Information Letter Series

Proposed Changes to Class I Differentials in the Recommended Decision and Potential Farm Milk Price Impacts

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The changes to proposed pricing formulas in the recently-released Recommended Decision on Federal Milk Marketing Orders will result in higher average national Class I prices. The impacts on farm milk prices of the proposed changes to Class I pricing will vary by Federal Milk Marketing Order, with larger price increases for Orders with higher Class I utilization and smaller price increases for Orders with high Class III utilization. The dynamic effects of the proposed changes include adjustments to milk supply and product prices that are not reflected in static analyses that use historical product prices to calculate how class prices would be different. Analyses with a dynamic global dairy supply chain model suggest that the impacts of the proposed changes on Class I prices will vary over time as producers and consumers react.

Introduction

On July 1, 2024, the Dairy Division of the Agricultural Marketing Service of USDA released a Recommended Decision regarding proposed changes to milk pricing under Federal Milk Marketing Orders (FMMO). One key proposed change in the Recommended Decision is to increase the location-specific component of Class I Differentials used in the pricing formulas for Class I Milk. These differentials vary by the location at which fluid milk is processed or sold and are added to the Base Class I Price to determine the Class I Price. In addition, the Recommended Decision proposes changes to the formula for determining the Base Class I Price[1], the use of the "higher of" the Class III and Class IV Skim Milk Prices rather than the average of these two prices plus $0.74/cwt. In addition, the value of Class I milk prices will

[1] Specifically, the changes apply to the Base Class I Skim Milk Price that is used on conjunction with the Class I butterfat price to determine the Class I Price.

also be affected by changes proposed for other classified prices, such as the proposed increases in Make Allowances for butter, nonfat dry milk (NDM), dry whey, and cheese.

Current Class I Pricing Formulas

The Recommended Decision[2] provides an excellent description of the current Class I differentials and their justification (pp. 204-205) and thus is included here:

> *Class I milk pricing consists of two pieces: the base Class I mover applied uniformly to all Class I milk… and a location specific differential which represents the location value of milk at a specific plant location. The differentials provide producers a financial incentive to supply the Class I market, which tends to be closer to the population centers, rather than delivering milk to a manufacturing plant typically closer to the farm. The location specific differential consists of two parts: a base value (also referred to as the "base differential") applied uniformly to all Class I milk, and a location value.*
>
> *The base differential is currently $1.60 per cwt, representing three costs whose values were determined to reflect market conditions during the late 1990s. First, the cost of maintaining Grade A farm status ($0.40) which includes costs associated with the labor, resources and utility expenses for maintaining required equipment and facilities, and adherence to certain management practices. Second, marketing costs (also referred to as balancing costs) ($0.60) which include, among other things, the costs associated with seasonal and daily reserve balancing of milk supplies and transportation to more distant processing plants. Lastly, a competitive factor ($0.60) is included to represent a portion of the competitive costs incurred by fluid plants to compete with manufacturing plants for a milk supply.*
>
> *The [current] location values were developed during the Order Reform process [in the late 1990s] through an analysis conducted with the USDSS, maintained at the time by Cornell University. The USDSS was used to evaluate the geographic or "spatial" value of milk and milk components across the U.S. under the assumption of efficient markets. The model used 240 supply locations, 334 consumption locations, 622 dairy processing plant locations, 5 product groups, 2 milk components, and transportation and distribution costs among all locations to determine mathematically consistent location values for milk and components. Model results provided county specific information regarding the relationship of prices between geographic locations based on May and October 1995 data.*

The current Class I differentials (Figure 1) vary by county and are generally higher in locations with a deficit in farm milk supply relative to local dairy product demand (Figure 2). The current values of differentials were last modified for some regions of the US in 2008.

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[2] https://www.ams.usda.gov/sites/default/files/media/DraftAMS_DA_23_0031_RecommendDecisionPRR.pdf

