Testimony of Joseph V. Balagtas

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I. INTRODUCTION

a. Qualifications

My name is Joseph V. Balagtas, and I am a Professor in the Department of Agricultural Economics at Purdue University, and Interim Director of the Center for Food Demand Analysis and Sustainability. I teach and conduct research on the economics of agricultural markets and agricultural policy. I have a B.A. in Economics from Miami University, an M.S. in Agricultural Economics from Iowa State University, and a Ph.D. in Agricultural Economics from the University of California, Davis. I have taught undergraduate courses in introductory economics, econometrics, agricultural marketing, and economic geography of food and agriculture; as well as graduate courses in the industrial organization of food and agriculture, econometrics, agricultural markets and policy, and research methods.

My research program focuses on the economics of food and agriculture in the United States and around the world. I have published dozens of peer-reviewed articles and reports covering a broad range of issues including regulation and competition in U.S. dairy markets, impacts of U.S. farm policy in agricultural markets, consumer behavior and competition in retail food markets, agricultural commodity storage, agricultural technology adoption, and rural poverty. I have received multiple awards for research quality, and have served on the editorial boards of the top journals in the field of agricultural economics.

In addition to my academic positions, I was a Fulbright Senior Scholar at the International Rice Research Institute in the Philippines, and a Senior Economist at the Council of Economic Advisers in the Executive Office of the President in Washington, D.C.

b. Assignment

I have been retained by counsel representing International Dairy Foods Association to evaluate the economic evidence with respect to proposals submitted to the United States Department of Agriculture (USDA) and to be considered at the Hearing on Proposed Amendments to Marketing Agreements and Orders. In particular, I have been asked to review and evaluate Proposal 19 submitted by the National Milk Producers Federation.

My assessment of Proposal 19 is based on my review of the Proposal, my professional understanding of U.S. dairy markets and Federal Milk Marketing Orders, and empirical evidence that I have gathered to illuminate the likely effects of the Proposal.

c. Summary of Opinions

Based on my review of documents and original analysis, I have formed the following opinions relative to Proposal 19.

- Higher Class I differentials are not justified on the basis of ensuring adequate of supply of fluid milk to consumers at reasonable prices. Class I utilization has fallen steadily since 2001 across the country and in most Marketing Order regions. In those regions with higher or rising Class I utilization, Class I utilization has not resulted in high retail prices for fluid milk.

- Fluid milk demand is more elastic than previous, dated estimates suggest. Recent estimates of the elasticity of demand for fluid milk confirm that demand has become more elastic. The emergence of nondairy milks have increased competition in the category and increased the elasticity of demand for fluid milk. Under current market conditions, higher Class I differentials will reduce fluid consumption by more than what is implied by dated estimates of milk demand.

- Based on recent estimates of the price elasticity of retail demand for fluid milk, I estimate that Proposal 19 would reduce fluid milk consumption by 5.4%.

- Proposal 19 harms fluid milk consumers. By raising the retail price of fluid milk, I estimate that Proposal 19 imposes a cost of as much as $18.4 million per week on consumers of fluid milk.

- Proposal 19 diverts producer milk away from Class I uses and towards manufacturing-class uses. I calculate that the quantity of milk that would shift from Class I uses to manufacturing uses is 2.2 billion lbs. Costs associated with reallocating this milk to manufacturing uses include search costs of finding a buyer, transportation costs of moving milk to a manufacturing plant, and costs associated with increased production of manufactured dairy products.

- Increased production of manufactured dairy products would result in lower prices for manufactured products and lower farm prices for milk used in those products. I calculate that diverting from Class I uses were to be used for Class IV uses would result in 7.6%-increase in US production of NFDM and 3.1%-increase in US butter production. The effect of increased production of NFDM and butter on dairy commodity prices, farm milk prices, and producer revenue depend on the elasticities of demand for US NFDM and butter, for which published estimates are not readily available. I calculate effects for a range of elasticities that reflects uncertainty over these key parameters. Under plausible parameter values decreased milk revenue from manufacturing uses is large enough to offset additional Class I revenue from higher Class I differentials, making farmers worse off.

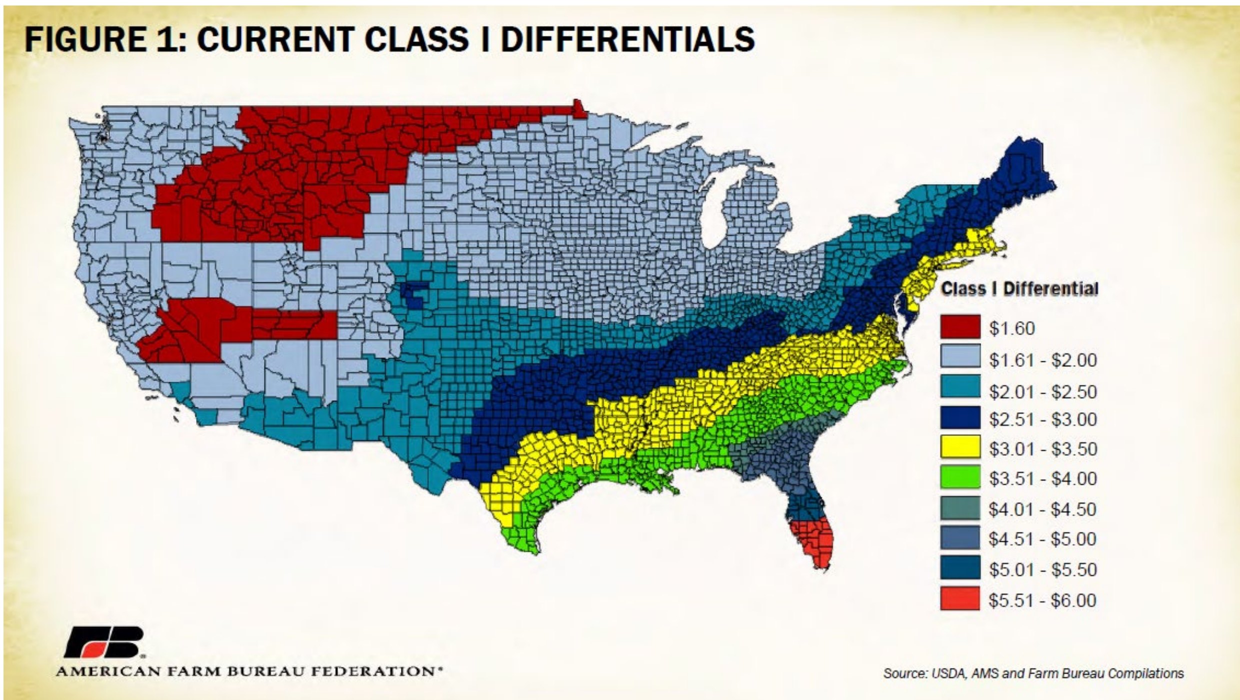
II. PROPOSAL 19

Proposal 19 consists of a new set of proposed Class I differentials. The proposed Class I differentials range from a low of $2.20 per cwt. in some Idaho counties, to a high of $7.90 per cwt. in Southern Florida. The simple average proposed differential is $4.07 per cwt. The proposed Class I differentials are substantially higher than the current Class I differentials, representing an increase ranging from $0.25 per cwt. to $2.70 per cwt.

