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# When the Pandemic Breaks Milk Prices: A Study in Returning to Normal


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**Inside…**



## Key Points:

- Cheese and milk prices have experienced extreme volatility in 2020, driven largely by supply chain disruptions, government purchasing, and changes in consumption habits during the COVID-19 pandemic.
- Record-high cheese prices lifted Class III milk prices disproportionately higher than Class IV milk prices, which were held in check by low butter and milk powder prices.
- Because of higher Class III milk prices, cheese manufacturers were incentivized to depool milk from Federal Milk Marketing Order (FMMO) marketing regions.
- This volatility and the widened price spreads between Class III and Class IV has meant lower milk checks for dairy farmers.
- The spread between Class III and IV milk prices is expected to realign in the first half of 2021 so long as government intervention does not persist, which will bring normalcy to Producer Price Differentials (PPDs) and mailbox milk prices.

## Market Volatility

The pandemic in 2020 caused unprecedented market volatility in dairy prices. As a result, mailbox milk prices – the net price dairy farmers receive – were no longer linked to Class III milk prices. Between 2014 and 2019, average monthly mailbox milk prices in all Federal Milk Marketing Orders (FMMOs) were highly correlated (97%) with Class III milk prices. Additionally, most of the time (96%), mailbox milk prices were above Class III milk prices. In comparison, average mailbox milk prices across the U.S. have historically had a weaker relationship with Class IV prices, with a correlation of 93%.

The coronavirus pandemic broke the relationship between monthly mailbox milk prices and monthly Class III milk prices *(Exhibit 1)*. In July, for instance, the Class III milk price was $24.54/cwt, but dairy farmers received much lower milk checks. Average mailbox milk prices in all FMMOs were a record $5.90/cwt below the Class III milk price.



The discounts were larger in parts of the country with less cheese processing capacity. For example, mailbox milk prices in New York were $6.79/cwt below the July Class III milk price. In Michigan, mailbox milk prices were $8.43/cwt less, and in California, $5.77/cwt below. In comparison, mailbox milk prices in Wisconsin were only $2.84/cwt less than the July Class III milk price and in Minnesota, $1.76/cwt below.

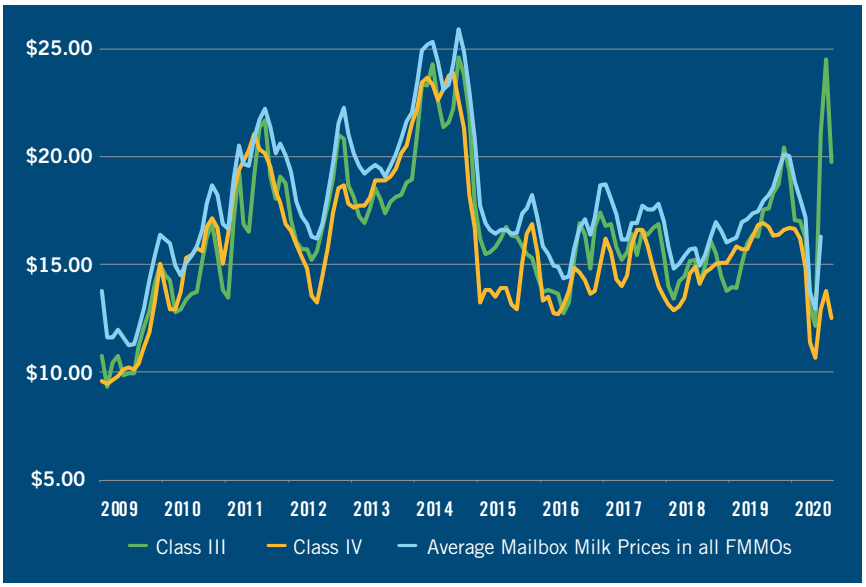
## *Pooling and De-pooling*

While most Class I processors are legally obligated to pool milk in an order, handlers of other classes of milk have the option to participate based on certain order performance requirements and the financial incentive.

Between June and November 2020, cheese processors have mostly found themselves in a disincentivized position. The cost of milk would be higher if processors had pooled milk in the order. As a result, cheese manufacturers have in many cases chosen to "de-pool" milk. In no market has the effect of de-pooling been more dramatic than in California where the FMMO pool was only made up of an average of just 0.8% Class III milk between June and October 2020. This followed an average of 29% of the order in the same period in 2019.