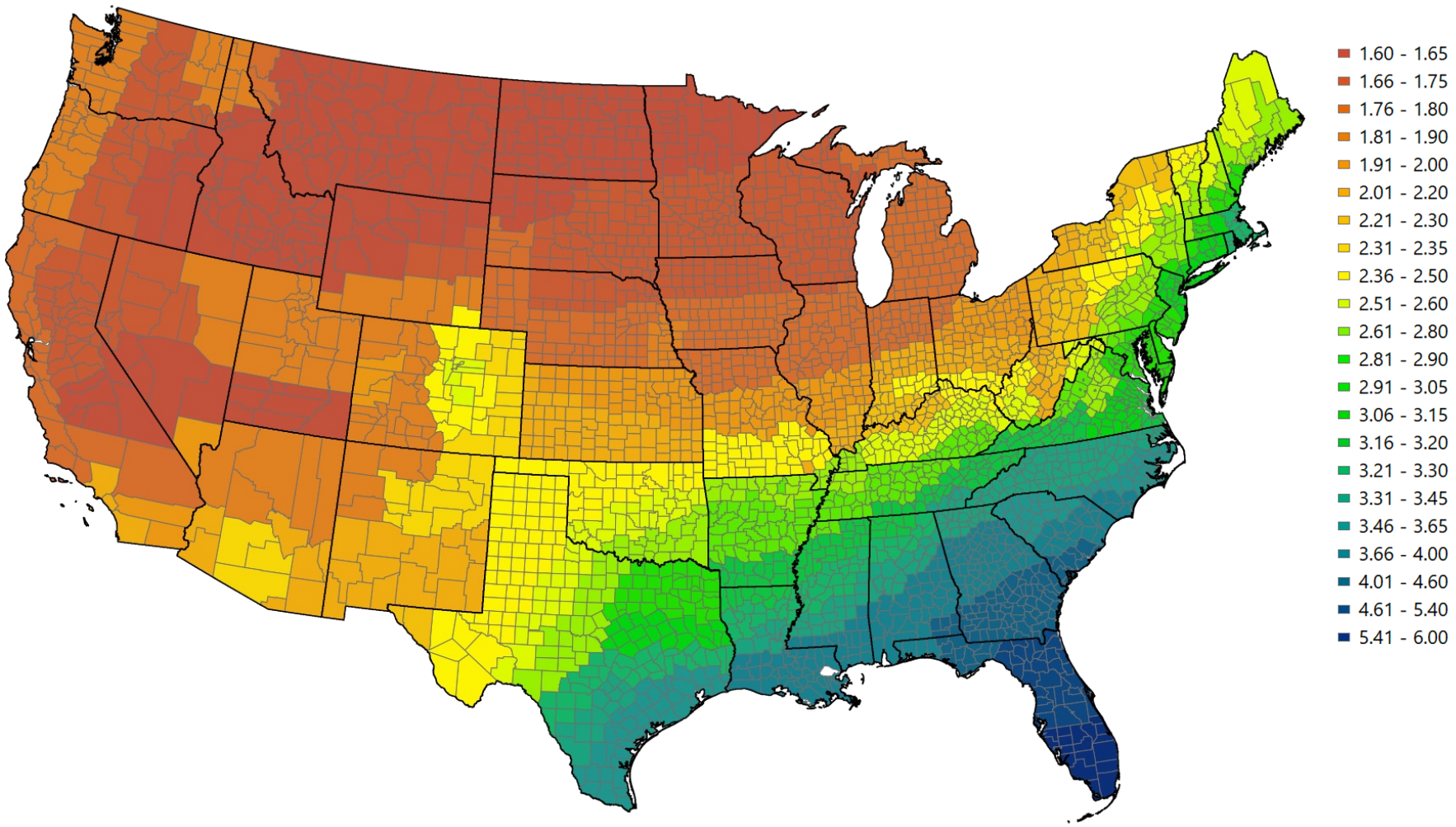

Figure 1. Current Class I Differentials by County Location

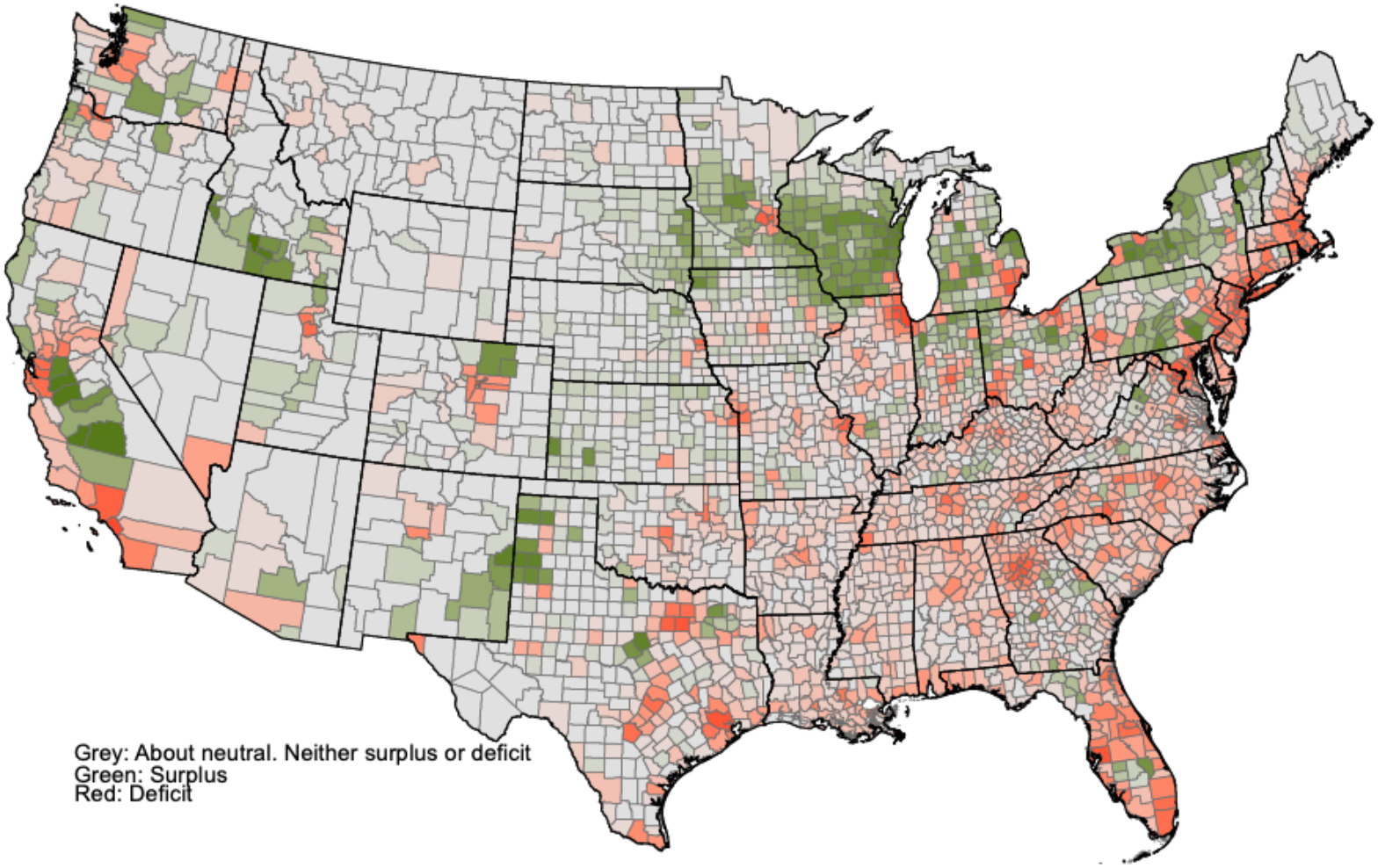

Figure 2. Estimated Milk Surplus (Green) or Deficit (Red) by County, 2021

Proposed Changes to Class I Differentials in the Recommended Decision

The Recommended Decision proposes to change the *location-specific component* of the Class I differential, but leaves the *base differential* of $1.60/cwt unchanged. The Federal Milk Marketing Order Pricing Formula Hearing recorded diverse perspectives on Class I differentials in testimony from multiple dairy industry organizations. Ultimately, the proposed changes (Figure 3) drew heavily on the analysis of a large-scale spatial optimization model of the US dairy industry, the US Dairy Sector Simulator (USDSS). The USDSS is a highly detailed mathematical spatial optimization model, but at its core solves a practical problem: how to get milk from dairy farms to plants to be processed into various dairy products and distribute those products to consumers with the lowest cost possible. For the US dairy industry as a whole, the USDSS minimizes the systemwide cost of assembling milk at plants, making final and intermediate dairy products and transporting them to other plants and locations of final demand. The USDSS provides a competitive benchmark for the differences in spatial milk values across the US. Analysis for two months in 2021 indicated considerable differences from the values of current Class I differentials (Figure A1).

