



Briefing Paper Series

Situation in the Dairy Processing Sector in Minnesota

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Introduction

In summer of 2015, Minnesota Department of Agriculture has been asked by Minnesota legislature to conduct a Livestock Industry Study to identify causes of the relative growth or decline in the number of head of poultry and livestock produced in Minnesota, Iowa, North Dakota, South Dakota, Wisconsin and Nebraska over the last ten years. The Commissioner of the Minnesota Department of Agriculture must report findings and provide recommendations on how to strengthen and expand Minnesota animal agriculture. This paper contributes to the understanding of current situation and medium-term outlook for Minnesota's dairy sector.

Between 1992 and 2014, Minnesota milk production declined by 7.4%, from 9.85 billion pounds to 9.13 billion pounds. Over the same period of time, milk production in neighboring states of Wisconsin, Iowa and South Dakota increased by 16%, 16.5% and 27%, respectively. Pennsylvania and Vermont, two northeast states characterized by small average herd size similar to Minnesota, also grew by 3.2% and 6.1% respectively. The fastest growing state in the Midwest/Northeast belt was Michigan, with 77% growth between 1992 and 2014.

Between 1992 and 2014, the number of dairy farms in Minnesota decreased by 76%, from 14,000 to 3,500, while average herd size nearly tripled from 47 to 129 cows per farm. In 1993, annual milk production per cow in Minnesota was 15,255 lbs or 345 lbs higher than cow productivity in Wisconsin, and 135 lbs higher than Iowa yield per cow. With 2014' annual yield at 19,845 lbs, Minnesota was trailing Wisconsin by 2,030 lbs and Iowa by 2,640 lbs. The difference between Michigan and Minnesota annual yield per cow increased from 1,120 lbs in 1992 to 4,785 lbs in 2014.

While the data presented above paints the picture of dairy decline, in reality the dairy production trends changed in mid-2000's and Minnesota milk production increased by close to 1.5 billion pounds between 2004 and 2015. Long-standing excess dairy processing capacity rendered the Upper Midwest for many years a 'sellers' market' for milk, characterized with small production growth, under-utilized processing capacity and high milk price premiums. However, that situation was not a stable equilibrium. A combination of attrition of dairy processing capacity, strong regional increases in milk production since 2013, and a decrease in demand for beverage milk, have jointly altered the landscape in the last year and a half.

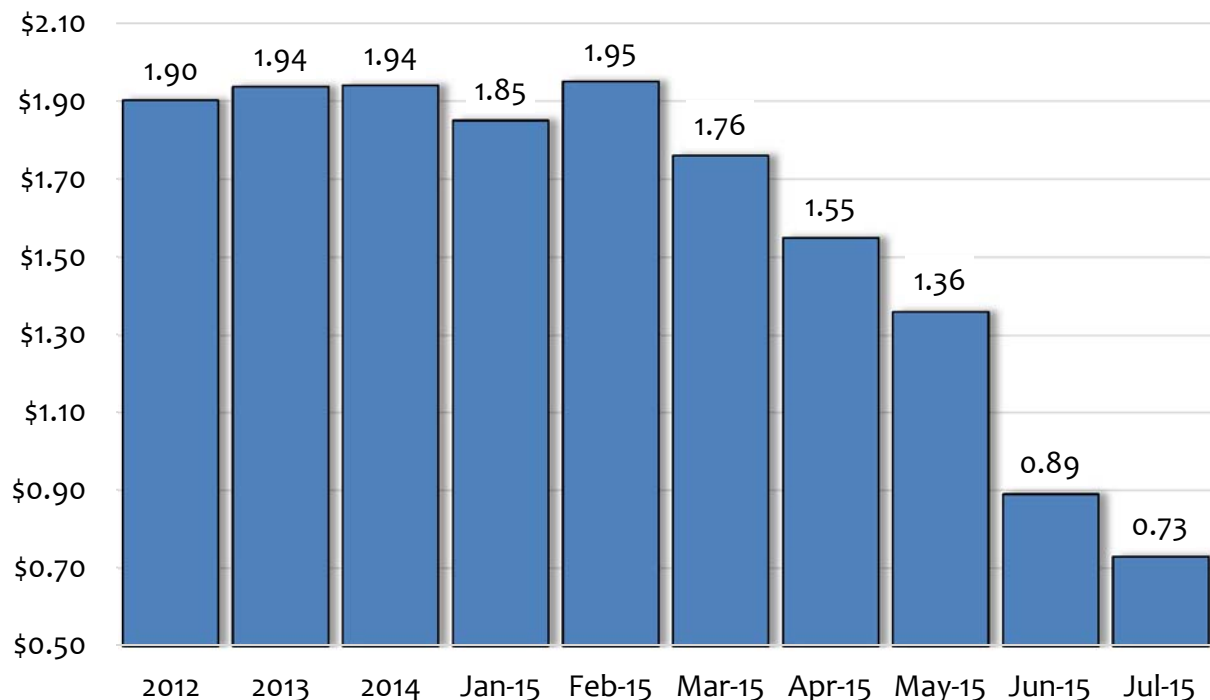
Economic factors relevant for dairy production, such as water availability, quality feed, dairy-related infrastructure, and availability of labor are not substantially different across Upper Midwestern states. The difference in the relative growth of dairy sectors among these states despite similar economic factors suggests that public policy decisions matter, and can meaningfully impact the trajectory of dairy sector development. This briefing paper argues that today the most pressing issue the Minnesota dairy sector is facing is no longer the sluggish milk production growth, but bottlenecks in milk processing capacity. Should policy makers seek to boost Minnesota's dairy sector, they should consider measures to stimulate investments in dairy processing capacity and boost demand for locally produced fluid milk and soft dairy products.