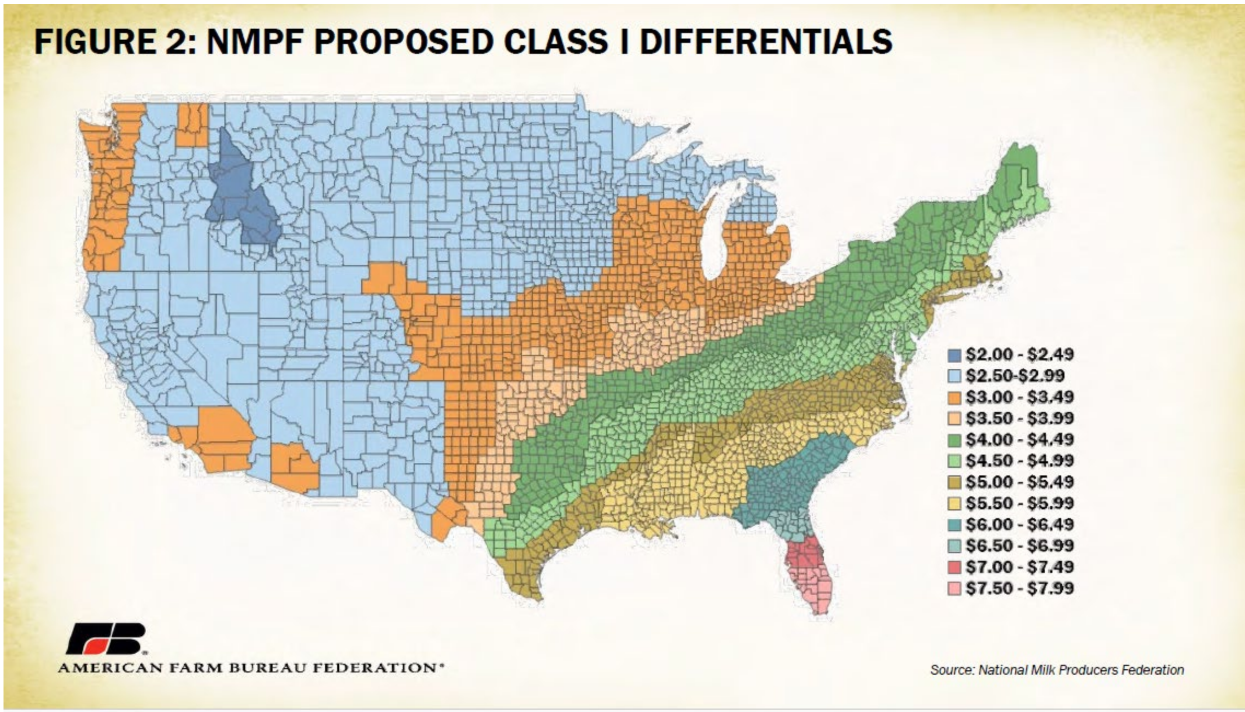
Maps 1 and 2 depict current and Proposed Class I differentials by county, respectively. Maps 3 and 4 depict the changes in Class I differentials in each county, both in levels ($ per cwt) and the change relative to the current Class I differential. Proposal 19 would result in an increase in the

Class I differential in every county. The increases range from $0.25 per cwt to $2.70 cwt., and average $1.50 per cwt. In relative terms, Proposal 19 would increase Class I differentials by an average of 60 percent, ranging from 10 percent to as high as 124 percent.

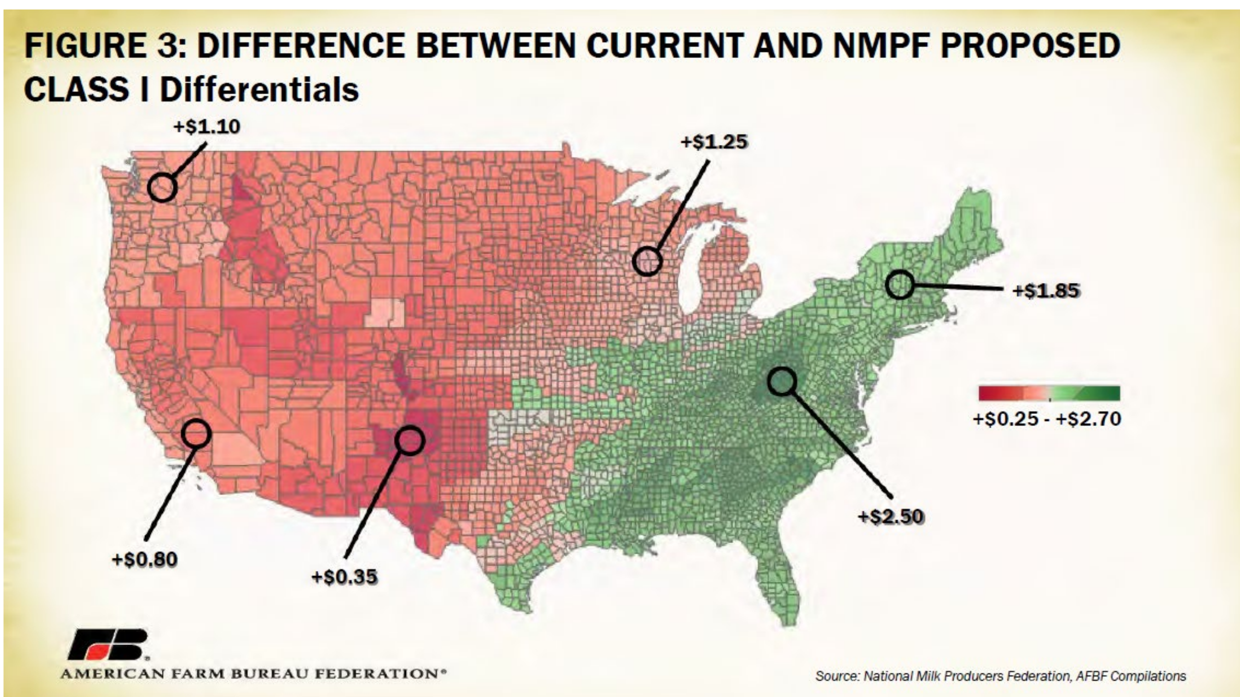
In 2023, the average Class I Base price was $19.20 (USDA AMS). Thus the average proposed increase in Class I differentials, $1.50 per cwt, represents an increase in the Class I price of approximately 7.8 percent.