The Recommended Decision indicates that modifications were made to the USDSS values for three reasons: 1) to promote Class I handler equity, 2) to maintain producer equity (prevent uneconomic rewards or penalties to producers), and 3) to ensure that marketwide pools continue to provide orderly marketing conditions. Most of the adjustments were within $0.20/cwt of the USDSS model-generated values (Figure A2).

The Recommended Decision proposes increases in the location-specific component of Class I differentials throughout the US. The largest increases of around $2.00/cwt were in the mid-Atlantic and southeast regions, including a corridor of states from West Virginia to Mississippi[3]. Increases in the western states were lower, often between $0.05/cwt and $0.40/cwt, reflecting the balance of milk supply and demand in that region. Proposed increases in the Upper Midwest generally ranged from $1.00/cwt to $1.35/cwt, and recommended increases in the Northeast ranged from $1.30/cwt to $1.70/cwt.

Short-term Impacts on Class I Prices

The Recommended Decision (p.231) indicates that the national average effect of changes to Class I differentials would be $1.24/cwt based on pooled Class I milk from 2019 to 2023. To illustrate the effect, it is useful to consider one month. In May 2024, the current Base Class I Price was $18.46/cwt and with an average national Class I differential of $2.63, this would imply a Class I Price of $21.09/cwt (Table 1). The change to use the "higher of" the Class III Skim Milk Price and Class IV Skim Milk Price (rather than their average plus %0.74/cwt) would have increased the Base Class I Price by $1.02/cwt despite a reduction in the value of butterfat in Class I resulting from changes to make allowances. (See IL24-03 for additional information.) With an increase in the average Class I differential of $1.24/cwt, this implies an overall increase in the average Class I price of $2.26/cwt.

