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Federal Milk Marketing Order Hearing Testimony

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My name is Christopher A. Wolf, I am the E.V. Baker Professor of Agricultural Economics in the S.C. Johnson College of Business and the College of Agriculture and Life Sciences at Cornell University. I graduated with a BS in Agricultural Economics from the University of Wisconsin and a PhD in Agricultural Economics from the University of California-Davis. I have been an academic dairy economist for approximately 26 years with an appointment that includes applied research, extension and teaching. Since 2019 I have been a professor at Cornell University. Prior to that I spent 22 years as a professor of agricultural economics at Michigan State University. I teach classes on agricultural finance as well as dairy markets and policy. My research program has focused on farm financial management as well as dairy markets and policy. I have published widely in academic journals and industry press on these topics and given hundreds of presentations to academics, government and industry audiences.

For 16 years I ran the farm business summary program at Michigan State University. Since moving to Cornell University, I have collaborated on the Cornell Dairy Farm Business Summary. Along with colleagues and co-authors, I have used detailed farm financial data from New York, Michigan and Wisconsin to analyze factors related to farm profitability, financial liquidity, solvency, risk management, and financial resiliency.

Milk markets are complex. Challenges in milk marketing relate to the inherent characteristics of milk production including daily harvesting, perishability, bulkiness, and asset fixity. Federal Milk Marketing Orders aim to create market conditions that will ensure:

1. orderly marketing activity; markets that function smoothly, predictably, and at a reasonable cost,
2. price stability (or reduced uncertainty),
3. adequate, and wholesome supplies of fluid milk, and
4. equitable returns to farmers.

In this testimony I would like to offer an academic perspective on dairy farm financial information particularly considering farm management and agricultural lender aspects. My intention is to discuss the financial conditions on dairy farms and the factors that describe the financial conditions. My testimony provides background on dairy farm profitability and cost of production as well as factors driving those measures.

Dairy farm profitability

Profitability is the extent to which net income is generated and represents return to labor, management, and capital invested. There are multiple measures of dairy farm profitability. To measure profitability I prefer to use the rate of return on assets without appreciation (ROA). ROA is defined as operating profit divided by total farm asset value, which controls for farm asset size allowing for comparisons across farms and over time. ROA is calculated as:

$$ROA = \frac{Operating\ Profit}{Average\ Farm\ Asset\ Value}$$

$$= \frac{NFI - Interest - Value\ of\ Unpaid\ Management\ and\ Labor}{\left[\frac{Beginning\ Farm\ Asset\ Value + Ending\ Farm\ Asset\ Value}{2}\right]}$$

where NFI is net farm income defined as gross revenue less cash expenses plus change in inventory, prepaid expenses, and capital adjustments. ROA measures before tax profitable earnings per dollar of investment in assets that reflects how efficiently the farm business uses all

assets—whether borrowed or equity capital—to generate profit. Using the Cornell Dairy Farm Business Summary, the average rate of return on assets (without asset appreciation) for New York farms since 2000 was 6.1 percent with a great deal of variation both across farms and years. One important consideration is that these are not random farm participants. Instead these farms are those that voluntarily participate in the program. The participants in University farm business summaries (including Cornell) tend to have larger milking herds and achieve above average financial performance. Thus, the average farm profitability of the general population would be expected to be below the figure values in a given year.

The long-run average of 6.1 percent ROA is not a level of profitability with which many industries in the general economy would be comfortable realizing over long periods of time. This relatively low average profitability reflects the large dairy farm investments in land, facilities, machinery and equipment on dairy farms. It is also important to recognize that this measure does not consider appreciation in land-value but also that the only way to realize that appreciation is to sell the very land that makes the farm a viable business.

Dairy farm financial performance has tended to have a "boom" or "bust" aspect for the past couple of decades. Examining the New York farm returns from 2000 through 2022, 2007, 2014 and 2022 were profitable years, while 2009 and 2012 resulted in large losses (Figure 1). Using a definitions that a "good" profit year was more than 25% above average ROA, a "poor" profit year was more than 25% below average ROA and any year within that band was "average" profitability, the twenty three years here included 8 "good" years, 6 "average" and 9 "poor" years. Of particular importance is that, since 2014, every year until 2022 was either "poor" or "average." Studying dairy farm financial resiliency makes it clear that "good" profitable years are necessary to recharge liquidity and solvency and ensure farm viability. The results reveal a

tendency for margins and profitability to move back toward the average value as milk production and consumption react to demand or supply shocks.