Map 1. Current Class I differentials (source: AFBF USDA AMS Exhibit 58)



Map 2. Proposal 19 Class I differentials (source: AFBF USDA AMS Exhibit 58)



Map 3. Proposed Increase in Class I Differentials (source: AFBF USDA AMS Exhibit 58)

III. CHANGES IN MARKET CONDITIONS SINCE THE LAST MAJOR REVISION OF CLASS I DIFFERENTIALS DO NOT SUPPORT A NEED FOR HIGHER CLASS I DIFFERENTIALS

The stated objectives of Federal Milk Marketing Orders are (1) to promote orderly marketing of milk, (2) to ensure adequate supplies of milk to consumers at reasonable prices, and (3) to assure milk producers fair treatment vis-à-vis milk processors (CRS 2022). To achieve these objectives Marketing Orders set minimum prices that processors must pay by end-use, known as classified pricing. A key component of classified pricing is that the minimum price for milk sold for fluid uses (Class I milk) is set at a premium over milk sold for other uses. Together with revenue pooling, classified pricing with a relatively high price for Class I milk raises average revenue if demand for Class I milk is inelastic (Balagtas, Smith, and Sumner 2007). Higher Class I prices are established through the addition of Class I differentials, which are added to minimum prices of manufacturing milk (Class III or Class IV or the average of these). The last major revision to Class I differentials occurred in 2000, as authorized by the Federal Agriculture Improvement Act of 1996. Current Class I differentials range from $1.60 per cwt. in the Upper Midwest to $6.00 per cwt. in Southern Florida (Map 1).

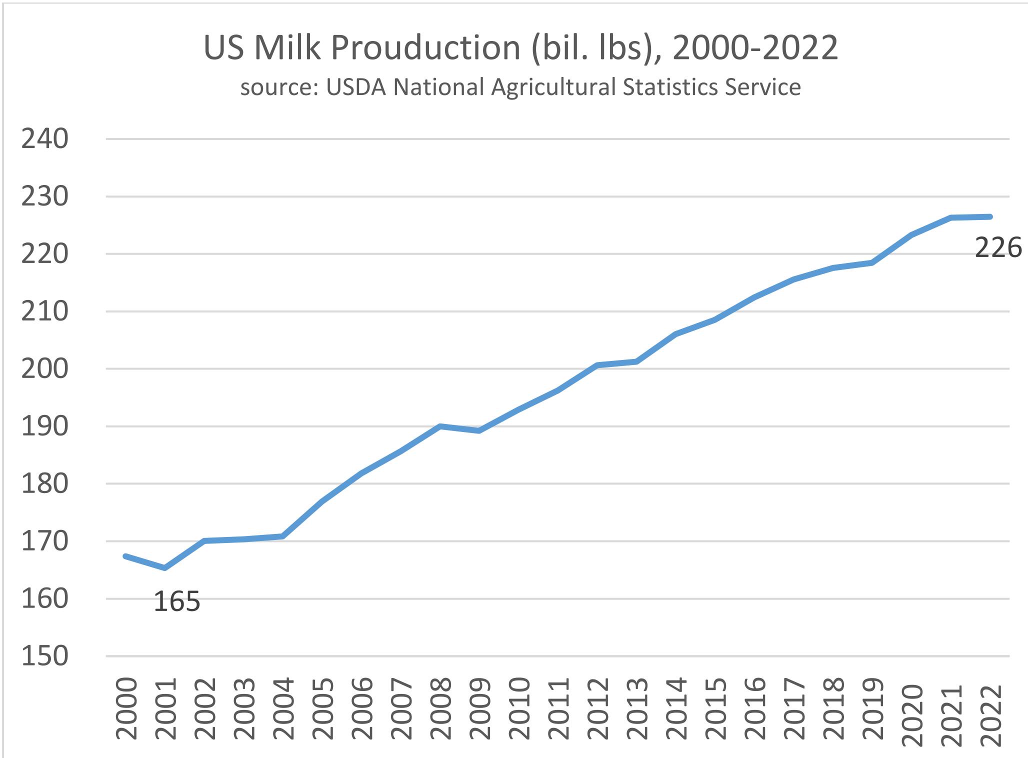
In order to evaluate the justification for the higher Class I differentials proposed in Proposal 19, I consider changes in the market for fluid milk since the current Class I differentials were established in 2000, and assess Proposal 19 in the context of the Federal Milk Marketing Order objectives listed above, with particular focus on adequate supplies of fluid milk at reasonable prices.

I start from the premise that Class I differentials set in 2000 were appropriate for market conditions during that time to support adequate supply of fluid milk and dairy farm income. I then ask the question: do current market conditions, or changes in market conditions since 2000 and 2001, justify the higher Class I differentials proposed in Proposal 19 on the basis the adequate supply and fair treatment of milk producers objectives.

a. Adequate Supplies of Fluid Milk at Reasonable Prices

U.S. milk production grew from 165 billion pounds in 2001 to 226 billion pounds in 2022, an increase of 37% and an average annual growth rate of 1.8% (Figure 1). Increased milk production has been driven by increased milk yields. In the decade from 2013 to 2022, U.S. average milk production per cow grew by 10%, from 21,813 pounds to more than 24,000 pounds per year. In the same decade the number of dairy cows in the country increased by 1.9%, from to 9.2 million head to 9.4 million head.

Figure 1. U.S. Milk Production, 2000-2022 (bil. lbs)



Growth in milk production has been widespread but not even across geographic regions. Seven of 10 U.S. regions saw expanded milk production between 2000 and 2022 (Table 1). Three regions that did not see growth were Appalachia, the Southeast, and Delta States. These three regions represented 7.5% of national milk production in 2001 and 3.6% of national milk production in 2022.

While U.S. milk production has grown, fluid milk consumption in the United States has been in decline for more than half a century (USDA ERS). Data from the USDA Economic Research Service shows that U.S. per capita milk consumption has fallen from approximately one cup per person per day in 1970 to less than half a cup per person per day in 2019 (Figure 2). Data from Cornell's Dairy Markets and Policy Program shows that the decline in fluid milk sales has been particularly steep in the years since 2010 (Figure 3).

As a result of declining consumption of fluid milk, the quantity of milk in Class I uses has also declined across all Marketing Order regions. In Table 2, I report the quantity of producer milk used in Class I products in Federal Milk Marketing Orders in 2001 and 2022. The quantity of Class I milk has declined by 11% over that time period across all Marketing Order regions, and fell by as much as 46% in the Upper Midwest and 41% in the Southeast.