[3] Location values were increased but less in areas further south and east, such as Georgia and Florida.

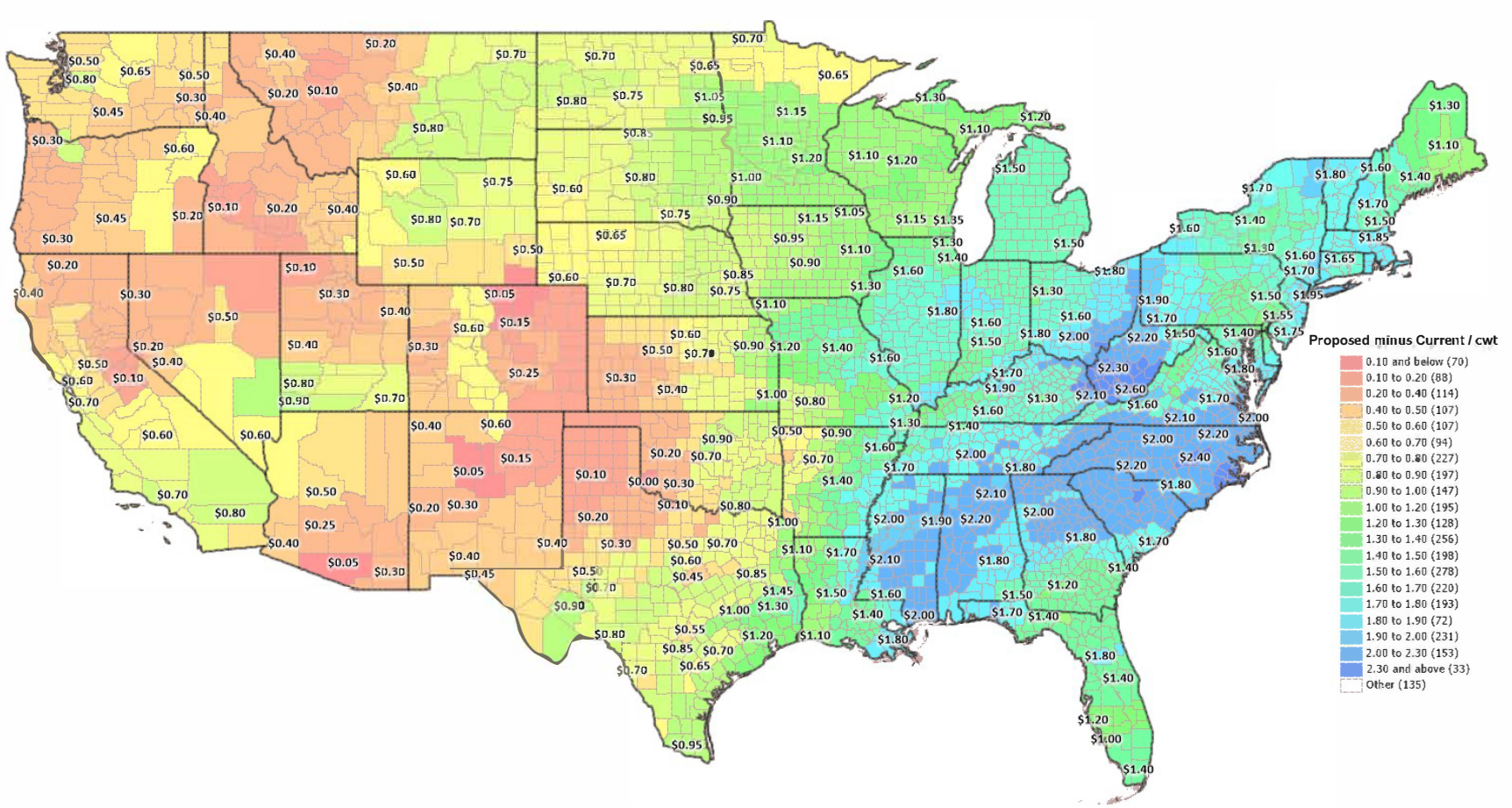

Figure 3. FMMO Pricing Hearing Recommended Decision Issued July 1, 2024 Proposed Change in Class I Differentials

Source: https://www.ams.usda.gov/sites/default/files/media/ProposedClassIDifferentialChangeMap.pdf

Table 1. Summary of Changes in National Average Class I Prices for May 2024 with the Recommended Decision Compared to Current