Recent trends in Minnesota milk price basis

The Class III milk price is the ‘standard’ price for milk used in cheese manufacturing, and is published monthly by the USDA. The fundamental principle used in determining the Class III milk price is that the value of milk originates from its components: protein, milkfat and other solids such as whey proteins, lactose and minerals. The value of components is inferred from the prices of commodity dairy products: cheddar cheese, dry whey and butter. The milk price that dairy producers actually receive reflects the value of their milk components, as well as the local processing demand for milk. For example, when milk is scarce, milk processors may increase premiums for butterfat or protein, or may reward more generously milk with lower somatic cell count. Other methods milk processors use to compete for milk is to subsidize milk hauling costs, or to offer volume-based premiums. The state-level *mailbox milk* price is the price published monthly by the USDA Agricultural Marketing Service – Dairy Programs that captures the average price actually received by dairy producers, once all premiums and deductions have been accounted for. The difference between mailbox milk price and standard Class III milk price is denoted as milk price *basis*. If average milk components in an area are higher than the standard for Class III milk, than basis will capture the additional value of those components. Consequently, when cheese, butter and whey prices decline, basis will also decline. More importantly, by measuring basis over time, we can also begin to uncover dynamics in the competitiveness of milk demand in a certain area.

Figure 1 presents the Minnesota milk price basis, defined as the difference between the mailbox milk price as reported by the USDA Agricultural Marketing Service – Dairy Programs, and the Class III milk price. The basis averaged close to \$2.00/cwt in 2012, 2013 and 2014, but has since declined to under \$0.75/cwt.