Table 1. Milk Production by U.S. Region, 2001 & 2022 (mil. lbs)

	2001	2022	% Change
			%
Northeast	28,787	30,541	6
Lake States	36,881	54,099	47
Corn Belt	14,616	18,357	26
Northern Plains	4,790	10,039	110
Appalachia	6,283	3,831	-39
Southeast	4,511	4,154	-8
Delta States	1,561	247	-84
Southern Plains	6,432	17,239	168
Mountain	20,902	37,288	78
West Coast	40,448	50,662	25
United States	165,332	226,462	37

Figure 2. U.S. Per capita Milk Consumption

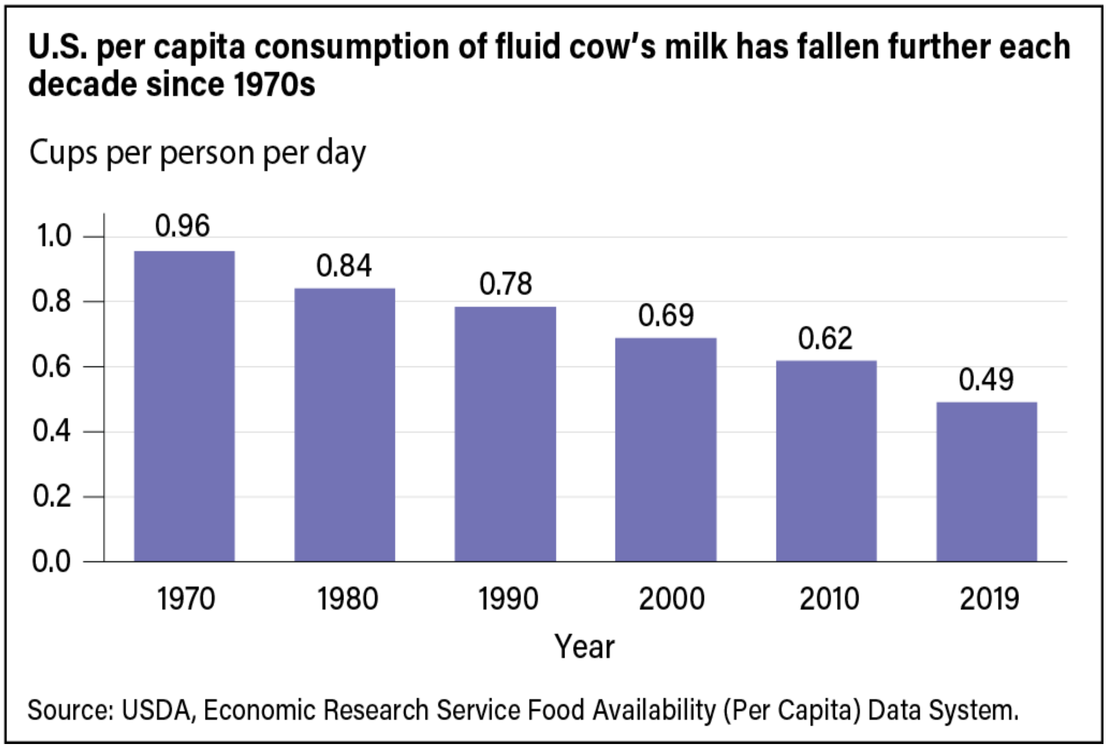


Figure 3. U.S. Fluid Milk Sales, 2001-2017

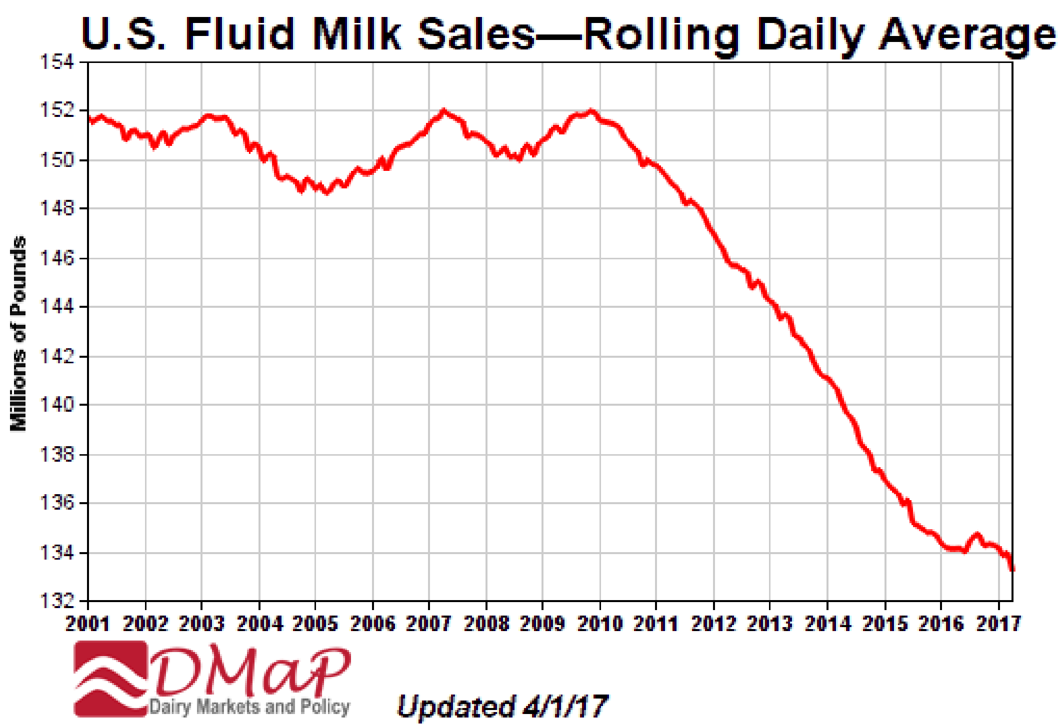


Table 2. Producer Milk Used in Class I Products in Federal Milk Marketing Orders, 2001 and 2022.

Class I Milk (million pounds)			
Marketing Order Region	2001	2022	% Change
Appalachian	4,352	3,818	-12.27
Central	4,881	4,363	-10.61
Florida	2,492	2,061	-17.30
Mideast	6,633	6,211	-6.36
Northeast	10,642	7,963	-25.17
Pacific Northwest	2,098	1,622	-22.69
Southeast	4,805	2,833	-41.04
Southwest	4,029	3,864	-4.10
Upper Midwest	4,092	2,192	-46.43
All Markets Combined	45,887	40,986	-10.68

Source: USDA Agricultural Marketing Service

With growing milk production and declining fluid milk consumption, Class I utilization rates have also been declining. In Table 3 I report Class I utilization rates for each Marketing Order and all Marketing Order regions in 2001 and 2022. Across all Marketing Orders, Class I utilization fell by 29%, from 38% in 2001 to 27% in 2022. Class I utilization fell in seven of the nine Marketing Order regions reported in the table. In addition, Class I utilization fell in the California Milk Marketing Order, from 22% in 2018 to 21% in 2022. Through June of 2023, Class I utilization in California is only 17%. In the Arizona Milk Marketing Order, Class I utilization fell from 37% in 2007 to 27% in 2022 (USDA Agricultural Marketing Service).

Table 3. Class I Utilization of Producer Milk in Federal Milk Marketing Orders, 2001 and 2022.