Class Price	Current	Recommended Decision	Difference
Class IV			
Class IV Skim Price, $/cwt	8.68	8.43	-0.25
Class III			
Class III Skim Price, $/cwt	6.67	6.30	-0.37
Class I			
Advanced Class III Skim Milk Pricing Factor,$/cwt	3.8763	3.1487	-0.7276
Advanced Class IV Skim Milk Pricing Factor, $/cwt	8.9902	8.4645	-0.5257
Average of Advanced Class III and IV Skim Milk Pricing Factor. $cwt	6.4332	--	--
Differential for current pricing, $/cwt	0.74	0.00	-0.74
Higher of Advanced Class III and Class IV Skim Milk Pricing Factor $/cwt	--	8.4645	--
Base Class I Skim Milk Price, $/cwt	7.17	8.46	1.29
Advanced Butterfat Pricing Factor, $/lb butterfat	3.2954	3.2297	-0.0656
Base Class I Price, $/cwt	18.46	19.47	1.02
Class I Differential (national average), $/cwt	2.63	3.87	1.24
Class I Price, $/cwt	21.09	23.34	2.26

However, the impacts on the Class I price will vary by location given the differences in the proposed changes to the location-specific components of Class I differentials. The impact on Class I prices will be smaller in regions with smaller increases in location-specific differential values, for example, much of the western US.

In addition, the short-term impact on farm milk prices of the proposed changes will vary based on the amount of Class I utilization in a Marketing Area. The impacts on farm milk prices of the proposed increases in the Class I price will be larger where Class I utilization is high and proposed increases in the location-specific differentials are larger, for example, in much of the Southeast. The impacts on farm prices of the proposed changes to Class I pricing will be less in regions such as California and the Upper Midwest. As noted in IL-24-0X, the overall impacts of the proposed changes to milk pricing may be negative in those regions despite the increase in Class I prices due to increases in location-specific differentials.

Dynamic Assessment of the Changes Proposed in the Recommended Decision

A common approach to evaluating the impacts of changes to FMMOs is to use historical data on the product prices and modify make allowances and yield factors to calculate a new series of class prices. Another approach uses observed historical quantities (lbs) of milk and components pooled by Order and then adjust the monetary value of those quantities to reflect changes to the value of components based on modified pricing formulas. This latter is the approach adopted by USDA for its Regulatory Economic Impact Analysis.

Although frequently used, these approaches have the limitation that they do not account for how changes in the farm milk price due to changes in the formulas will affect milk production, its allocation to different uses and product prices. In essence, both static historical approaches assume that total milk production, allocation and product prices will be unchanged even as farm milk prices are changed. Thus, although helpful as a first approximation, historical static analyses can be complemented by a forward-looking, dynamic analysis that accounts for the potential effects of farm milk prices on milk production and allocation, and thus also product prices that are used in the pricing formulas.

We used a dynamic systems model of the global dairy supply chain (Nicholson and Stephenson, 2015) to evaluate the dynamic impacts of the changes proposed in the Recommended Decision. This model incorporates dynamic decision-making by farms (for 10 size categories and locations in the US), processors, product buyers, and exporters in 15 global dairy regions. This model has previously been used to evaluate the effects of the Dairy Margin Coverage Program and proposed supply management programs (Nicholson and Stephenson, 2021). The model incorporates all elements of the classified pricing system of the US under FMMOs, albeit in aggregated geographical regions (California and the rest of the US[4]).

The impacts of proposed changes in the Recommended Decision were simulated monthly, assuming their implementation in January 2024[5] and through December 2028. Component values were decreased to account for increases in make allowances, with additional modifications to the yield factors, the butterfat retention factor used in Class III pricing, increases in national average Class I differentials, and the use of the "higher of" Class III Skim Milk Price and the Class IV Skim Milk Price, rather than their average plus $0.74/cwt.

Our analysis indicates that the impacts of the Recommended Decision will vary over time as farm milk production and dairy product markets respond to the changes in incentives resulting from proposed pricing changes (Figure 4). These results suggest negative impacts on the US All Milk price during the next three years, with positive impacts for the subsequent two years. Similar to the results of the static historical analyses, our results project increases in Class I prices and decreases in Class III prices from 2024 to 2028, albeit

[4] This geographical aggregation means it is not possible to report simulation results for each Order separately.
[5] This is prior to any likely actual implementation date but provides a five-year future time horizon to mirror the past five years analyzed by USDA.

with variation year by year. Negative impacts are projected for Class II and Class IV prices during the first three years, with subsequent increases in the final two years of the simulation. For the entire five-year projection period, the average All Milk, and Class III prices are lower than with current pricing formulas and the average Class I, Class II and Class IV prices are higher. Although not shown, the model projects modest increases in average over-order premiums, about $0.04/cwt as a result of changes proposed in the Recommended Decision.