Each FMMO is a pool of milk. This means that whenever an order is devoid of a specific class of milk, it causes the weighted average price in that order to be based more on the other class prices. Furthermore, because producers are usually paid based on the FMMO price in a region, order prices are highly correlated with mailbox milk prices. The de-pooling of Class III milk in 2020 has caused FMMO prices – and in turn mailbox milk prices – to be closer to lower Class IV prices. In July, the Class IV milk price was $13.76/cwt while the Class III price was $24.54/cwt.

### EXHIBIT 1: The Milk Price Relationship Breaks in Pandemic




Source: The Dairy & Food Market Analyst, Inc.

### EXHIBIT 2: Top Five Spreads Between Class III and IV, and Resulting PPDs in Selected FMMOs

| Rank | Date | Class III Premium Above Class IV | PPD: Northeast | PPD: Mideast | PPD: Upper Midwest |
|---|---|---|---|---|---|
| 1 | Jul-20 | $10.78 | ($5.46) | ($8.02) | ($4.86) |
| 2 | Jun-20 | $8.14 | ($5.38) | ($7.05) | ($3.81) |
| 3 | Oct-20 | $8.14 | ($4.54) | ($6.87) | ($4.43) |
| 4 | Aug-20 | $7.24 | ($1.75) | ($2.93) | ($2.06) |
| 5 | May-04 | $6.08 | ($0.74) | ($1.59) | ($1.97) |

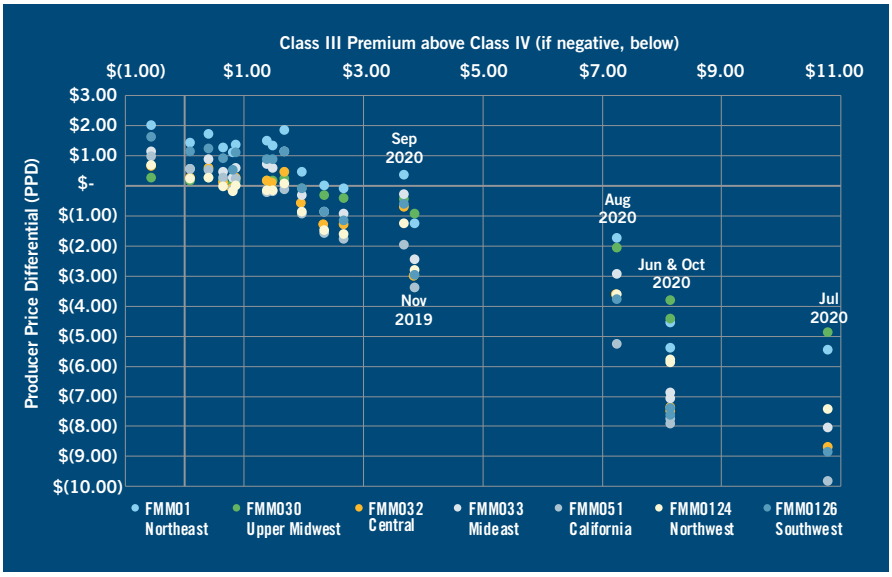
Source: The Dairy & Food Market Analyst, Inc.

## *Price Spreads*

Before the 2020 pandemic, the highest spread between Class III and Class IV milk prices ever to occur was in May 2004 and totaled $6.08/cwt *(Exhibit 2).* At that time, Class III prices shot up to then-record levels due to a shortage of milk in the Midwest. That same month, Class III processors de-pooled milk in FMMOs. In the Northeast



## EXHIBIT 3: Post May 2019: When the Spread Between Class III and IV is Very High, the PPD is Very Low




Source: The Dairy & Food Market Analyst, Inc.

Order, Class III was only 17% of the order in May 2004, down from an average of 28% in the previous year. In the Mideast, Class III was 5.5% of the order, down from an average of 37%. In the Upper Midwest, it was 4.6%, compared to the average of 63%.

The next month (June 2004), prices no longer incentivized de-pooling of milk and Class III milk made up 18% of the order pool in the Northeast, 47% in the Mideast, and 70% of the order pool in the Upper Midwest.

De-pooling is incentivized when the blend or uniform price in an order pool falls below either Class III or Class IV prices. Historically, de-pooling also tends to coincide with a negative Producer Price Differential (PPD). PPDs are announced by each federal order with component pricing and is calculated as the difference between valuing the milk in the order at Class III and the overall value of the order blend.