Class I Utilization (%)			
Marketing Order Region	2001	2022	% Change
Appalachian	65.22	70.43	7.99
Central	27.37	27.90	1.94
Florida	89.90	83.01	-7.66
Mideast	38.50	36.98	-3.95
Northeast	43.34	29.62	-31.66
Pacific Northwest	29.60	21.40	-27.70
Southeast	61.85	72.40	17.06
Southwest	46.83	28.17	-39.85
Upper Midwest	17.47	6.88	-60.62
All Markets Combined	38.17	27.03	-29.19

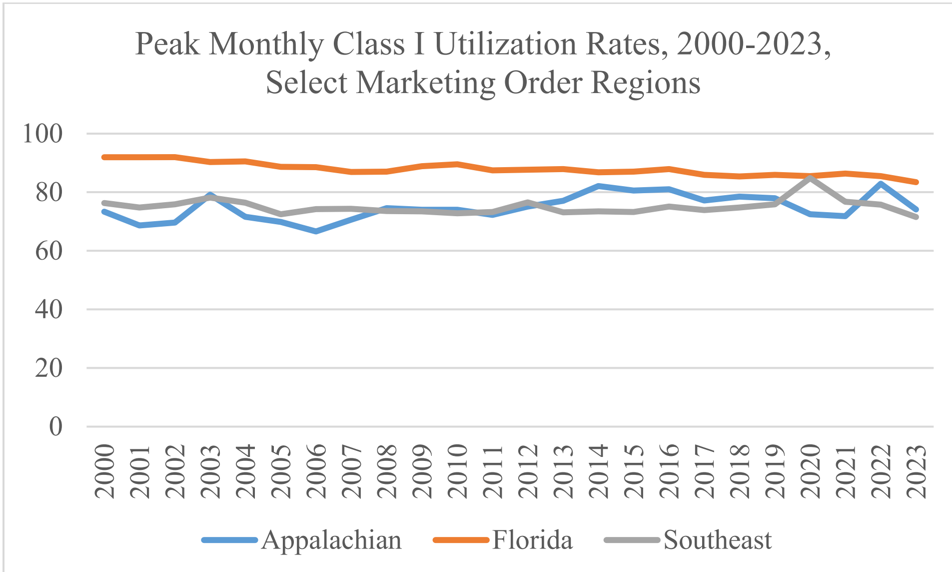
Source: USDA Agricultural Marketing Service

In Federal Milk Marketing Order regions where Class I utilization has declined dramatically since 2001, falling Class I utilization rates are clear evidence that there is adequate supply of milk to serve the market for fluid milk products. In the Central Marketing Order region, Class I utilization has remained essentially unchanged at 27%. Only the Upper Midwest and the Pacific Northwest have lower Class I utilization. Thus in the Central Marketing Order, as well, there is clearly adequate supply of milk to serve the market for fluid milk products.

That leaves two regions in which Class I utilization has increased since 2001: Appalachian (+2.4%) and Southeast (+11.4%). These regions, together with Florida, also had the highest Class I Utilization rates in 2022: Appalachia (70%), Southeast (72%), and Florida (83%). For these three regions, the relatively high or rising Class I utilization rates potentially suggest an inadequate quantity of milk available to serve the market for fluid products. Thus, I explore market conditions in these markets further. For these three Marketing Order regions, I plot the peak monthly Class I utilization rate in each year since 2000 (Figure 4). Because of seasonal cycles in both supply and demand, average annual Class I utilization rates may understate peak monthly Class I utilization rates during the year, typically in the Fall. In the Florida Marketing Order, monthly Class I utilization rates frequently exceeded 90% in 2000-2004. But monthly Class I utilization rates in Florida have remained below 90% since 2004, and below 86% since 2016. In the Southeast and Appalachian Marketing Order regions, peak monthly Class I utilization rates have remained below that of Florida for the entire period, and do not exhibit a clear rising trend. Thus, even in the Marketing Order regions with the relatively high or rising Class I utilization, milk production during the months of peak Class I utilization is in excess of Class I uses and increasingly so.

For the Appalachian and Southeast regions, fluid milk supplies are supplemented by producer milk from outside of the marketing order boundaries with the assistance of the Federal Order Transportation Credits. Federal Order Transportation Credits effectively subsidize the transportation of milk from surplus regions to fluid milk processors in the Appalachian and Southeast regions for those months of the year when Class I utilization rates tend to be highest. Further, USDA last week issued a final decision proposing to expand Transportation Credits program to cover the Florida region, and to also include producer milk originating within marketing order boundaries. Thus the Federal Order Transportation Credit program already encourage movement of producer milk to these regions, and under USDA's proposed decisions, would even further encourage milk deliveries fluid milk plants in these regions.

Figure 4. Peak Monthly Class I Utilization Rates, Select Marketing Order Regions, 2000-2023



Class I utilization rates alone may not tell us whether supplies meet USDA objectives for Federal Milk Marketing Orders. In particular, Class I utilization rates in the Appalachian, Southeast, and Florida Marketing Orders may indicate inadequate supplies for fluid uses if they lead to retail prices of milk that are unreasonably high.

In Table 4. I present data on retail prices of conventional, reduced-fat milk reported by the USDA AMS for cities covered by Federal Milk Marketing Order regulations. For each of the past 5 years (including 2023 through August) I report the average and 75th percentile prices across all 30 cities for which USDA AMS reports data. In the same table, I report prices for cities in the three Marketing Orders with relatively high Class I utilization: Atlanta, GA (Southeast Marketing Order), Louisville, KY (Appalachian Marketing Order), and Miami, FL (Florida Marketing Order).

Table 4: Average Annual Retail Price of Conventional Reduce-Fat Milk, 2019-2023

	2019	*2020*	*2021*	*2022*	*2023*
			(US$/gallon)		
30-City Average	3.25	3.47	3.62	4.21	4.29
75th Percentile	3.75	3.85	4.02	4.61	4.59
Atlanta, GA (Southeast)	3.56	3.37	3.45	4.07	4.42
Louisville, KY (Appalachian)	2.07	2.38	2.70	2.53	2.81
Miami, FL (Florida)	3.91	3.83	3.60	4.34	4.21

Source: USDA Agricultural Marketing Service

In Atlanta, GA, the average price of milk was lower than the 30-city average in three of the past five years, and is below the 75% percentile price in each of the past five years. In Louisville, KY, the average price of milk is well below the 30-city average in each of the five years. In Miami, FL, the average milk price is higher than the 30-city average in each year, but lower than the 75th percentile price in four of the five years, and for four years running. Thus the relatively high Class I utilization rates in these Marketing Order regions do not correlate with relatively high retail prices for fluid milk. This fact suggests to me that milk supplies in these regions are sufficient to provide adequate supplies of fluid milk to consumers at reasonable prices.