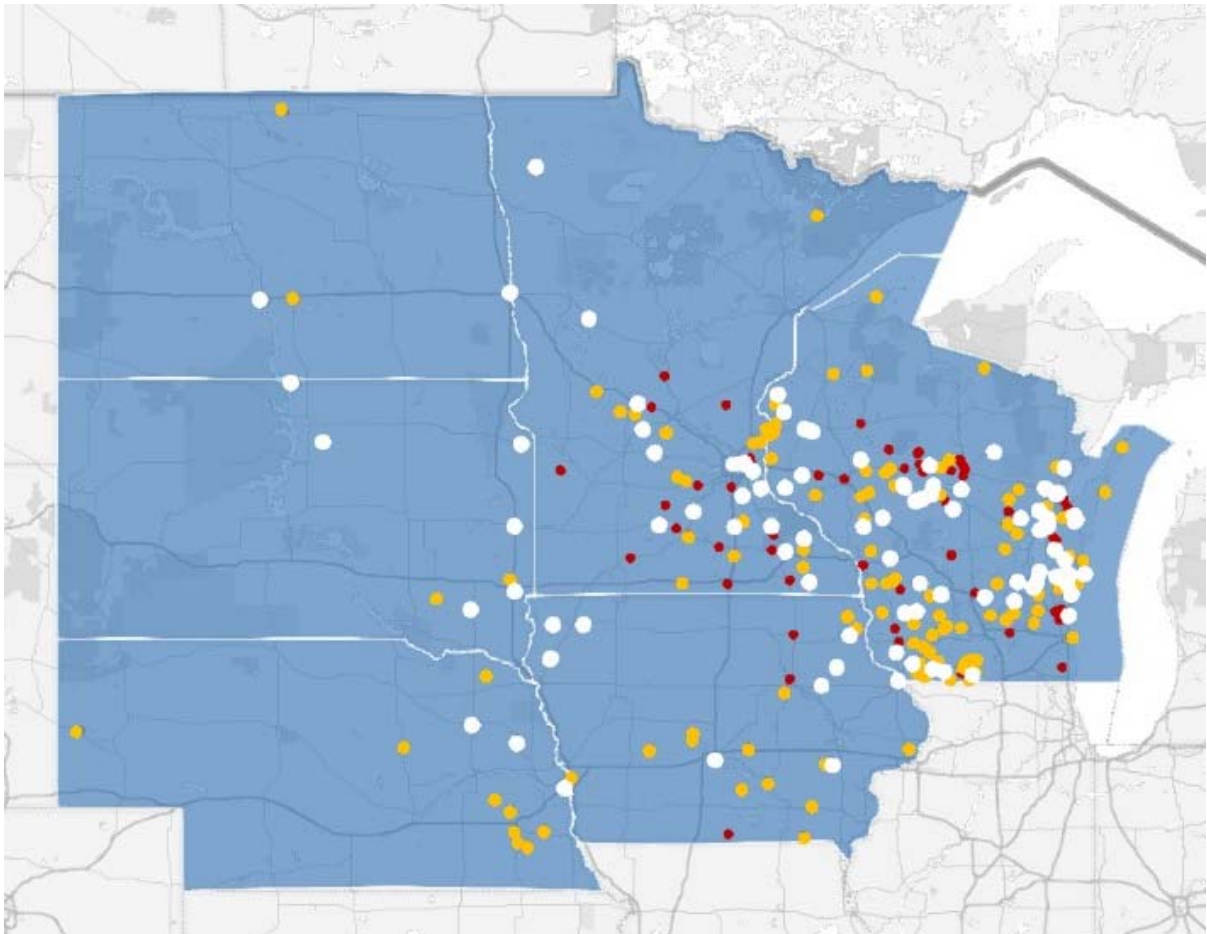
Figure 1. Minnesota Mailbox Milk Price - Class III Milk Price



Developments in Milk Processing Capacity in Minnesota

To evaluate the current situation in the dairy processing sector in Minnesota we have contacted all major processors in the state, requesting plant-level data on capacity and capacity utilization. Processors were offered Confidentiality Agreements that guarantee only aggregate measures of capacity will be reported publicly. With only a few exceptions, most Minnesota dairy processors extended strong support for this research and shared all requested sensitive production and capacity data. For processors for which we were unable to obtain data directly, we used interviews with dairy industry participants that work with those plants to obtain necessary data indirectly. As a result, we are able to present comprehensive and precise aggregate measures on dairy capacity and utilization in the state of Minnesota. Map 1 charts all dairy plants in Minnesota and in the neighboring states.

Map 1. Dairy Plants in the Upper Midwest



MN Dairy Plant Types: • Artisan/Farmstead • Major Dairy Plants • Secondary Processors

We classified all dairy plants in Minnesota into three categories:

- Major dairy plants are those dairy plants that intake raw milk or cream
- Artisanal and farmstead operations are either very small independent dairy foods makers or dairy producers that have added dairy manufacturing capacity to their dairy operation. For the sake of completeness, in this category we include dairy plants that utilize sheep and goat milk.
- Secondary processing plants are all plants that take dairy ingredients such as liquid or dry whey, cheese, milk powders, etc. as input in their production. Products such plants make are very diverse and vary from butter oil to cheese powders to animal nutrition products, etc.

Table 1. Dairy Plants in the Upper Midwest by Category

<i>State</i>	<i>Total Plants</i>	<i>Artisanal/Farmstead</i>	<i>Major Dairy Plants</i>	<i>Secondary Processors</i>
WI	228	80	57	60
MN	71	18	19	23
IA	34	15	10	3
NE	17	10	3	0
SD	12	2	7	2
ND	5	2	2	0
Total	367	127	98	88

The alternative classification in Table 2 counts dairy plants by the product they make, irrespective of their size. If a dairy plant makes more than one type of product, it is counted under each column separately.

Table 2. Dairy Plants in the Upper Midwest by Product

<i>State</i>	<i>Cow Cheese</i>	<i>Goat/ Sheep Cheese</i>	<i>NFDM</i>	<i>Butter</i>	<i>Fluid</i>	<i>Dairy Softs</i>	<i>Dairy Ingredient Processors</i>
WI	63	17	1	7	21	25	45
MN	15	7	4	6	17	11	22
IA	10	5	1	3	9	9	3
NE	5	3	0	1	6	7	0
SD	7	0	1	2	2	1	4
ND	1	0	0	0	3	4	0
Total	101	32	7	19	58	57	74

Map 2 and Table 3 provide further detail the major dairy processing plants in Minnesota.