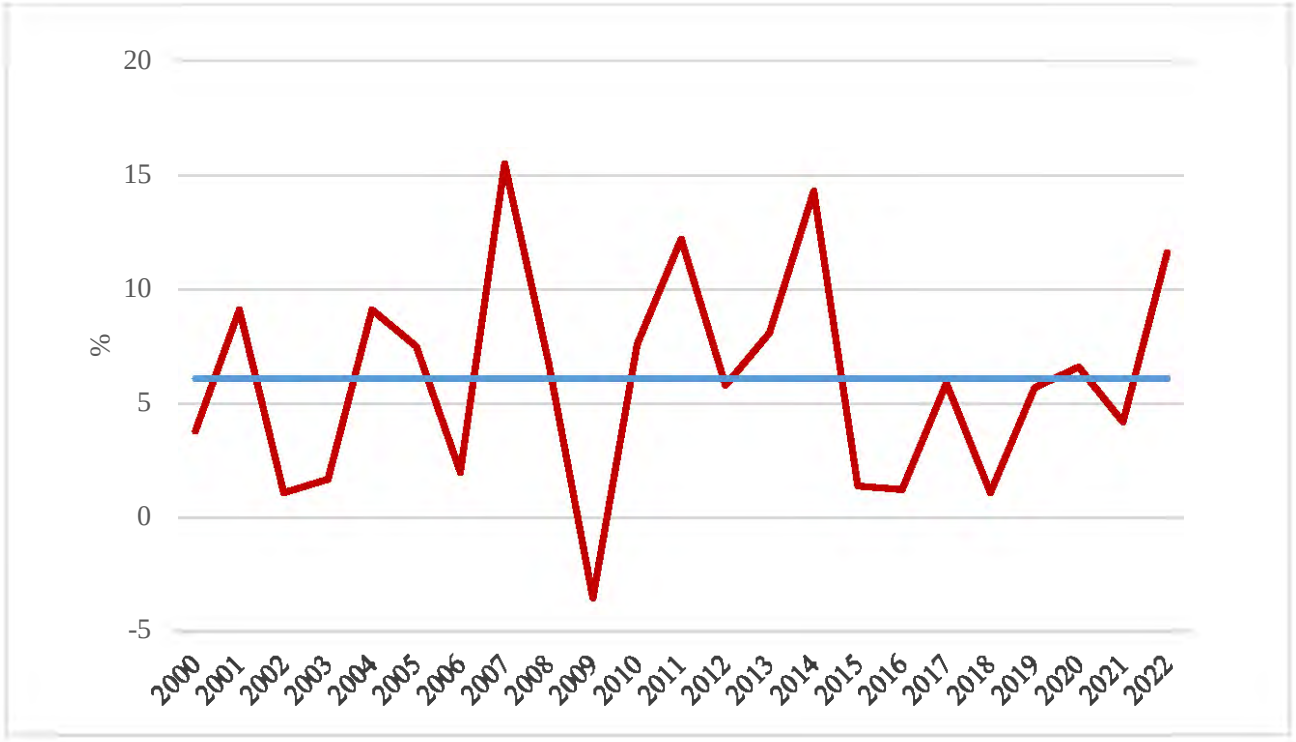

Figure 1. NY Dairy Farm Average Rate of Return on Assets without Appreciation, 2000-2022

The results in Figure 1 reveal that 2022 was the first "good" profit year since 2014. The seven-year period from 2015 through 2021 was difficult financially for dairy farms across the country. At the current time, 2023 is forecasted to be a below average profitability year. The consequences and relationship between profitability and other financial aspects including liquidity and solvency are discussed more below.

Long-term examination of dairy farm financial performance reveals that milk sales provide the overwhelming majority of dairy farm revenue and is the major source of risk as milk production tends to be relatively stable (Wolf, Black, and Hadrich, 2009). Milk production at the

farm level is generally stable and predictable while milk price is highly variable. Dairy farms tend to derive the vast majority of their revenue from the milking enterprise. Other sources of revenue may off-set some of the dairy revenue variation as these farms look for other sources of revenue in poor milk price years.

Another robust profitability result is that cost of production is the major driver in performance across farms. This research used 7,826 annual farm financial observations were available from 758 dairy farms in Wisconsin and Michigan. We can further divide ROA into Operating Profit Margin Ratio (OPM) and Asset Turnover Rate (ATO) to examine drivers of profitability. OPM measures the proportion of every dollar of sales that is kept by the farm as profit. OPM is defined as:

$$OPM = \frac{Operating\ Profit}{Value\ of\ Farm\ Production}$$

ATO measures farm efficiency generating sales using its assets. ATO is defined as:

$$ATO = \frac{Value\ of\ Farm\ Production}{Average\ Farm\ Asset\ Value}$$

The result is that OPM = OPM x ATO. Dividing ROA in this manner helps to identify whether a farm is deficient at generating profit per dollar of sales (low OPM) or sales per dollar of business asset (low ATO). If the ATO is low, the farm is not generating enough sales for the amount of assets utilized—the farm is over-capitalized. One solution in this situation is to sell unproductive assets. If the OPM is low, the solution is to examine cost of production as farms are price-takers in the milk market.