To summarize, growth in U.S. milk production and declining fluid milk consumption have combined to reduce the national average Class I utilization rate by approximately 30% since 2000, when the USDA last implemented a systematic revision of Class I differentials. Thus, in aggregate, U.S. milk production is more than adequate to supply national fluid needs. Over the same period, Class I utilization is low and falling in all but three of the Federal Milk Marketing Order regions, which leads me to conclude that milk supplies in those markets are also adequate to serve the fluid milk market. A closer look at the three Marketing Order regions with highest Class I utilization (Southeast, Appalachian, and Florida) suggests that Class I utilization rates in these regions are not trending upward, and that high Class I utilization rates are not causing high retail prices of fluid milk in those regions. Thus, it is my conclusion that higher Class I differentials proposed in Proposal 19 are not justified on the basis of Federal Milk Marketing Orders' objective of achieving adequate supply of fluid milk to consumers at reasonable prices.

b. Demand Elasticities and Competition in the Dairy Category

Classified pricing increases average revenue for dairy farms only under certain market conditions. In particular, classified pricing raises average farm revenue if demand for Class I milk is inelastic. When demand for Class I milk is inelastic, Class I differentials result in higher Class I revenue, as higher fluid milk prices more than offset the reduction in the quantity of Class I milk consumed. Further, when demand for manufacturing-class milk is elastic, milk diverted from Class I uses to manufacturing uses has a relatively small, negative effect on prices of manufacturing milk, and manufacturing milk revenue also rises. With both Class I revenue and manufacturing-class revenue both rising, average dairy farm revenue also rises.

So a key question for the functioning of Federal Milk Marketing Orders is whether demand for Class I milk is inelastic. The importance of this question has lead to a large literature that estimates the elasticity demand for fluid milk, dating back to the middle of the 20th Century. In that literature, the typical finding is that fluid milk demand is indeed inelastic, as Prof. Harry Kaiser pointed out in his testimony earlier in this Hearing (Kaiser, 2023). However, much of the literature on the elasticity of milk demand is irrelevant for the evaluation of Proposition 19. The market for fluid milk has changed dramatically over time, such studies that rely on data that do not reflect current market conditions estimate behavior that is not relevant for evaluating the effects of Proposal 19.

What are those current market conditions? As noted above, fluid milk consumption has been in decline for multiple decades, and current per capita milk consumption in 2019 was 0.49 cups per person per day, which is 29% lower than it was in 2000, and 21% lower than it was in 2010

(Figure 2). Research by USDA's Economic Research Service showed that consumption of milk as a beverage and milk with cereal have both declined across all age groups, with particularly large drops among children and teens (Steward and Kuchler, 2022).

The dramatic decline in fluid milk consumption in the United States has two important implications for the functioning of classified pricing under Federal Milk Marketing Orders. First, even under the assumption that fluid milk demand is inelastic, as Class I utilization rates fall, higher Class I prices have an increasingly small effect on average milk revenue. As noted earlier, Federal Milk Marketing Order Class I utilization fell from 38% in 2001 to 27% in 2022. Thus raising Class I prices is, increasingly, an ineffective way to raise average milk revenue.

Second, the inelasticity of fluid milk demand can no longer be assumed. As milk consumption has declined, non-dairy, plant-based milks have emerged as a growth category. These plant-based beverages are marketed to compete directly with dairy milk, including strategic placement in the grocery stores in the same coolers as dairy milk. An industry study by Mintel Group showed that sales of non-dairy milk grew by 67% between 2017 and 2022. In 2022, non-dairy milk accounted for 17% of all "milk" sales. A new study by researchers at the Center for Food Demand Analysis computed "milk" expenditure shares from Nielsen scanner data farm March 2018 to December 2022, and found similar market shares (Son and Lusk, 2022). That study estimated that the expenditure share of non-dairy milks grew by 19% from 12.9% in 2018 to 15.4% in 2022.

The growth of non-dairy milk alternatives has implications for the demand elasticity of dairy milk. Elasticity of demand tends to increase (i.e., demand becomes more elastic) with the availability of close substitutes. A new published paper tests for the relevance of nondairy milks in demand for milk, and concludes that "… nondairy milk products compete with dairy milk for consumers' budget allocated to milk" (Ghazaryan et al., 2023). Since the emergence of non-dairy milks is a relatively recent phenomenon, estimates of the demand elasticity of milk based on data that do not capture the presence of non-dairy milks in the market likely understate the elasticity of demand for fluid milk.

I am aware of few studies that estimate milk demand with recent data, but those that do tend to find more elastic demand. Ghazaryan et al., (2023) use IRI scanner data from 2012 to 2017 to estimate demand for dairy and non-dairy milks. They estimate elasticities of demand for three categories of dairy milk (skim, reduced fat, and whole fat) and find in each case that demand is elastic. In the aforementioned study from the Center for Food Demand Analysis and Sustainability, the authors estimate demand for "Regular dairy" milk, lactose-free milk, and four major non-dairy alternatives. They estimate elasticities of demand for Regular dairy as -0.946, and for Lactose-free as -1.387, both more elastic than previous estimates.

Finally, in testimony provided to this hearing, Prof. Oral Capps, Jr. reported milk demand elasticities estimated using weekly grocery store scanner data spanning 2017 to 2023. Capps, Jr. reports estimated elasticities for five dairy milk categories over three separate periods: pre-Covid19 (Jan 2017-Mar 2020), Covid19 (June 2020-May 2022), and "post-Covid19 (May 2022-Aug 2023). Of the 15 price elasticities for fluid milk demand reported, ten are in the elastic range. In the post-Covid19 period, Capps, Jr. finds that demand is elastic for all but one fluid milk category (conventional flavored milk). This research suggests that, with the exception of conventional flavored milk, milk demand has gotten more elastic over time and is now generally elastic.

In a separate study published by the Center for Food Demand Analysis and Sustainability, Lusk et al. (2023) surveyed 1200 U.S. consumers to elicit preferences for dairy and non-dairy milks. They found that 40% of respondents had tried soy-based milk in the past 6 months, and 47% had tried other plant-based milks in the past 6 months. For those that had not tried nondairy milks, the authors asked whether they would try nondairy milks if the price was the same. Fifteen percent of respondents said they were "somewhat likely" or "very likely" to try the nondairy milks. Of those, half the respondents were Millennials or Generation Z. Thus, younger consumers are especially open to nondairy milks as a substitute for dairy milk. This underscores the fact that these nondairy milks are substitutes for dairy milk, and only will become more so as younger generations are more open to nondairy milks.

Taken together, these studies provide evidence that, under current market conditions, it can no longer be assumed that demand for Class I products is inelastic, and that instead demand likely is elastic and is likely to become more elastic over time. Under more elastic demand for Class I milk, Proposal 19 would cause a bigger reduction in fluid milk consumption and Class I use. In addition, Proposal 19 would result in a smaller increase in the All Milk price.

The testimony by Professor Capps, Jr. bears this out. Professor Kaiser, in his testimony, reported that, based on the elasticities found in previous, dated literature, and assuming that Proposal 19 caused retail milk prices to rise by 4.7%, fluid milk consumption would fall by 1.7% and Class 1 revenue would increase by approximately 7%. In contrast, Professor Capps, Jr. applies his estimated demand elasticities and finds that Proposal 19 would cause milk consumption to fall by 6% and Class 1 milk revenue to rise by approximately 2%. That is, Professor Capps, Jr. shows that under current retail market realities facing fluid milk, the higher Class 1 differentials advanced in Proposal 19 would cause a substantially larger decline in fluid milk consumption and a substantially smaller increase in Class 1 revenue than what is suggested by Professor Kaiser.

