



## Information Letter Series

### Analysis of Producer Price Differentials for March 2021

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Marin Bozic and Christopher Wolf<sup>1</sup>

March 2021 producer price differentials were negative in six out of seven Federal Milk Marketing Orders where multiple component pricing is used. Bozic and Wolf (2021) present a new framework to quantify importance of six factors contributing to negative PPDs:

- 1) Long-term trends in utilization rates
- 2) Rising protein tests
- 3) Spreads between Class III and Class IV milk prices
- 4) Advanced pricing for fluid milk products
- 5) Class I mover formula reform introduced in the 2018 Farm Bill
- 6) Depooling

We apply that framework in this information letter to analyze PPDs in six Federal Milk Marketing Orders in March 2021.

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<sup>1</sup> *Marin Bozic is Assistant Professor in the Department of Applied Economics at the University of Minnesota and Christopher Wolf is the E.V. Baker Professor of Agricultural Economics in the Charles H. Dyson School of Applied Economics and Management at Cornell University.*

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## Quantifying Contribution to Negative Producer Price Differentials

### *Baseline PPD*

It has been commonly accepted that negative PPDs are an aberration. But what is the ‘normal’ PPD? What would the PPD equal to if all relevant factors were at a ‘normal’ level? To better understand trends and future tendencies, we define the baseline PPD as the PPD that would be predicted for the same calendar month (March) for 2010, if all contributing factors were at their normal levels. In particular:

- (a) utilization rates by class are equal to those predicted for March 2010 by trend models described in Bozic and Wolf (2021). These predicted utilization rates do not allow for depooling and reflect the ‘typical’ utilization of milk a decade ago.
- (b) Component tests are as observed in February 2010. By setting component tests at levels typical a decade ago we facilitate the analysis of consequences of rising component tests.
- (c) Announced dairy product and milk component prices are held constant at the average levels observed over January 2010 through December 2019.
- (d) Advanced prices are set equal to the announced prices.
- (e) base Class I skim prices are calculated using the “higher-of” pricing method.

Across all MCP orders which existed in 2010, we find that the baseline PPD values are substantially higher than PPDs published by USDA for March 2021.

### *Long-Term Trends*

In the next step, we predicted the PPDs using the same assumptions as used for the baseline PPDs, except that (a) utilization rates by class are equal to those predicted for March 2021 by trend models described in Bozic and Wolf (2021) and, (b) component tests are as observed in March 2021. Across all six MCP orders we analyzed, we observe declining Class I utilization rate and rising protein tests. Declining Class I utilization rate reduces PPD because there is relatively more milk used in manufacturing over which Class I dollars must be spread. Rising protein tests reduce PPD for two reasons. First, Class I handlers pay to the pool based on skim milk which uses standardized protein tests (3.1 per hundredweight of skim milk, or 2.9915 per hundredweight of standard milk). As protein tests rise, Class I handlers draw more from the pool for component value of milk, without paying more to the pool, thus reducing funds available for PPD. The second reason why rising protein tests reduce PPD lies in the attempt to equalize producer prices across all classes. Under federal orders, protein is paid for based on the value in cheese, but only a fraction of protein is used in cheese. Protein is also used in nonfat dry milk powder, in yogurts and fluid milk. When there is a positive spread between market value of skim solids in cheese (Class III) and nonfat dry milk powder (Class IV), then under current FMMO rules, producers are paid for components beyond the pool average value they create in the market, and the deficit is manifested as a lower PPD.

### *The Spread between Class III and Class IV Milk Prices*

Stephenson and Novakovic (2020) discussed the impact of COVID-19 pandemic on milk prices and PPDs. They explain the reasons for extraordinary large spreads between Class III and Class IV prices and the impact on PPDs. We quantify that impact in this step. We predict PPDs using

the same assumptions as in the previous step, except that announced dairy product and milk component prices are as published by USDA for March 2021. The spread between Class III and Class IV prices averaged \$0.39/cwt over 2010-2019 period. In March 2021, Class III price was \$16.15 and Class IV price was \$14.18. The spread of \$1.97/cwt is larger than historical average, which reduces the predicted PPD. PPD will be more reduced in orders with higher Class II and Class IV utilization rates.

