acid production by bacteria present in the whey, 3) processing steps that may reduce competing microbial levels and thereby increase the risk of staphylococcal enterotoxin formation in warm whey, 4) sanitation steps taken to prevent contamination of whey with vegetative non-spore-forming pathogenic bacteria, 5) monitoring and documentation to verify safety.
6. Encourage partnership between dairy companies and local authorities to collaborate on the processing or treatment of whey or co-products for energy production. Partners include Wisconsin Office of Energy Independence (OEI), Wisconsin Department of Natural Resources (DNR), and DATCP.
7. Further investigate whey market opportunities and engage Wisconsin whey processors to identify common and potential needs. Specific inquiries could include:
  - a. Technical knowledge, workforce training, human capital development.
  - b. Value of a Wisconsin whey brand.
  - c. Attraction strategies for whey value chain expansion locations within Wisconsin.
  - d. Global market opportunities.

### MOVING FORWARD

Whey represents a significant economic opportunity for cheese manufacturers of all sizes. This report has addressed the current volume and processing of cheese whey in Wisconsin, regional whey buyers concerns and requirements for whey, and the return on investment for cheesemakers considering whey handling and processing improvements.

Wisconsin has an abundance of resources to help dairy companies address challenges and opportunities when using and processing whey. The following is a partial list of available resources.

#### **Wisconsin Center for Dairy Research (UW-CDR)**

- General programs and how CDR works with industry: Tom Szalkucki, [tszal@cdr.wisc.edu](mailto:tszal@cdr.wisc.edu)
- Latest whey research: John Lucey, [jlucey@cdr.wisc.edu](mailto:jlucey@cdr.wisc.edu)
- Whey processing/equipment: Mike Molitor, [molitor@cdr.wisc.edu](mailto:molitor@cdr.wisc.edu)
- Drying of dairy ingredients: Karen Smith, [smith@cdr.wisc.edu](mailto:smith@cdr.wisc.edu)
- Whey quality and regulations: Marianne Smukowski, [mismuk@cdr.wisc.edu](mailto:mismuk@cdr.wisc.edu)
- Impact of cheese making practices on whey: Dean Sommer, [dsommer@cdr.wisc.edu](mailto:dsommer@cdr.wisc.edu)
- Whey product development and applications: KJ Burrington, [burrington@cdr.wisc.edu](mailto:burrington@cdr.wisc.edu)

#### **Wisconsin Department of Agriculture, Trade and Consumer Protection (DATCP)**

- Food safety: Peter Haase, 608-224-4711, [peter.haase@wi.gov](mailto:peter.haase@wi.gov)
- Market and business development: Norm Monsen, 608-224-5135, [norm.monsen@wi.gov](mailto:norm.monsen@wi.gov)
- Business financing: Carl Rainey, 608-224-5139, [carl.rainey@wi.gov](mailto:carl.rainey@wi.gov)
- International trade and export services: Jen Pino-Gallagher, 608-224-5125, [jen.pinogallagher@wi.gov](mailto:jen.pinogallagher@wi.gov)

#### **Wisconsin Department of Natural Resources (DNR)**

- Agribusiness sector development: Christine F Lilek, 920-387-7898, [christine.lilek@wisconsin.gov](mailto:christine.lilek@wisconsin.gov)

#### **Wisconsin Economic Development Corporation (WEDC)**

- Sector manager: Cate Rahmlow, 608-210-6845, [cate.rahmlow@wedc.org](mailto:cate.rahmlow@wedc.org)

#### **University of Wisconsin-Madison, Department of Food Science**

- Product development: Scott Rankin, 608-263-2008, [sarankin@wisc.edu](mailto:sarankin@wisc.edu)

Now is the time to reinvest in Wisconsin whey, as it represents a significant economic opportunity for cheese manufacturers and whey processors of all sizes. The state is well positioned to meet the industry's needs and increase the state's market share in both a national and international whey market. Together, we can ensure Wisconsin maintains its competitive advantage at the forefront of this rapidly growing sub-sector.

### APPENDIX A: WISCONSIN WHEY PURCHASERS DIRECTORY

This directory lists Wisconsin companies purchasing Wisconsin whey. Contact each company directly.

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#### **Agropur Inc.**

Contact: Dan LaMarche

Phone: 920-944-0973

Fax: 920-944-0991

E-mail: dan.lamarche@agropur.com

Website: www.agropur.com and www.tregafoods.com

Company Address: 3500 E. Destination Dr., Appleton, WI 54915

**Whey Products Purchased:** Raw Whey; Concentrated Whey (RO); WPC (UF), Permeate

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#### **BelGioioso Cheese Inc.**

Contact: Mark Schleitweiler

Phone: 920-863-2123

Fax: 920-863-8791

E-mail: marks@belgioioso.com

Website: www.belgioioso.com

Company Address: 4200 Main St., Green Bay, WI 54311

**Whey Products Purchased:** Raw Whey; Concentrated Whey (RO), Max solids: 20%

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#### **Foremost Farms USA**

Contact: Darcy Craker or Kirk Layer

Phone: 608-355-8679 – Darcy or 608-355-8779 -- Kirk

Fax: 608-355-8198

E-mail: darcy.craker@foremostfarms.com or kirk.layer@foremostfarms.com

Website: www.foremostfarms.com

Company Address: E10889 Penny Lane, Baraboo, WI 53913-8115

**Whey Products Purchased:** Concentrated Whey (RO), Min solids 15%, Max Solids 50%; WPC (UF), Min protein 34%, Max protein 40%; Permeate, Min solids 20%.