Finally, it is important to note that Federal Milk Marketing Orders' objective of ensuring adequate supplies of fluid milk for consumers implies that encouraging consumption of fluid milk is a goal of the regulation. In the current market environment, with declining fluid milk consumption and an expanding assortment of non-dairy milks available to consumers contributing to more elastic demand for fluid milk, higher Class I differentials further discourage consumption of fluid milk in the United States. That is to say, higher Class I differentials undermine the objective of encouraging fluid milk consumption.

To summarize, the market for fluid milk is highly competitive, with plant-based milks' share of the market growing. The growing list of non-dairy options available to consumers makes demand for dairy milk is more elastic, and recent research finds that demand for fluid milk is in fact elastic. Given elastic demand, higher Class I differentials accelerate the already-declining consumption of fluid milk, and generate little benefit in the form of higher Class I revenue.

IV. HIGHER CLASS I DIFFERENTIALS HARM FLUID MILK CONSUMERS

By raising Class I prices and fluid product retail prices, Proposal 19 harms fluid milk consumers. Economists commonly use the concept of consumer surplus as a measure the economic wellbeing of consumers. When retail prices rise, the harm to consumers can be measured by the reduction in consumer surplus. To estimate the reduction in fluid milk consumer surplus, I use data and demand elasticity estimate from Professor Oral Capps, Jr.'s testimony, as well as a price transmission elasticity from Professor Harry Kaiser's testimony, as follows.

Proposal 19 increases Class I prices by 7.8%. Applying Professor Kaiser's price transmission elasticity of 0.55, that translates to a 4.3% increase in retail milk prices. Applying Professor Capps, Jr.'s demand elasticity estimate for single category milk of -1.26, a 4.3%-increase in the retail price of milk causes a reduction in consumption of Class I products of approximately 5.4%. Moreover, Professor Capps reports an average price of fluid milk of $4.95 per gallon during the Moving Past Covid period, and average consumption of 56.9 million gallons per week. Given these data and estimated price and quantity changes, consumer surplus declines by $11.8 million per week. This is a cost to consumers equivalent to 4.2% of milk expenditure. In other words, the damage to fluid milk consumers is approximately equal to the additional money they pay for milk.

Notably, because I use data from Professor Capps, Jr.'s study, $11.8 million per week is an estimate of the harm to consumers represented by the Circana data used in his study, which cover 64% of retail milk volume. This estimated cost does not capture the harm to (a) consumers purchasing milk in retail outlets not tracked in the Circana, accounting for 12% of retail milk volume; nor (b) consumers of milk in the food service sector where 24% of milk volume is sold. Because Professor Capps' data and estimates plausibly represent the untracked retail group, a fair estimate of the damage to all consumers purchasing milk in retail outlets is $14 million per week (= 11.8 x 76/64).

I am not aware of estimates of the price transmission and demand elasticities necessary to measure the effect of higher Class I differentials on fluid milk prices and consumption in food service. As well, I do not have data on prices of fluid milk products in food service. If I assume that the elasticities and data from the retail sector are relevant to the 24% of milk volume sold in the food service sector, then an estimate of the total harm to consumers caused by Proposal 19 would be $18.4 million per week (= $14 x 100/76).

To summarize, by raising retail prices of fluid milk, Proposal 19 harms consumers. I measure the cost to fluid milk consumers to be equivalent to 4.2% of consumer expenditure on milk. For the 76% of milk sold in retail outlets, that cost is $14 million per week. Assuming the Circana data is representative of the 24% of milk sold in food service, the consumer cost is $18.4 million per week.

V. DIVERSION OF CLASS I MILK TO OTHER USES

By reducing fluid milk consumption, Proposal 19 would also increase farm milk used in manufacturing classes. Proposal 19 increases Class I prices by 7.8% (compared to a 2023 average Class I price of $29.20 per cwt). Using Professor Harry Kaiser's price transmission elasticity of 0.55, that translates to a 4.3% increase in retail milk prices. Applying Professor Capps, Jr.'s demand elasticity estimate for single category milk of -1.26, a 4.3%-increase in the retail price of milk causes a reduction in consumption of Class I products of approximately 5.4% and, assuming fixed proportions production of fluid products, a 5.4% reduction in the quantity of Class I milk. In 2022, 41 billion lbs. of producer milk was used in Class I products, so that a 5.4% reduction in Class I utilization is equivalent to 2.2 billion lbs. of milk. This demand response would thus reduce Class 1 utilization to 39 billion lbs. Note that to measure the reduction in Class I milk, I apply Professor Capps, Jr.'s estimate to all fluid milk products, including those sold in food service.

The 2.2 billion lbs. of displaced Class I milk would need to find a home in manufactured products. Reallocation of farm milk from fluid uses to manufacturing is costly, including search costs associate with finding new buyers, differential transportation costs to manufacturing milk plants, and the effect of additional manufactured dairy products on prices dairy commodities and on the prices of milk used in production of those commodities. While I do not have estimates of the costs associated with search or transportation, I can calculate the potential impact on commodity market prices and on prices of farm milk.

I calculate the effects of the diversion of Class I milk to NFDM/butter production. If the 2.2 billion lbs. of displaced milk were allocated to Class IV uses, that would translate to an additional 201.0 million lbs. of NFDM and an additional 62.9 million lbs. of butter. Given 2022 US production data, the additional production is equivalent of a 7.6%-increase in annual production of NFDM and a 3.1%-increase in of annual production of butter. This additional production would cause lower prices of NFDM and butter, the magnitude of which depends on the elasticities of demand for US NFMD and butter.

I am not aware of any published estimates of relevant elasticities of wholesale demand for US NFDM and butter. In the absence of these estimates, I calculate the effects of increased production of NFDM and butter under a range of elasticity scenarios. In each scenario, I assume demand for NFDM is more elastic than demand for butter, because as much as 70% of US NFDM is exported onto world markets, as opposed to butter which is primarily a domestic market. I report results in Table 5.

Under my inelastic scenario, relatively large reductions in dairy commodity prices drive relatively large reductions in farm component prices. As a result, a large reduction in revenue of manufacturing milk more than offsets additional revenue from higher Class I differentials, resulting in a net reduction in the All Milk Price of $0.28 per cwt. In my elastic scenario, increased production has results in smaller reductions in commodity prices and component values, resulting in a net gain in the All Milk Price of $0.12/cwt.