Asset turnover measures the farm business ability to generate revenues from assets while profit margin measures the farm's ability to control costs incurred to generate the revenues. The

level of asset turnover and profit margin are, in part, products of the farm business strategy. For example, dairy farms that specialize in milking cows and do not have large crop operations tend to have relatively higher asset turnover as they invest less in land.

Table 1 displays summary statistics from Wisconsin and Michigan dairy farms from 2000 through 2016. The average profitability on these farms was 4.8 percent over that 17 year period. The large standard deviation and percentiles reveal the wide range. OPM (coefficient of variation (CV) = 1.51) was relatively more variable than ATO (CV = 0.49).

Table 1. Summary Statistics, Wisconsin and Michigan dairy farms, 2000-2016

Variable	Mean	Standard Deviation	25th percentile	50th percentile	75th percentile
			%		
ROA	4.8	6.5	0.9	4.4	8.2
ATO	37.9	18.6	25.2	34.0	46.8
OPM	11.4	17.2	2.9	12.8	21.4

Average ROA revealed the expected "boom or bust" pattern over the period considered cycling between more and less profitable years in Michigan and Wisconsin similar to the New York farms discussed above (Figure 2). The pattern of ATO and OPM were similar to ROA which was not surprising as both are greatly affected by farm milk price received. OPM was very volatile throughout the period and drove farm profitability. Not only did the average OPM by

year vary, within each year there was a large variance and standard deviation across farms.