Map 2. Major Dairy Plants in Minnesota

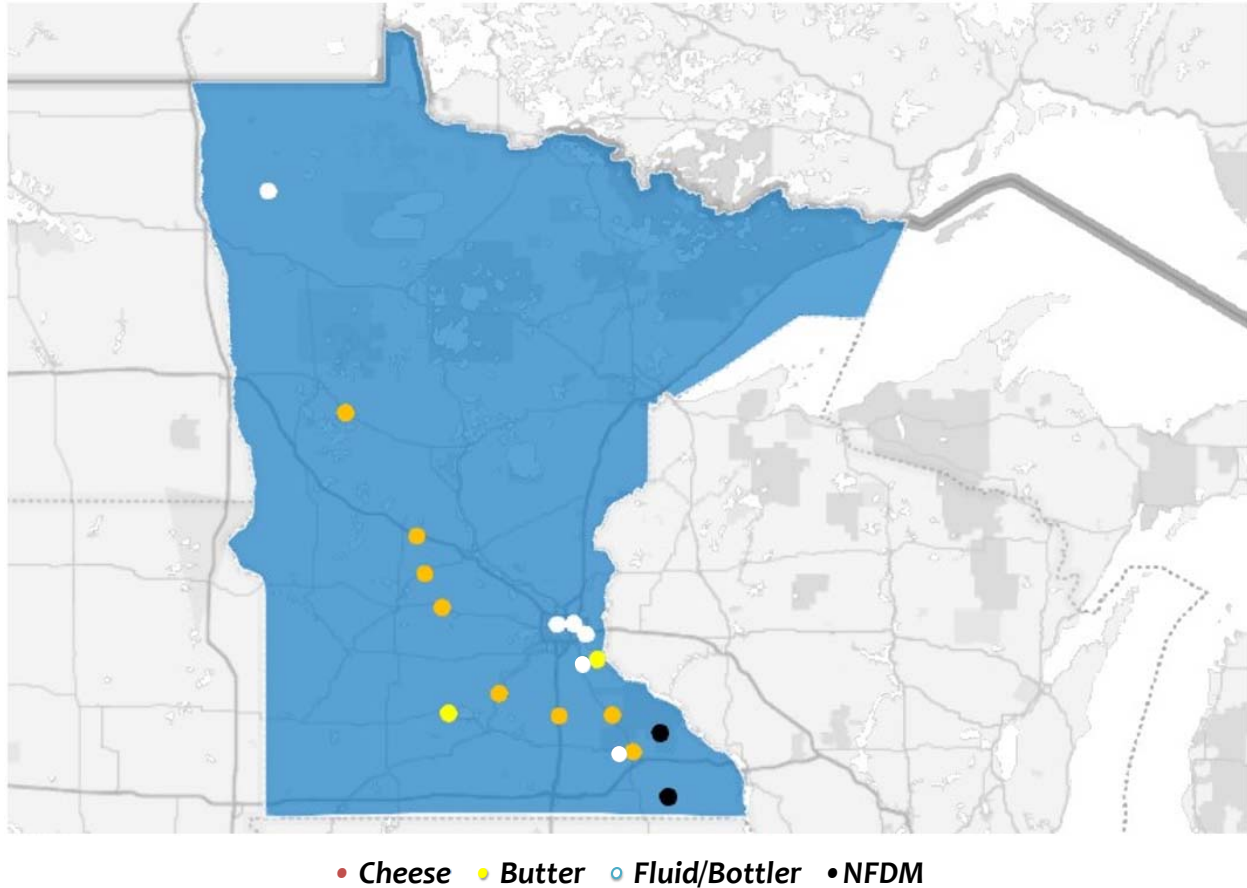


Table 3. Major Dairy Processing Plants in Minnesota

Name Of Business	City in MN	Products Manufactured
Associated Milk Producers, Inc.	New Ulm	Butter, Buttermilk, AMF, Condensed Buttermilk
Associated Milk Producers, Inc.	Paynesville	American Cheese, Cheddar (Barrels), WPC-34, WPC-80, Whey Permeate
Associated Milk Producers, Inc.	Rochester	American Cheese, Cheddar, Blocks, WPC, Lactose
Bongards' Creamery	Perham	Barrel Cheese, Processed Cheese, WPC 80, WPC 80, WPI, Procream, Whey Permeate
Dairy Farmers Of America	Zumbrota	American Cheese, Hard Italian, Barrel, Spray Dried Cheese, Whey
Dean Foods - Thief River Falls	Thief River Falls	Beverage Milk
Dean Foods – Woodbury	Woodbury	Beverage Milk