### *Negative PPDs*

When a PPD is negative on a milk check, it means a farm is receiving less than the Class III value for its milk.

It is common for milk checks to itemize the components of milk based on pounds of fat, protein, and other solids, and price them using Class III component prices. The milk checks then include a PPD, shown on a per hundredweight basis that either lowers or raises the net milk price.

U.S. dairy farmers that ship milk in an FMMO are paid based on USDA's announced prices and the PPD. Announced prices are calculated each month based on surveyed commodity prices, and the PPD is calculated based on the make-up of the order using the quantities and values of Class I, II, III, and IV milk that handlers pool in the order.

Prior to May 2019, Class I milk prices usually exceeded Class III and Class IV prices because the base Class I pricing formula at that time was calculated as the maximum of either Class III or IV. Because of the formula, Class I prices would typically end up being higher than all other prices (II, III, or IV) and, as a result, the blend price of all of the milk in an order would normally be higher than Class III and Class IV prices. As such, handlers would usually be incentivized to participate in the order pool and would very rarely de-pool.

The Class I formula was reformed in May 2019 to make it easier to hedge fluid milk prices. The new formula calculates base Class I prices as the average of Class III and Class IV prices plus $0.72. However, since the change, the likelihood of persistent de-pooling and negative PPDs has increased in all FMMOs.

The reformed Class I pricing formula does not as frequently keep pace with Class III or IV. And during periods with historically large price spreads, Class I prices can become persistently below either Class III or Class IV prices further contributing to de-pooling.

With the reformed Class I formula, the primary driver of negative PPDs is the spread between the Class III and Class IV milk prices *(Exhibit 3).* PPDs will be negative whenever a federal order weighted average value for



milk is below Class III prices – an outcome that tends to occur whenever the spread between Class III and Class IV milk is at historically high levels.

The exact price spread that creates negative PPDs varies depending on the order and other market conditions. Over the last 20 years, Class III prices have averaged $0.62 higher than Class IV prices. Class III has been above Class IV 61% of the time, and 25% of the time the spread has been $1.57/cwt or more. The three highest spreads ever recorded between Class III and Class IV took place in 2020: July at $10.78, June at $8.14 and October at $8.14.

The Class III and Class IV milk pricing formulas are designed to approximate the valorization of manufacturing milk into commodity products *(Exhibit 4).*

## *Milk Price Divergence*

Over time, milk will tend to move to the highest valued use. For example, if milk is valued higher in cheese and whey than it is in butter and milk powder (i.e. Class III is above Class IV), cheese plants will purchase milk from powder plants and increase cheese production. This shift in milk is one reason monthly Class III and Class IV milk prices were 88% correlated.

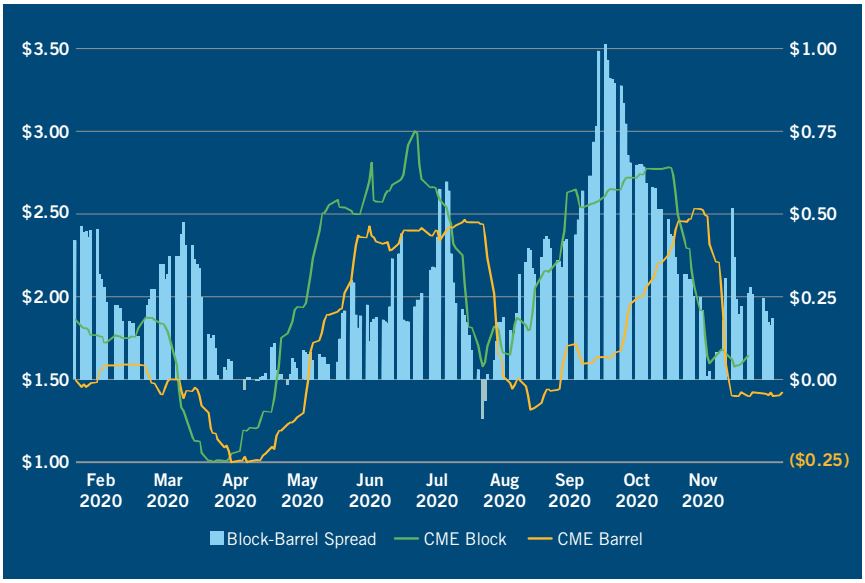
However, because of constraints in manufacturing capacity, milk supplies are not always able to move to the highest-valued use. Throughout the pandemic, this has been the case as cheese plants have operated at full capacity and struggled to meet rising demand. As a consequence, price has rationed demand with block Cheddar cheese prices setting a new record high of $3/lb in July *(Exhibit 5).*