#### *Advanced Pricing for Class I and Class II dairy products*

Classic reason given for negative PPDs is that is a short-term consequence of sudden rally in manufacturing milk price, after beverage milk price for the month has already been determined (Jesse and Cropp, 2008). In this step we examine the impact of advanced pricing for Class I and Class II dairy products on PPDs. We predict PPDs using the same assumptions as in the previous step, except that advanced prices are as published by USDA for March 2021. Advanced Class III skim milk price for March 2021, as published on February 18, was \$11.10/cwt. Announced Class III skim milk price for March was \$10.51/cwt. In contrast, advanced butterfat price was \$1.4135/lb while monthly average butterfat price for March was \$1.7176/lb. When market prices for milk components increase after Class I price for the month is set, then Class I handler draws from the pool for component value of milk increases, while their obligations to the pool are unchanged. That reduces PPD. Opposite holds as well – when announced component prices are lower than advanced component prices, then Class I handlers draw from the pool based on lower component value of milk, which increases PPD. Combined effect of changes in butter, cheese and dry whey prices from mid-February to March monthly averages resulted in increase in predicted PPDs across all orders we analyzed.

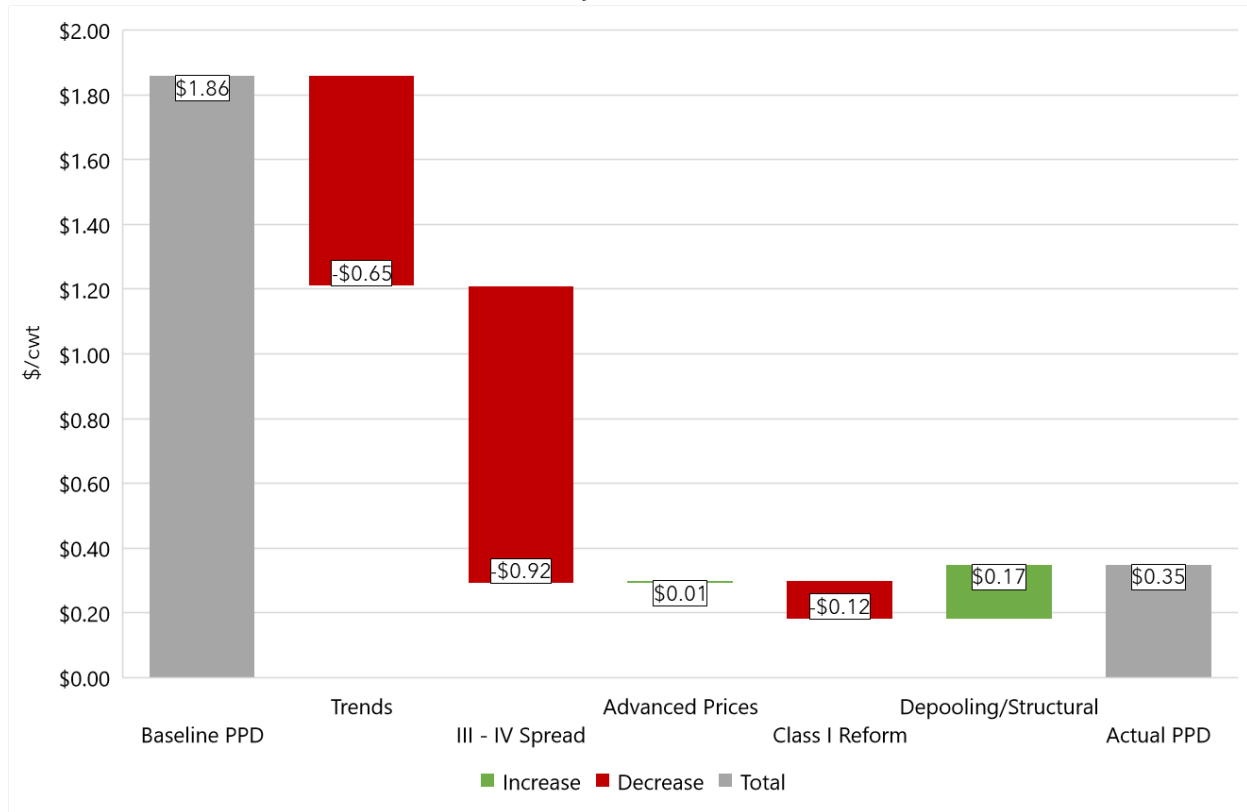
#### *Class I Pricing Reform*

In this step, we predict PPDs using the same assumptions as in the previous step, except that base Class I skim milk prices are calculated using the “average-of” pricing method introduced in the 2018 Farm Bill. When the spread between advanced Class III skim milk price and advanced Class IV skim milk price is lower than \$1.48/cwt, then “average-of” method increases PPD. From January 2010 through December 2019, “average-of” method would increase PPD in 74 out of 120 months. Advanced Class III skim milk price for March 2021 is \$11.10 and advanced Class IV skim milk price is \$8.66. The spread is \$2.44, and therefore “average-of” method reduced the predicted PPD for March. PPD reduction is proportional to Class I utilization rate.