Table 3. Major Dairy Processing Plants in Minnesota (continued)

Name Of Business	City in MN	Products Manufactured
Faribault Dairy Company, Inc.	Faribault	Blue Cheese, Gorgonzola
First District	Litchfield	Cheddar, Monterey Jack, Swiss Curd, Barrel, Lactose, WPC 34
Foremost Farms USA	Preston	WPC-34, Powder Blends, Dried Buttermilk, Cultured & Organic Products, Whey, Demineralized whey, Condensed Skim, NFDM
Hastings Co-op Creamery	Hastings	Beverage Milk, Heavy Whipping Cream, Half & Half, Buttermilk, Egg Nog, Sour Cream & Dips, Cottage Cheese, Yogurt, Butter, Ice Cream & Shakes, Creamers
Kemps-Farmington	Farmington	Yogurt, Sour Cream, Cottage Cheese
Kemps-Minneapolis	Minneapolis	Beverage Milk
Kemps-Rochester	Rochester	Beverage Milk, Ice Cream
Land O'Lakes, Inc.	Melrose	Alternate-Make Cheddar, American Cheese, Cheddar, Hard Italian, WPC 34, Whey Permeate
Le Sueur Cheese Company	Le Sueur	Cheddar, Barrel, WPC 80, WPI, Procream
Plainview Milk Products Coop	Plainview	Butter, Condensed Milk, Condensed Skim, NFDM, Dried Buttermilk, WMP
Schroeder	Maplewood	Beverage Milk

Detailed maps and tables of artisanal/farmstead and secondary processing maps are included in the appendix to this briefing paper. Minnesota has 18 large dairy plants of which are 8 cheese plants, 6 fluid milk plants, 1 butter plant, 1 soft dairy products plant and 2 milk powder plants.

From 2010 to 2015, MN cheese plant capacity utilization went up from 93.1% to 96.2% even though annual aggregate milk intake capacity went up from 6.1 to 7.3 billion pounds (18.8% increase) over this period due to expansions. Over the same period, non-cheese plant utilization (fluid, soft, and drying plants) decreased below 65% due to declining demand for fluid milk and an increase in milk condensing capacity that is still not being utilized. As South Dakota and Wisconsin increased their own production, the proportion of Minnesota's milk production processed outside Minnesota borders shrunk from 16.2% in 2010 down to 7.5% in 2015.

These statistics suggest the following:

- Neighboring states have grown their own milk production faster than processing capacity, and they do not need to import as much milk from Minnesota as before.
- Due to declining demand, Minnesota fluid milk plants are getting less utilized.

- Cheese plants have undergone substantial increases over the past five years, through a combination of major plant upgrades, as well as incremental expansions achieved through optimizing product mix or resolving production bottlenecks. At over 96% utilization, it is fair to say that cheese plants in Minnesota are essentially full. Some increase in milk intake may come from running longer production shifts, but that opportunity is fairly limited.
- Under-utilized capacity still exists in the Class IV milk market, as Plainview Milk Products Cooperative recently increased its spray dryer capacity.

The confluence of these four factors suggest that while capacity still exists to accommodate seasonal milk production surges, the recent decline in milk price basis is at least partially going to be persistent over the next several years. Stimulating investments in cheese processing capacity and boosting demand for fluid/soft dairy products from local processors would seem to be policy initiatives that can help to address the forthcoming oversupply of milk in Minnesota.