### EXHIBIT 4: Calculating Class III and Class IV Milk Prices

| | | | | |
|---|---|---|---|---|
| **Dry Whey** 1 Cent Change = 6 Cent Change in Class III | + | **Cheese** 1 Cent Change = 10 Cent Change in Class III | = | **Class III Milk Price** |
| **Butter** 1 Cent Change = 4 Cent Change in Class IV | + | **Nonfat Dry Milk** 1 Cent Change = 9 Cent Change in Class IV | = | **Class IV Milk Price** |

Source: The Dairy & Food Market Analyst, Inc.

### EXHIBIT 5: CME Block Cheese Prices Have Been Volatile During the Pandemic



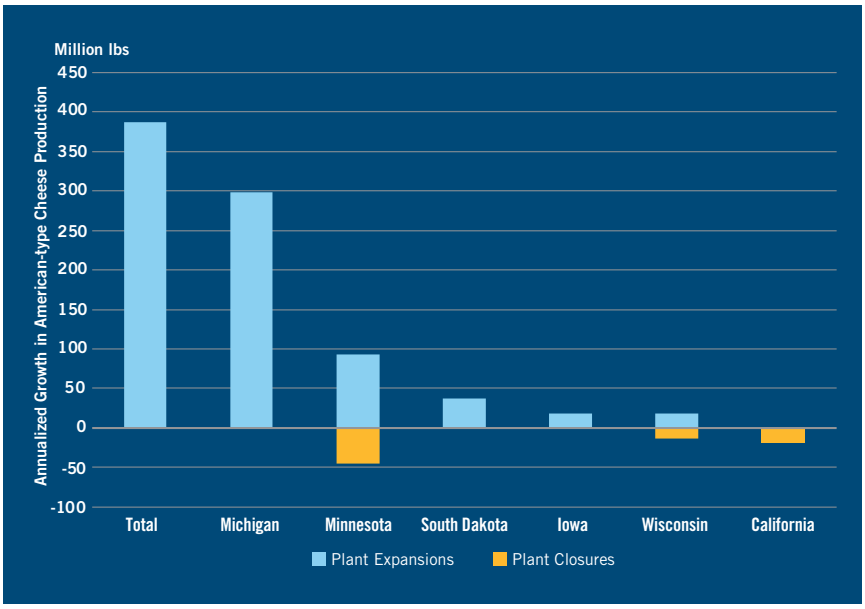

Source: The Dairy & Food Market Analyst, Inc.

Production of American-type cheese was in part constrained by the closures of three cheese plants in the previous 18 months. Those plants manufactured approximately 1.5% of all American-type cheese in the U.S.

Meanwhile, total domestic disappearance of cheese rose by 1.5% May through September, lifted by stronger demand through limited-service restaurants and government purchases through the USDA Farmers to Families Food Box Program.



## EXHIBIT 6: New American-type Cheese Manufacturing Will Cause Class III/IV Price Spreads to Converge




Source: The Dairy & Food Market Analyst, Inc.

### *Future of PPDs*

Negative PPDs occur when milk in a federal milk pool is less than Class III prices. This tends to happen when the Class III price is a significant premium to Class IV milk prices.

New cheese manufacturing plants coming online and expanding in Iowa, Michigan, Minnesota, South Dakota, and Wisconsin will increase American-type cheese production by an estimated 8% YoY by June 2021. When at capacity, the addition in manufacturing will utilize approximately 4.6 billion lbs of milk annually – roughly equivalent to 1.5 years of increases in annual U.S. milk production.

Additionally, the Farmers to Families Food Box Program, which included more than $1 billion in dairy product purchases and was responsible for buying more than 3% of U.S. milk supply in some months, is ending on December 31. Much of the dairy purchases through this program was American-type cheeses.

The increase in plant capacity and slowing of government intervention should contribute to Class III and Class IV prices returning to more historical price spreads, with futures supporting convergence in the second quarter of 2021 *(Exhibit 6)* and resulting in positive PPDs. ■

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