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### **Lynn Proteins, Inc.**

Contact: Bill Schwantes

Phone: 715-238-7129

Fax: 715-238-7130

E-mail: [bill@lynndairy.com](mailto:bill@lynndairy.com)

Website: [www.lynndairy.com](http://www.lynndairy.com)

Company Address: W1929 US Hwy 10, Granton, WI 54436

**Whey Products Purchased:** Raw Whey; Concentrated Whey (RO), Min solids 10%, Max solids 20%; WPC (UF), Min protein 34%, Max protein 60%; Permeate, Min solids 7%.

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### **Muscoda Protein Products LLP**

Contact: Scott Meister

Phone: 608-739-3141

Fax: 608-739-4348

E-mail: [smeister@meistercheese.com](mailto:smeister@meistercheese.com)

Website: [www.meistercheese.com](http://www.meistercheese.com)

Company Address: 960 Industrial Dr., Muscoda, WI 53573

**Whey Products Purchased:** Raw Whey; Concentrated Whey (RO), Min solids 12%, WPC (UF), Min protein 30%, Max protein 50%; Permeate, Min solids 5%.

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### **Omega Protein (formerly Wisconsin Specialty Protein, LLC)**

Contact: Terry Olson

Phone: 608-445-0354

Fax: 608-768-9441

E-mail: [terry@artisanwhey.com](mailto:terry@artisanwhey.com)

Website: [www.omegaprotein.com](http://www.omegaprotein.com)

Company Address: 522 Greenway Ct., Reedsburg, WI 53959

**Whey Products Purchased:** Raw Whey; Concentrated Whey (RO); WPC (UF)

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### **Packerland Whey Products**

Contact: Steve Spaeth

Phone: 855-551-9439

E-mail: [steve@packerlandwhey.com](mailto:steve@packerlandwhey.com)

Website: [www.packerlandwhey.com](http://www.packerlandwhey.com)

Company Address: 407 4th St., Luxemburg, WI 54217

**Whey Products Purchased:** Raw Whey; Concentrated Whey (RO), Min solids 14%; WPC (UF), Max protein 34%; Permeate, Min solids 6%; Scotta, Acid Whey.

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### **PGP International, Inc.**

Contact: Mike Artery

Phone: 608-934-1400 ext. 2223; Cell: 608-558-5721

Fax: 608-934-1044

E-mail: [martery@pgpint.com](mailto:martery@pgpint.com)

Website: [www.pgpint.com/contact/juda-wisconsin-usa](http://www.pgpint.com/contact/juda-wisconsin-usa)

Company Address: N2689 County Road S, Juda, WI 53550

**Whey Products Purchased:** Raw Whey; Concentrated Whey (RO); WPC (UF); Permeate

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### **Saputo Cheese USA**

Contact: Patrick Fish

Phone: 608-524-8244 ext. 111

Fax: 608-524-8091

E-mail: [pfish@saputo.com](mailto:pfish@saputo.com)

Website: [www.saputo.com](http://www.saputo.com)

Company Address: 25 Tri State International Office Center, Suite 250, Lincolnshire, IL 60069

**Whey Products Purchased:** Raw Whey; Concentrated Whey (RO), Min solids 6%; WPC (UF)

### **Torkelson Cheese Company**

Contact: Lindsey White

Phone: (815) 369-5547

Fax: (815) 369-2302

E-mail: [lindsey@torkelsoncheese.com](mailto:lindsey@torkelsoncheese.com)

Website: [www.torkelsoncheese.com](http://www.torkelsoncheese.com)

Company Address: 9453 W. Louisa Rd., Lena, IL 61048

**Whey Products Purchased:** Raw Whey; Concentrated Whey (RO)1 Permeate Min solids 5%; UF Milk Permeate

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### **Wisconsin Whey Protein, Inc. (Turtle Lake plant)**

Contact: Robert ( Bob ) Krikorian

Phone: (508)-424-1130 x 105

Fax: (508)-424-1140

E-mail: [bob@stainlesstech.com](mailto:bob@stainlesstech.com)

Website: [www.wisconsinwheyprotein.com](http://www.wisconsinwheyprotein.com)

Company Address: 40 Speen St, Suite 201, Framingham, MA 01701

**Whey Products Purchased:** Raw Whey; Concentrated Whey (RO) Min solids 15%; WPC (UF) Min protein 34%, Max protein 60%; Permeate

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