Appendix 1. Minnesota Artisanal and Farmstead Dairy Processors

Map 3. Minnesota Artisanal and Farmstead Dairy Processors

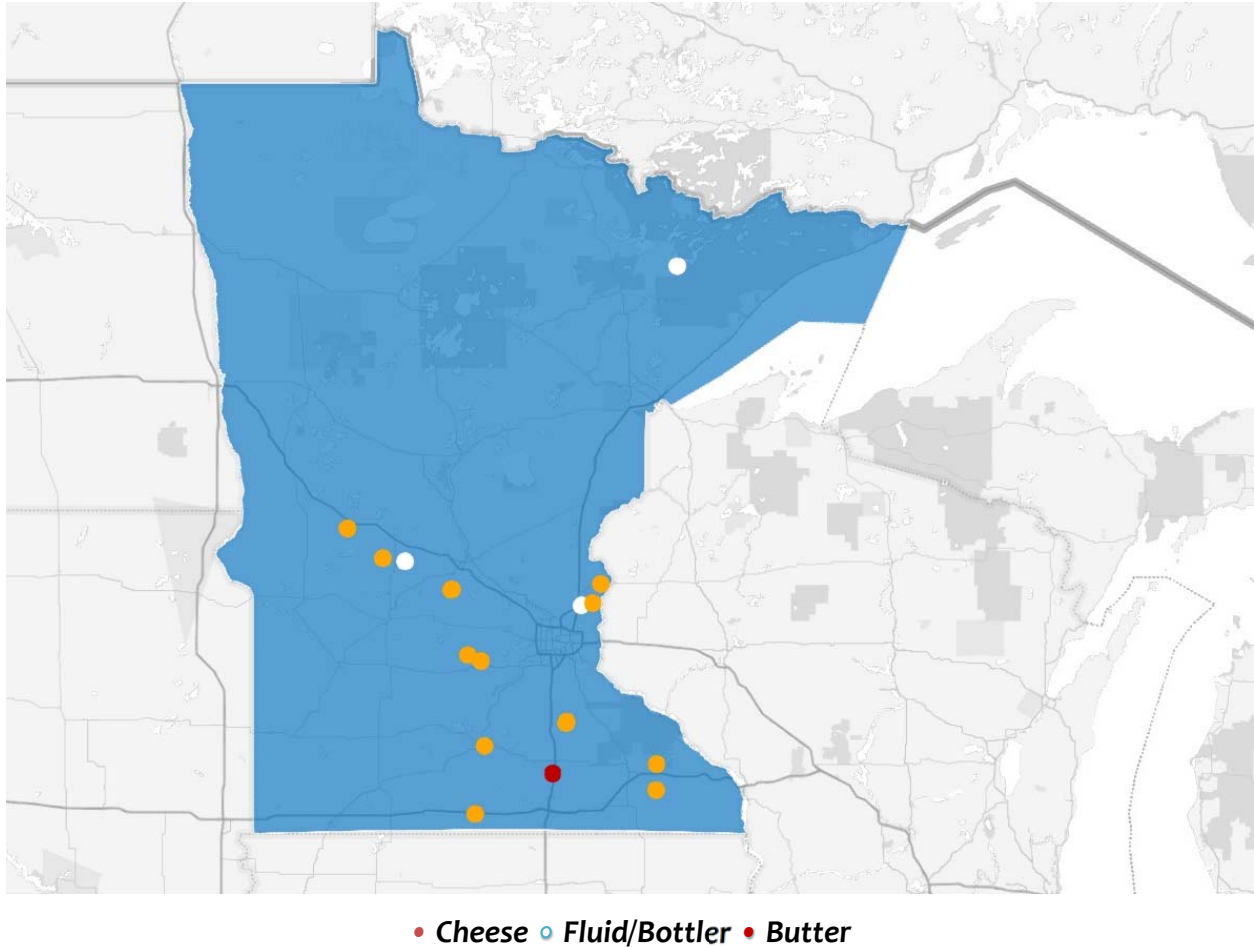


Table 4. Minnesota Artisanal and Farmstead Dairy Processors

Name Of Business	City in MN	Dairy Animal	Brief Description
Aleamar Cheese	Mankato	Cow	This Mankato facility adds the "Blue Earth Brie" to the Aleamar brand of specialty cheeses.
Autumnwood Dairy	Forest Lake	Cow	Award-winning quality beverage milk produced and processed by 3 rd & 4 th generation, farmers who value environmental stewardship
Buffalo Creek Creamery	Plato	Sheep	Buffalo Creek Farm is a century old farm and home to Buffalo Creek Creamery, which makes farmstead sheep's milk cheese.