#### *Depooling and Structural Changes.*

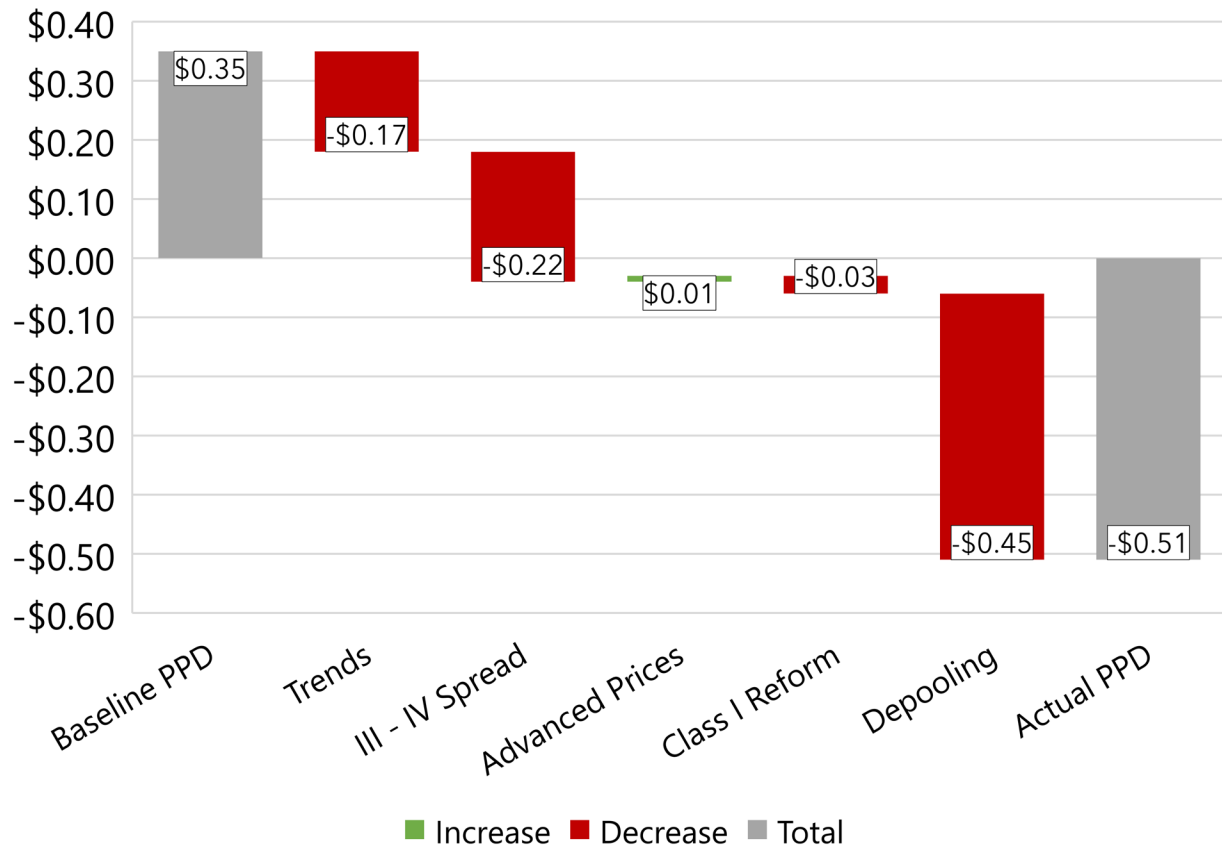
Actual published PPDs may differ from the PPDs predicted under the previous step. This difference is driven primarily by depooling, though some small part of the spread may be attributable to recent changes in utilization rates not well captured by long-term trend/seasonal models we used in previous steps.