Table 5. Effects of a 7.6%-increase in NFDM and 3.1%-increase in Butter Production under Alternative Demand Elasticity Scenarios

	Elasticity Scenarios		
	More Inelastic	*Mid-range*	*More Elastic*
Elasticity of demand for US NFDM	-4.0	-8	-10.0
Elasticity of demand for US Butter	-0.25	-0.6	-1.0
Change in NFDM price	-1.9%	-0.95%	-0.76%
Change in Butter price	-12.23%	-5.09%	-3.06%
Change in FMMO skim price	-$0.20/lb.	-$0.10/lb.	-$0.08/lb.
Change in FMMO butterfat price	-$0.385/lb.	-$0.1589/lb.	-$0.0954/lb.
Net change in All Milk Price	-$0.28/cwt	$0.03/cwt	$0.12/cwt

Because the relevant elasticities have not, to my knowledge, been estimated, there is uncertainty about how Proposal 19 would play out. In general, the more inelastic is demand for NFDM and butter, the less effective are higher Class I differentials at increasing farm milk prices. My main takeaway from the calculations reported in Table 5 is not assured that Proposal 19 would benefit farmers.

Notwithstanding the ambiguous effect on milk producers, Proposal 19 would cause significant disruption in dairy markets: higher fluid milk prices, reduced fluid milk consumption, harm to fluid milk consumers, and diversion of milk from Class I uses to manufacturing uses.

To summarize, by raising Class I milk prices and increasing farm prices of milk, Proposal 19 would reduce milk consumption and cost fluid milk consumers approximately 4% of expenditure on fluid milk. By reducing consumption, Proposal 19 also diverts farm milk into manufacturing uses. I calculate that the increased production of manufactured dairy products leads to lower prices of those commodities and lower prices of farm milk in manufacturing uses. Lost producer revenue from lower component values offsets gains from higher Class I differentials. The net effect on average farm prices of milk is uncertain, and may be negative.

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	A	B	C	D	E	F	G	H	I
1		**Increasing Class I Differentials**	**Increasing Class I Differentials**	**Increasing Class I Differentials**					
2	Elasticity Scenario	**Inelastic**		**Elastic**					
3	Elasticity of denand for NFMD	**-4**	**-8**	**-10**					
4	Elasticity of demand for Butter	**-0.25**	**-0.6**	**-1**					
5									
6	CALCULATE ADDITIONAL CLASS I REVENUE FROM HIGHER CLASS I DIFFERENTIALS								
7	Expected Price Change ($/cwt)	$1.50	$1.50	$1.50					
8	Class 1 price	$19.20	$19.20	$19.20					
9	% increase in Class I price	7.8%	7.8%	7.8%					
10	Price transmission elasticity	0.55	0.55	0.55		From Kaiser			
11	% increase in Retail milk price	4.3%	4.3%	4.3%					
12	Fluid Milk Elasticity	-1.26	-1.26	-1.26		Capps Total Fluid Milk Elasticity			
13	% change in Fluid consumption	-5.4%	-5.4%	-5.4%					
14	Total Class I sales (lbs)	40,986,000,000	40,986,000,000	40,986,000,000					
15	Percent Class I Retail Sales	100%	100%	100%		% of milk not perfectly inelastic			
16	Lbs Class I Sales (Lbs)	40,986,000,000	40,986,000,000	40,986,000,000					
17	Change in Class I sales (lbs)	(2,219,007,656)	(2,219,007,656)	(2,219,007,656)					
18	Additional Class I revenue	581,504,885	581,504,885	581,504,885		(Remaining sales x Class I Price Change)			
19									
20	CALCULATE EFFECTS OF MILK DIVERTED TO NFDM								
21	Additional Lbs Fluid to Class IV	2,219,007,656	2,219,007,656	2,219,007,656		from B17			
22	Percent Fat in Fluid Sales	2.27%	2.27%	2.27%		2.27% Per AMS			
23	Additional Lbs Skim to NFDM	2,168,636,182	2,168,636,182	2,168,636,182		(Assumes 2.27% BF in lost fluid sales)			
24	Additional Lbs of NFDM	201,032,574	201,032,574	201,032,574		(Assumes 9# NFS Per cwt skim; 3% moisure in powder)			
25	US NFDM/SMP Prod pre adj	2,650,000,000	2,650,000,000	2,650,000,000					0.0927
26	% increase in US NFDM Prod	7.6%	7.6%	7.6%					
27	NFDM Elasticity	-4	-8	-10		(-4, -10)			
28	Pct Change in NFDM Price	-1.90%	-0.95%	-0.76%					
29	NFDM Price	$1.2000	$1.2000	$1.2000					
30	Change in NFDM Price	($0.0228)	($0.0114)	($0.0091)					
31	New NDM Price	$1.1772	$1.1886	$1.1909					
32									

	A	B	C	D	E	F	G	H	I
33	CALCULATE EFFECTS OF MILK DIVERTED TO BUTTER								
34	Additional Lbs BF To Butter	50,371,474	50,371,474	50,371,474					
35	Additional Lbs of Butter	62,964,342	62,964,342	62,964,342		(Assumes 80% BF)			
36	US Butter Production pre adj	2,060,000,000	2,060,000,000	2,060,000,000					
37	Pct increase in Butter Prod	3.1%	3.1%	3.1%					
38	Butter Elasticity	-0.25	-0.6	-1		(-.25, -1.0)			
39	Pct Change In Butter Price	-12.23%	-5.09%	-3.06%					
40	Butter Price	$2.6000	$2.6000	$2.6000					
41	Change in Butter Price	($0.3179)	($0.1324)	($0.0795)					
42	New Butter price	$2.2821	$2.4676	$2.5205					
43									
44	CALCULATE CHANGES IN FARM REVENUE USING FMMO FORMULAE								
45	Change in Skim Price	($0.20)	($0.10)	($0.08)					
46	Class I Milk lbs	38,766,992,344	38,766,992,344	38,766,992,344					
47	Class II Milk lbs	14,238,000,000	14,238,000,000	14,238,000,000					
48	Class IV Milk lbs	16,824,007,656	16,824,007,656	16,824,007,656					
49	Class I Skim lbs	37,886,981,618	37,886,981,618	37,886,981,618		(Assumes 2.27% BF Per AMS)			
50	Class II Skim lbs	12,969,394,200	12,969,394,200	12,969,394,200		(Assumes 8.91% BF Per AMS)			
51	Class IV Skim lbs	16,031,596,896	16,031,596,896	16,031,596,896		(Assumes 4.71% BF Per AMS)			
52	CWT Class IV Based Skim	479,444,819	479,444,819	479,444,819		(Assumes 50% of Class I and 100%			
53	Dollars Change in Skim	($97,220,567)	($48,610,283)	($38,888,227)		of Class II & Class IV)			
54									
55	Change In BF Price	($0.3815)	($0.1589)	($0.0954)					
56	Class I, II and IV Lbs BF	2,941,027,287	2,941,027,287	2,941,027,287					
57									
58	Dollars Change in BF	($1,121,866,268)	($467,444,278)	($280,466,567)					
59									
60	CALCULATE CHANGE IN TOTAL FARM MILK REVENUE AND ALL MILK PRICE								
61	Total Change	($637,581,949)	$65,450,324	$262,150,092					
62	change in All Milk Price	($0.28)	$0.03	$0.12		ASSUMING 2022 MILK PRODUCTION			
63						2260000000			