Table 4. Minnesota Artisanal and Farmstead Dairy Processors (continued)

Name Of Business	City in MN	Dairy Animal	Brief Description
Crazy Cow Creamery	Blue Earth	Cow	A non-GMO dairy that makes a variety of flavored cheeses.
Dahl's Sunrise Dairy	Babbitt	Cow	Processes milk and bottles it into half-gallon glass bottles and delivers to 25 communities in northern Minnesota. Founded in 1994.
Donnay Dairy	Kimball	Goat	Fourth-generation family farm producing organic goat cheese. Currently produces two award-winning, certified organic goat cheeses: bulk Chèvre, and Granite. The milk and cheese is certified organic and comes from 150 goats.
Eichten's Cheese & Bison	Center City	Cow	Specialty farmstead cheese maker powered by a 1 megawatt solar farm covering 4 acres. Cheese varieties include cheddar and limburger.
Fruitful Seasons Dairy	Alexandria	Cow	Small producer/handler with a herd of grazing Jerseys, and a cheese facility for gouda, Colby, and caerphilly
Hope Creamery Inc.	Hope	Cow	Very small, hand crafted butter facility.
Kappers Big Red Barn	Chatfield	Cow	Grade A farmstead milk bottling plant located right on the farm, also producing cheese and ice cream.
Poplar Hill Dairy	Scandia	Goat	The oldest Grade A dairy goat farm in Minnesota, according to the business website. In addition to cheese, and milk, the farm sells goat milk soap.
Prairie Hollow Farm	Dover	Cow	Cheese produced by its own organic milk production, producing a wide variety of cheeses including cheddar, feta, gouda, ricotta, and mozzarella.
Redhead Creamery	Brooten	Cow	This farm has 180 cows and flow the milk directly to their cheese plant and has an on-site store. Varieties include cheddar, curds, and brie.
Shepherd's Way Farm	Nerstrand	Sheep	Shepherd's Way Farms makes award-winning, hand-crafted sheep cheese. Varieties include, fresh, blue, semi-aged, bloomy rinds, and ricotta.
Singing Hills Dairy	Nerstrand	Goat	This 25-acre farm of grass-fed goats has a small cheese plant to process the milk. Varieties include Chevre and Feta

Table 4. Minnesota Artisanal and Farmstead Dairy Processors (continued)

Name Of Business	City in MN	Dairy Animal	Brief Description
Star Thrower Farm	Glencoe	Sheep	This 600 sheep farm seasonally produces sheep cheese, available for purchase online. Varieties include ricotta and camembert. Other products include handmade soap and knitted woolens and fleeces.
Stickney Hill Dairy	Kimball	Goat	Partnered with Midwest goat milk producers for commercial, food service, and retail market segments of goat's milk products.
Stony Creek Dairy	Melrose	Cow	Stony Creek Dairy is a five generation farm with a small bottling facility, supplying their premium label bottled milk.