### Producer Price Differential Analysis for FO 1 – Northeast for March 2021



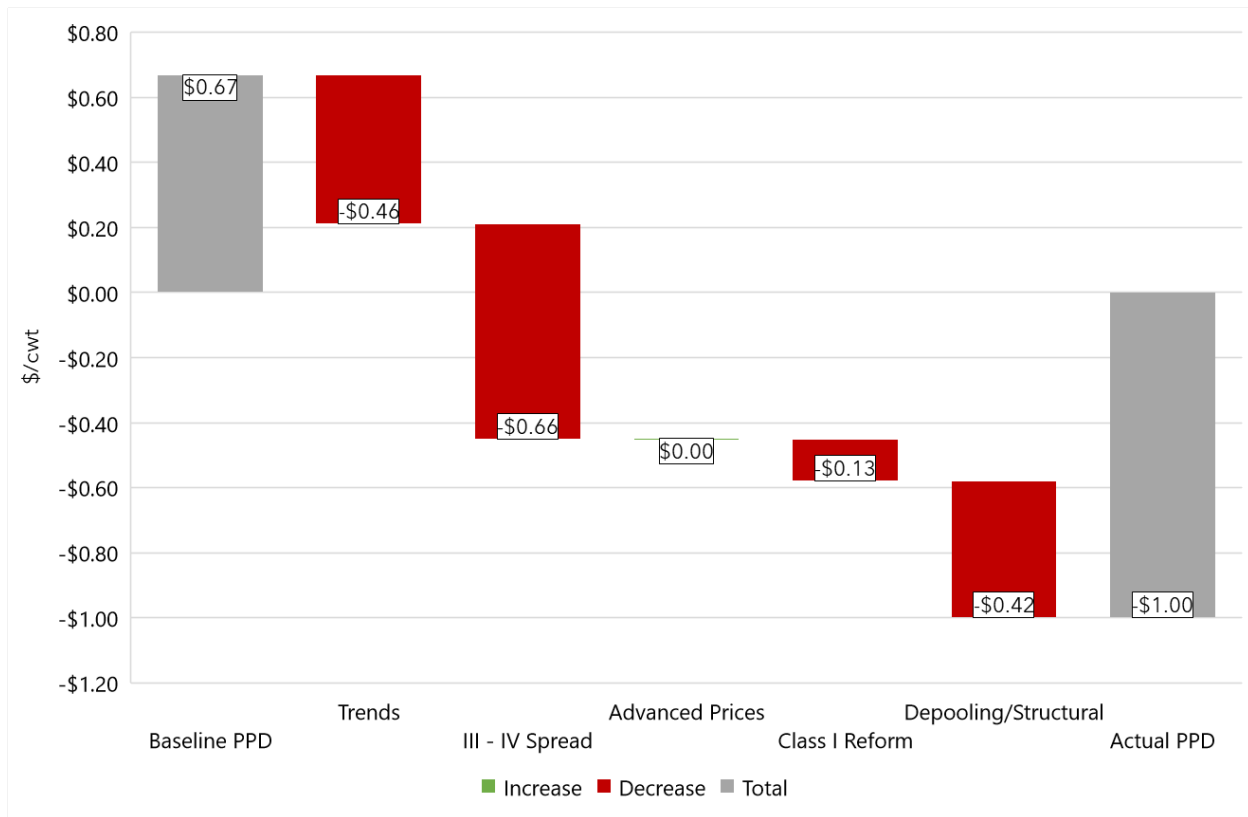
Baseline PPD for the Northeast order is \$1.86/cwt. In the Northeast order, over the past ten years, Class I skim milk utilization rate was declining by 1.25 percentage points per year, while protein test increased from 3.05 in March 2010 to 3.18 for March 2021. The long-term decrease in Class I utilization rates and increase in protein tests reduce the predicted PPD by -\$0.65/cwt, to \$1.21/cwt. Above average spread between Class III and Class IV milk prices reduces the predicted PPD by -\$0.92/cwt, to \$0.29/cwt. Combined effect of changes in butter, cheese, and dry whey prices from mid-January to February results in increase in predicted PPD by \$0.01/cwt, to \$0.30/cwt. The change from “higher-of” to “average-of plus 74 cents” reduced the PPD by -\$0.12/cwt, to \$0.18/cwt. In the last five years, Class I milk utilization rates have nearly stabilized, which is not well captured by the long-term trend and seasonal models we use. In addition, due to sufficiently high expected long-term PPD, Northeast federal order regulations can credibly impose deterrents to short-term depooling. Due to these factors, actual PPD in the Northeast order in February 2021 is \$0.35/cwt, which is \$0.17/cwt higher than predicted.