These results reflect the impacts of complex interaction among farm production, processing, demand, and exports resulting from proposed changes to the price formulas. Why the average Class I price does not increase by the amount of the nation average increase in the Class I differential, $1.24/cwt? The Class I Price depends on the values of Class III and Class IV Skim Milk Prices, and both of these prices initially decrease as a result of the proposed changes in make allowances (despite the use of the "higher of" these two prices in calculating the Class I price). As a result, the average Base Class I Skim Price is projected to decrease by about $0.70/cwt, so the net impact on the Class I prices is about $0.70/cwt (Figure 1). Why do Class II and IV prices not consistently decrease? This is the result of a dynamic milk supply response. The projected initial decreases in the All Milk Price result, over time, result in decreases in US milk production (from a baseline model projection). As projected dairy product demand grows over time, this modifies the supply and demand balance for butterfat, with increasing butterfat prices projected later in the simulated time period. These project higher butterfat prices affect all Class prices and result in a higher All Milk Price in Year 4 (2027) and Year 5 (2028).

Key Points:

- The proposed changes to Class I differentials will increase the value of Class I milk throughout the US, with larger increases in a region stretching from West Virginia to Mississippi. The Recommended Decision left the Base Class I Differential unchanged at $1.60/cwt but increased location-specific differential values from $0.05/cwt to $2.40/cwt.
- The short-term expected increases in prices paid for farm milk due to the proposed changes in Class I pricing will be larger in regions with larger increases in location-specific differential values and higher utilization of Class I milk (such as the southeastern US).
- Analyses with a dynamic dairy supply chain model indicate that Class I price increases will be less than the amount of the proposed change to the average national Class I differential.