Appendix 2. Secondary Processing Dairy Plants in Minnesota

Map 4. Secondary Processing Dairy Plants in Minnesota

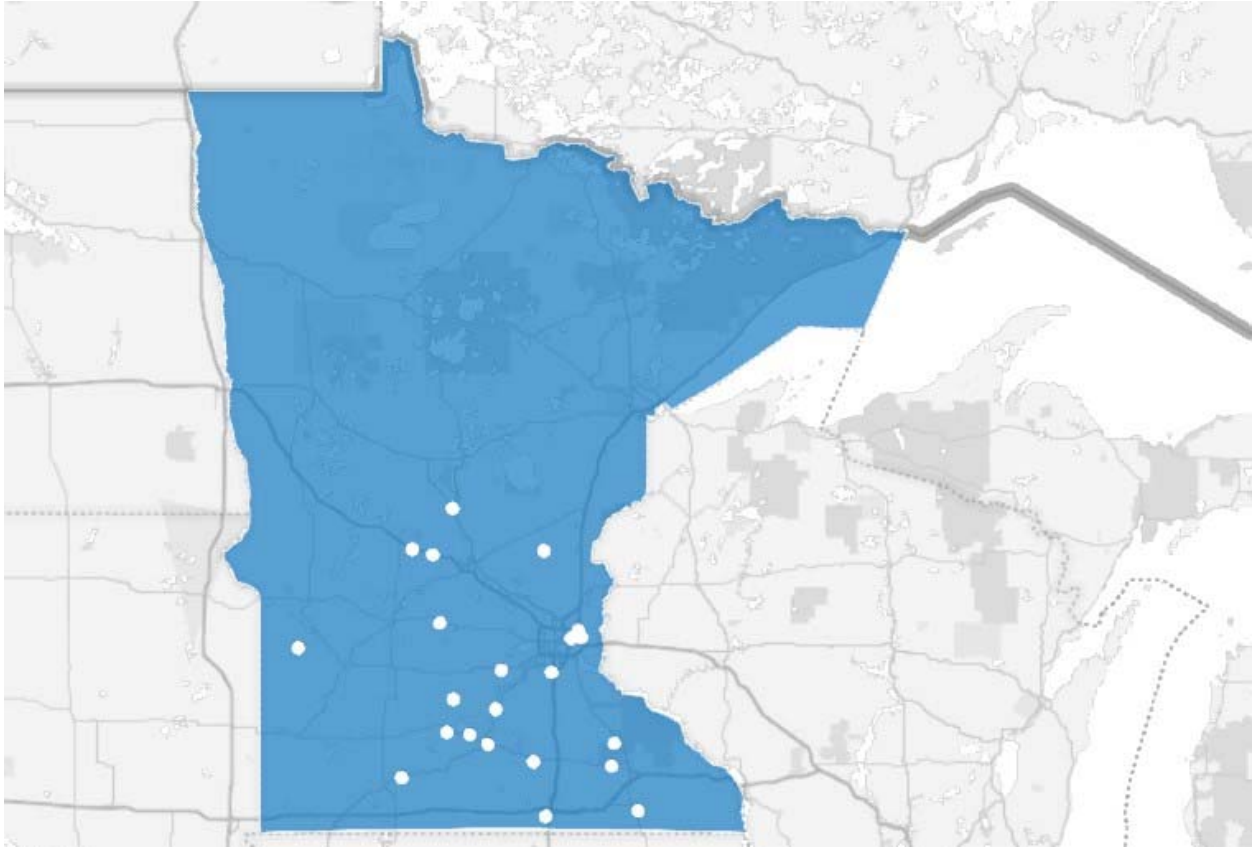


Table 5. Secondary Processing Dairy Plants in Minnesota

Business Name	City	Raw Materials	Output
Agropur Ingredients	Preston	NFDM/Whey Powders	Specialty Powder Blends
All American Foods, Inc.	Waseca	Liquid Dairy Components, Dry Dairy Products, NFDM, Whey, WPC	Custom Powders
All American Foods, Inc.	Mankato	NFDM/Whey Powders	Cheese Powder, Dried Buttermilk, Dried Cream, NFDM, Custom Powders
Amtech	Albert Lea	Liquid Foods	Whey Protein Fat Encapsulated Ingredients, Custom Drying, Specialty Powders

Table 5. Secondary Processing Dairy Plants in Minnesota (continued)

Business Name	City	Raw Materials	Output
Anderson Custom Processing	Little Falls	Liquid Foods	Custom Powders
Bluegrass Dairy	Dawson	Whey, Condensed Whey	WPC 34, Dried Whey, Whey Permeate
Bongards' Creamery	Norwood	Cheese	Cut & Wrap Cheese
Dairiconcepts	Dalbo	Cheese	Dried Cheese
Dairy Farmers Of America	Winthrop	Cream, Condensed Skim	AMF, Fat Blends, NFDM, Buttermilk, Sweetened Condensed Milk
Kraft-Albany	Albany	Cheese	Dried Cheese
Kraft-New Ulm	New Ulm	Cheese	Processed Cheese
Land O Lakes - Pine Island	Pine Island	Cheese, Barrels	Cheese Powder
Le Sueur Food Ingredient Company	Le Sueur	Liquid Whey, Condensed Whey	Custom Powders, Cut & Wrap Cheese
Maple Island	Wanamingo	NFDM, WMP, Butter Milk, Liquid Foods	Instant NFDM, Instant Whole Milk, Instant Maltodextrin, Dried Buttermilk, Functional Dairy Blends
Meadow Ingredients USA	Byron	MPC, Cheese, Rennet Casein, Food Starch	Processed cheese
Merricks, Inc.	Albert Lea	Liquid Whey	Whey Protein, Fat Encapsulated Ingredients
Milk Specialties Company	Mountain Lake	Condensed Whey, NFDM/Whey, MPC	Protein Hydrolysates, Agglomeration, Granulation, Highly-Functional Ingredients, WPI, WPC-80, Procream
Nicollet Food Ingredient Company	Nicollet	Liquid Whey, Liquid Foods	WPC, Specialty Whey
North Star Processing LLC	Litchfield	Liquid Foods	Cheese Powder, Custom Powders
Proliant - Melrose	Melrose	Permeate	Whey Permeate (dried)
Quality Ingredients, Inc.	Burnsville	Liquid foods	Custom Powders

Table 5. Secondary Processing Dairy Plants in Minnesota (continued)

Business Name	City	Raw Materials	Output
Rochester Cheese	Spring Valley	Cheese	Processed Cheese
Saputo Dairy Foods USA LLC	White Bear Lake	Milk, Whey, Condensed Skim	Creamers, Half & Half, Specialty Products