### Producer Price Differential Analysis for FO 30 – Upper Midwest for March 2021



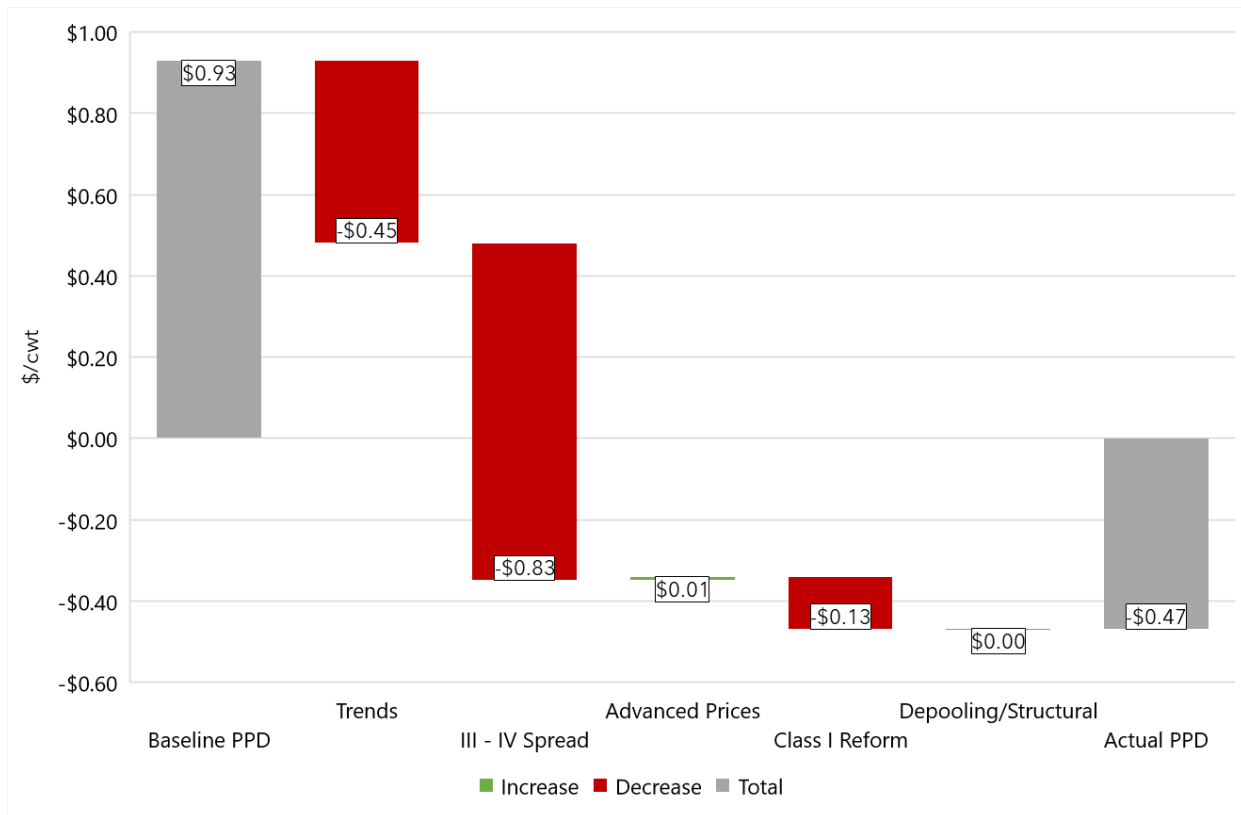
Baseline PPD for the Upper Midwest order is \$0.35/cwt. In the Upper Midwest order, Class I skim milk utilization rate is declining by 0.80 percentage points per year, while protein test increased from 3.02 in March 2010 to 3.18 for March 2021. The long-term decrease in Class I utilization rates and increase in protein tests reduce the predicted PPD by -\$0.17/cwt, to \$0.18/cwt. Above average spread between Class III and Class IV milk prices reduces the predicted PPD by -\$0.22/cwt, to -\$0.04/cwt. Combined effect of changes in butter, cheese, and dry whey prices from mid-February to March results in increase in predicted PPD by 1 cent. The change from “higher-of” to “average-of plus 74 cents” reduced the PPD by -\$0.03/cwt, to -\$0.06/cwt. Predicted PPD is negative, thus encouraging Class III handlers to reduce the volume pooled on the order. In March 2021, Class III receipts in the Upper Midwest order were at 355,467,968 pounds. In contrast, in March 2019, when PPD was positive and Class III handlers had the incentive to pool, Class III receipts were at 2,932,401,600 pounds. Actual published PPD for the Upper Midwest order is -\$0.51/cwt. This is lower than the value predicted in the previous step by -\$0.51/cwt. The discrepancy can be explained by depooling of Class III milk.