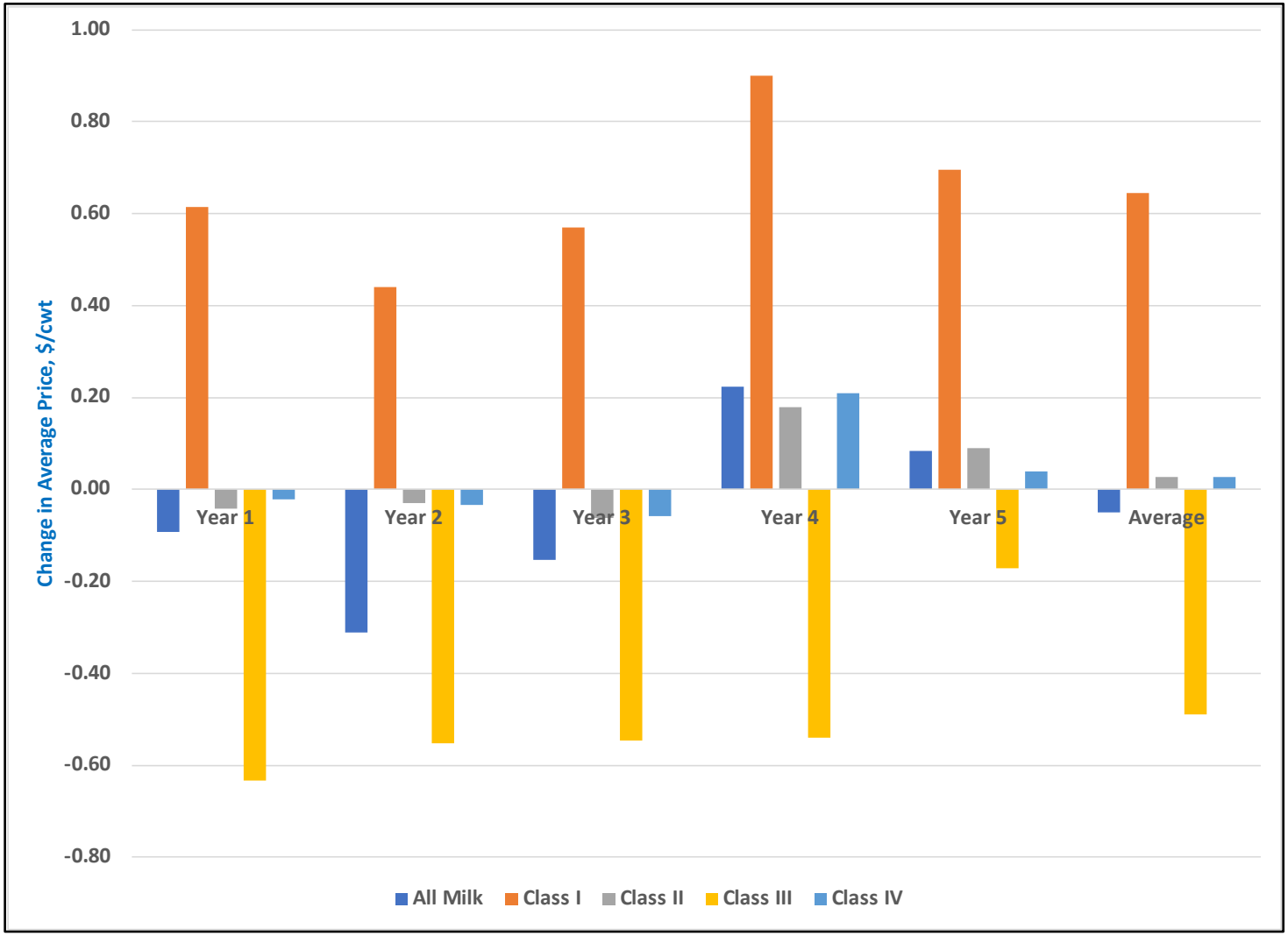

Figure 4. Simulated Differences in Class Prices and the US All Milk Price, Recommended Decision Compared to Current, 2024 *Year 1) to 2028 (Year 5) and Average Change

Note: Assumes Implementation of Recommended Decision changes in 2024.

Reference

Nicholson, C. F. and M. W Stephenson. 2015. Price Cycles in the U.S. Dairy Supply Chain and their Management Implications. *Agribusiness: An International Journal*, 31:507-520. DOI: 10.1002/ agr.21416

Nicholson, C. and M. Stephenson. 2021. Analyses of Proposed Alternative Growth Management Programs for the US Dairy Industry. Report for the Center for Integrated Agricultural System, University of Wisconsin, August.