## Producer Price Differential Analysis for FO 32 – Central for March 2021



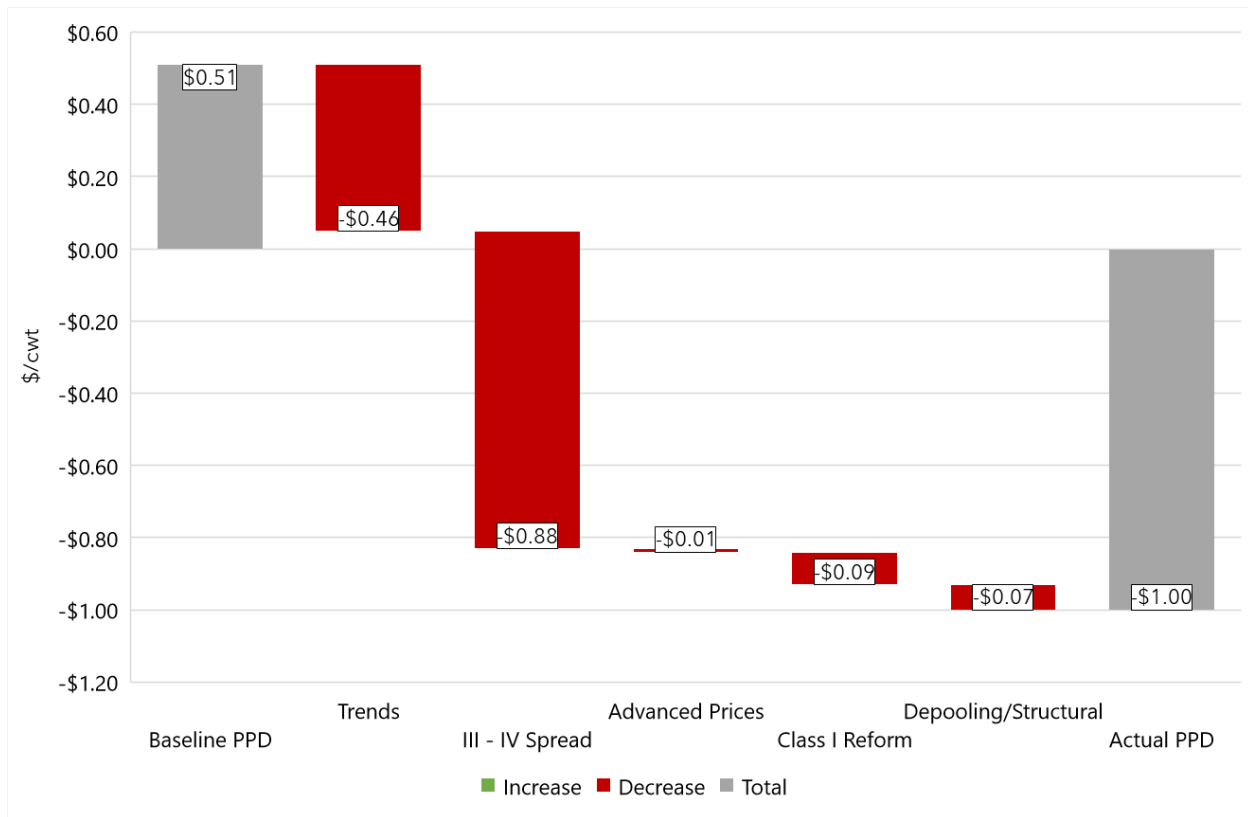
Baseline PPD for the Central order is \$0.67/cwt. In the Central order, Class I skim milk utilization rate is declining by 0.31 percentage points per year, while protein test increased from 3.11 in March 2010 to 3.25 for March 2021. The long-term decrease in Class I utilization rates and increase in protein tests reduce the predicted PPD by -\$0.46/cwt, to \$0.21/cwt. Above average spread between Class III and Class IV milk prices reduces the predicted PPD by -\$0.66/cwt, to -\$0.45/cwt. Combined effect of changes in butter, cheese, and dry whey prices from mid-February to March results in change in predicted PPD by less than \$0.01/cwt so the effect is displayed as \$0.00/cwt. The change from “higher-of” to “average-of plus 74 cents” reduced the PPD by -\$0.13/cwt, to -\$0.58/cwt. Predicted PPD is negative, thus encouraging Class III handlers to reduce the volume pooled on the order. In March 2021, Class III receipts in the Central order were at 52,668,189 pounds. In contrast, in March 2019, when PPD was positive and Class III handlers had the incentive to pool, Class III receipts were at 799,426,251 pounds. Actual published PPD for the Central order is -\$1.00/cwt. This is lower than the value predicted in the previous step by -\$0.42/cwt. The discrepancy can be explained by depooling of Class III milk.

## Producer Price Differential Analysis for FO 33 – Mideast for March 2021



Baseline PPD for the Mideast order is \$0.93/cwt. In the Mideast order, Class I skim milk utilization rate is declining by 0.57 percentage points per year, while protein test increased from 3.06 in March 2010 to 3.21 for March 2021. The long-term decrease in Class I utilization rates and increase in protein tests reduce the predicted PPD by -\$0.45/cwt, to \$0.48/cwt. Above average spread between Class III and Class IV milk prices reduces the predicted PPD by -\$0.83/cwt, to -\$0.35/cwt. Combined effect of changes in butter, cheese, and dry whey prices from mid-February to March results in increase in predicted PPD by \$0.01/cwt, to -\$0.34/cwt. The change from “higher-of” to “average-of plus 74 cents” reduced the PPD by -\$0.13/cwt, to -\$0.47/cwt. Predicted PPD is negative, thus encouraging Class III handlers to reduce the volume pooled on the order. In March 2021, Class III receipts in the Mideast order were at 253,769,138 pounds. In contrast, in March 2019, when PPD was positive and Class III handlers had the incentive to pool, Class III receipts were at 633,125,340 pounds. In contrast, Class I sales are better than expected by our models, so the combined effect for depooling and structural changes not well captured by our linear models is \$0.00/cwt. Actual published PPD for the Mideast order is -\$0.47/cwt.

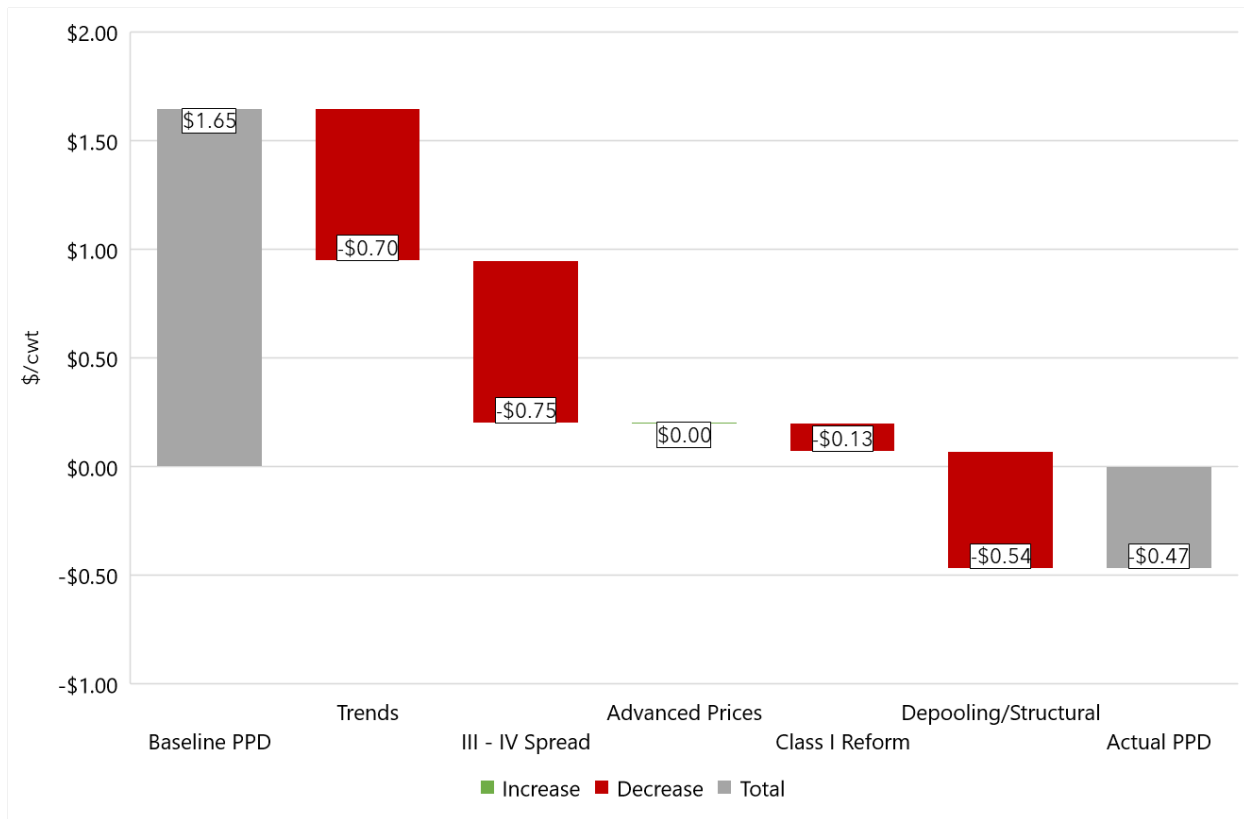
## Producer Price Differential Analysis for FO 124 – Pacific Northwest for March 2021