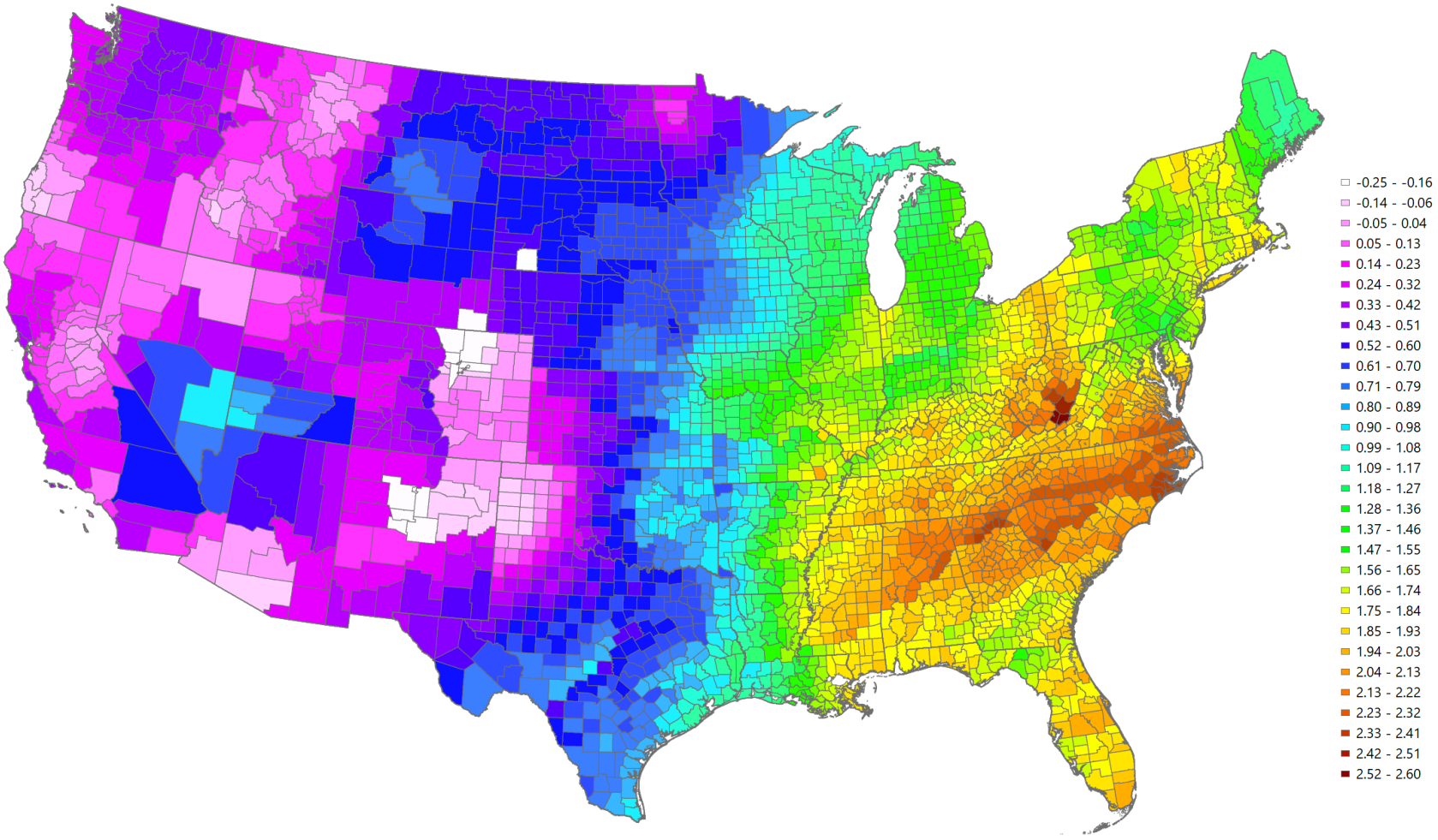

Figure A1. Difference Between USDSS Estimated May 2021 Spatial Milk Values and Current Class I Differentials

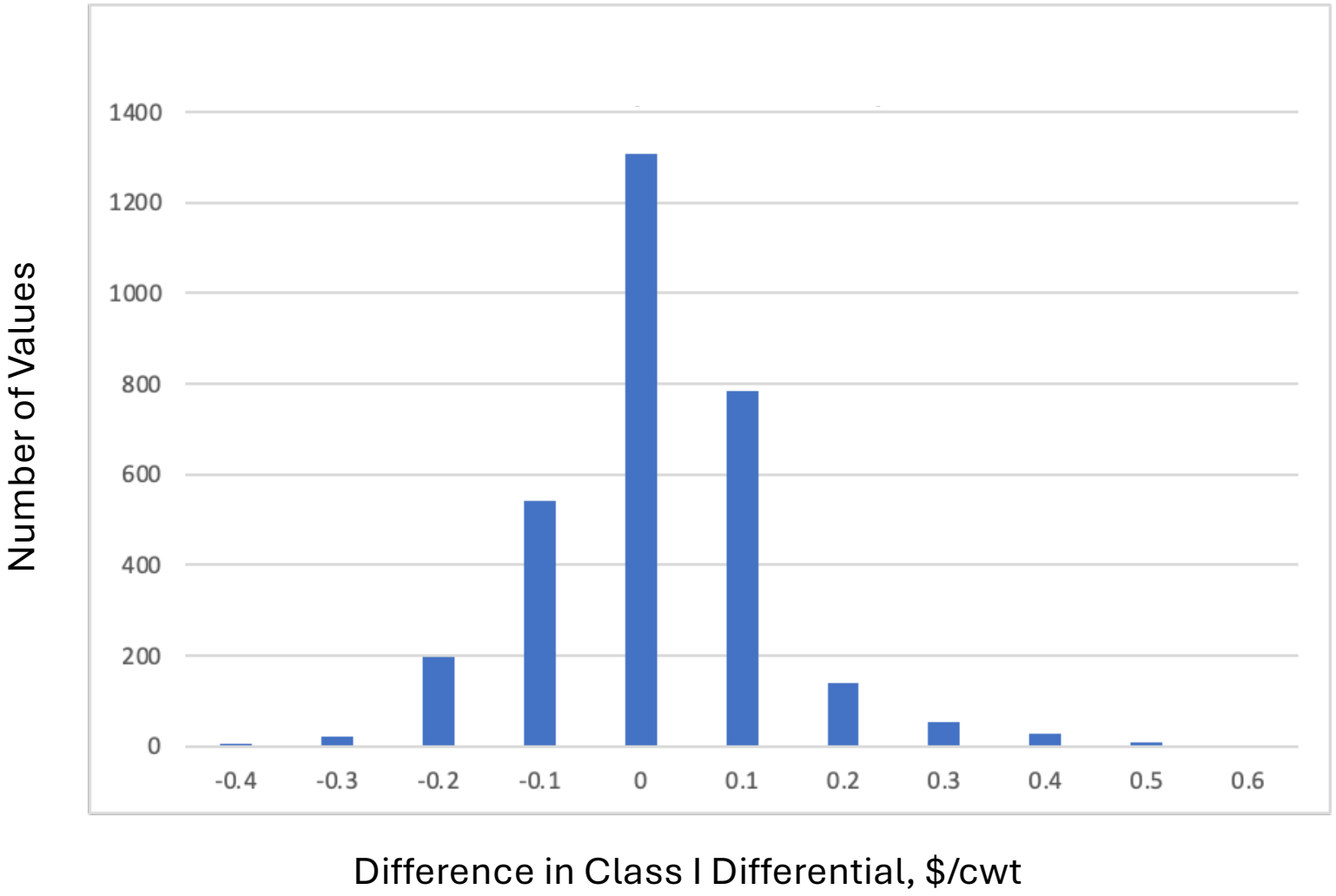

Figure A2. Distribution of Differences Between the May 2021 Analysis of Spatial Milk Values with the US Dairy Sector Simulator Model and the Class I Differentials in the Recommended Decision