Baseline PPD for the Pacific Northwest order is \$0.51/cwt. In the Pacific Northwest order, Class I skim milk utilization rate is declining by 0.72 percentage points per year, while protein test increased from 3.14 in March 2010 to 3.30 for March 2021. The long-term decrease in Class I utilization rates and increase in protein tests reduce the predicted PPD by -\$0.46/cwt, to \$0.05/cwt. Above average spread between Class III and Class IV milk prices reduces the predicted PPD by -\$0.88/cwt, to -\$0.83/cwt. Combined effect of changes in butter, cheese, and dry whey prices from mid-February to March results in reduction in predicted PPD by -\$0.01/cwt, to -\$0.84/cwt. The change from “higher-of” to “average-of plus 74 cents” reduced the PPD by -\$0.09/cwt, to -\$0.93/cwt. Predicted PPD is negative, thus encouraging Class III handlers to reduce the volume pooled on the order. In March 2021, Class III receipts in the Pacific Northwest order were at 170,040,435 pounds. In contrast, in March 2019, when PPD was positive and Class III handlers had the incentive to pool, Class III receipts were at 314,725,412 pounds. Actual published PPD for the Pacific Northwest order is -\$1.00/cwt. This is lower than the value predicted in the previous step by -\$0.07/cwt. The discrepancy can be explained by depooling of Class III milk.



## Producer Price Differential Analysis for FO 126 – Southwest for March 2021



Baseline PPD for the Southwest order is \$1.65/cwt. In the Southwest order, Class I skim milk utilization rate is declining by 0.72 percentage points per year, while protein test increased from 3.11 in March 2010 to 3.33 for March 2021. The long-term decrease in Class I utilization rates and increase in protein tests reduce the predicted PPD by -\$0.70/cwt, to \$0.95/cwt. Above average spread between Class III and Class IV milk prices reduces the predicted PPD by -\$0.75/cwt, to \$0.20/cwt. Combined effect of changes in butter, cheese, and dry whey prices from mid-February to March results in change in predicted PPD by less than \$0.01/cwt so the effect is displayed as \$0.00/cwt. The change from “higher-of” to “average-of plus 74 cents” reduced the PPD by -\$0.13/cwt, to \$0.07/cwt. In March 2021, Class III receipts in the Southwest order were at 36,683,974 pounds. In contrast, in March 2019, when PPD was positive and Class III handlers had the incentive to pool, Class III receipts were at 747,386,502 pounds. Actual published PPD for the Southwest order is -\$0.47/cwt. This is lower than the value predicted in the previous step by -\$0.54/cwt. The discrepancy can be explained by depooling of Class III milk.

## References

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Jesse, E.V. and R.A. Cropp. 2008. Basic Milk Pricing Concepts for Dairy Farmers. Cooperative Extension, University of Wisconsin-Extension, Bulletin A3379.

Stephenson, M. and A.M. Novakovic. 2020. "Making Sense of Your Milk Price in the Pandemic Economy: Negative PPD's, De-Pooling and Reblending." *Dairy Markets and Policy Information Letter* 20-03. Available online: <https://dairymarkets.org/PubPod/Pubs/IL20-03.pdf>