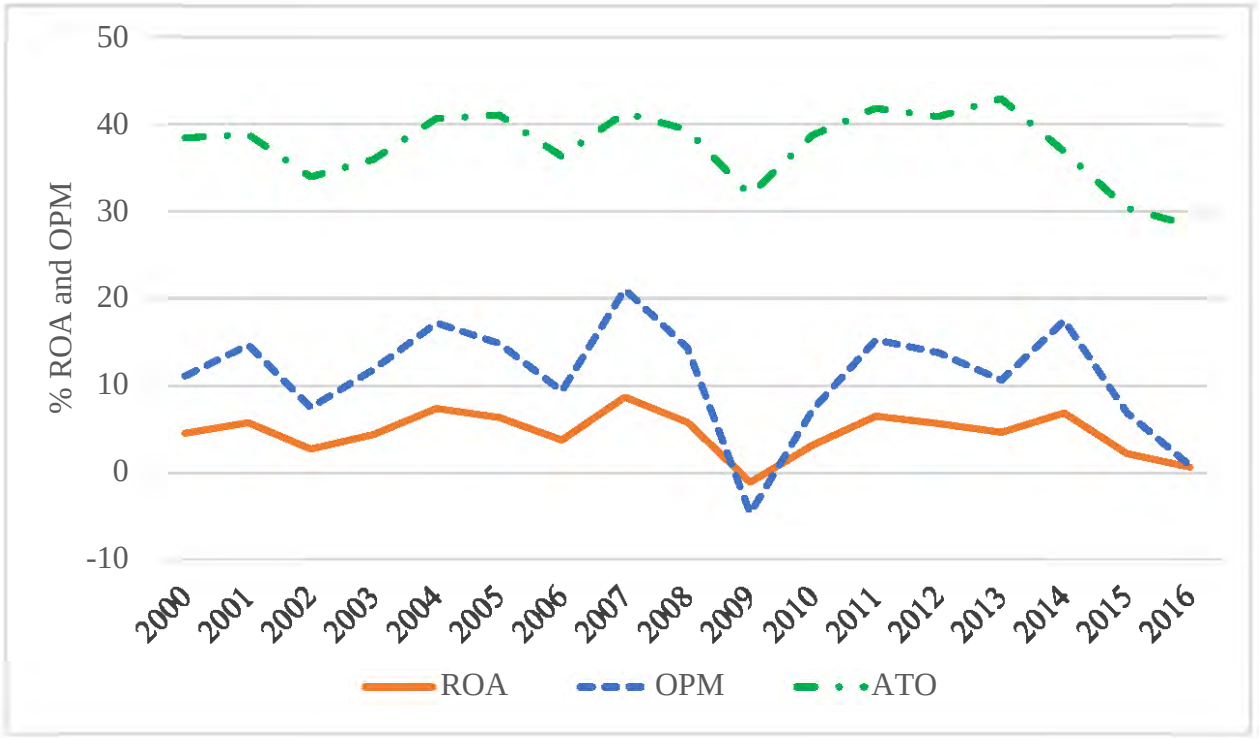

Figure 2. Profitability on Wisconsin and Michigan dairy farms, 2000-2016

Financial Risk

Financial risk is defined as uncertainty about interest rates, willingness of lender to keep or put money into the business, ability to meet cash flow needs from operations, and the market value of collateral. Financial resilience is the ability to withstand events that impact firm income. Key thresholds depend on safety measures that are often determined by agricultural lenders as access to affordable outside capital is critical to modern, commercial dairy farms. To measure financial risk and resilience, this research used farm data from a balanced panel of 105 New York dairy farms from 2010 through 2019. There are multiple dimensions to the financial condition of a farm business that relate to the ability to generate sufficient returns, pay bills as they come due, and maintain sufficient assets to adequately account for liabilities against the farm business.

Lenders tend to rely heavily on repayment capacity, solvency, and loan security than on the borrower's profitability and financial efficiency.

When assessing farm financial risk, four areas of business performance are evaluated: solvency, liquidity, repayment capacity, and financial efficiency. Across these four areas there are many different measures that might be utilized. We examine selected measures for each dimension including debt coverage ratio, equity to asset ratio, current ratio, operating expense ratio and net farm income ratio. We utilize ratios for the financial risk measures for consistency and simplicity.

Solvency is the ability of the business assets to cover all liabilities if the farm business exits. Percent equity, or equity to asset ratio (EA), represents the portion of the assets on a market value basis that would be returned to the family after paying all. The EA ratio is calculated by dividing total net worth by total assets from the market value balance sheet. The higher the EA ratio, the less risk there would be for covering liabilities at the time of business exit, if that occurred. EA is calculated as:

$$EA = \frac{Total\ Farm\ Equity}{Total\ Farm\ Asset\ Value}.$$

A larger EA value indicates greater farm equity and less risk of insolvency. Lenders use EA—or similar measures of net worth such as debt-to-asset ratio—to assess insolvency risk and charge higher interest rates to farms above established risk thresholds. One common agricultural lender benchmark value is to maintain an EA value above 0.50 with lower values indicating more risk. Of course, farm operators might set their own target above that benchmark particularly if they are risk averse. Similarly, lenders may tolerate lower EA if debt repayment capacity or other key factors are judged to be exceptionally high. Farm solvency measures are primarily driven by

debt and asset values are specific to the farm investment situation and are more appropriately benchmarked to lender or industry standards.

Liquidity is the ability of the business to meet financial commitments over the next 12 months. Liquidity considers whether the business has the ability internally to absorb any negative impacts that might occur. One measure of liquidity is current ratio (CR) is calculated as:

$$CR = \frac{Current\ Farm\ Asset\ Value}{Current\ Farm\ Liabilities}.$$

Current assets are cash equivalents plus those assets that are expected to be available for sale in the next year while current liabilities are those to be paid in the next year (including the current portion of long-term loans). If CR > 1.0, then the farm has more current assets available than expected liabilities. If there are not sufficient current assets and the current liabilities cannot be covered from current operations, then the farm must either use off-farm income, sell longer-term assets or borrow. Higher CR values indicate less risk. The safety threshold for CR is 1.0 although lenders might become concerned even at 2.0.

Repayment capacity is the ability of the business to service debt payments over the next 12 months. Repayment capacity considers whether there is sufficient or excess cash or earnings after expenses and family withdrawals to cover planned principal and interest payments. The measure used in this research is debt coverage ratio (DCR) defined as:

$$DCR = \frac{Capital\ debt\ repayment\ capacity}{planned\ principal\ and\ interest\ payments}.$$

The numerator, capital debt repayment capacity, is net farm income plus net non-farm income less family living and income draws plus interest paid on term loans. The denominator is planned principal and interest on term debt plus planned reductions in operating debt or account payables. The DCR is based on earnings, so it does not reflect cash that may have come in through other

sources, such as sale of capital assets or contributed capital. The higher the debt coverage ratio, the less risk that farm may have for meeting debt payment obligations. The safety threshold for DCR is 1.15.

Similar to the profitability pattern, the data revealed a pattern dairy farm financial performance that varied with milk price over the decade considered (Table 2). Solvency positions were relatively stable being based on long-term asset and liability values. During the poor years, the percent of farms below danger thresholds for liquidity and debt repayment capacity spiked indicating that these farms were at higher risk of financial default (Table 2). In particular, the debt coverage ratio measure indicates that the majority of the well-managed New York dairy farms were experiencing high levels of financial risk from 2015 through 2018 without respite.

Table 2. NY Dairy Farms at Risk Relative to Safety Thresholds by Year, 2010-2019

Year	EA < 0.5	CR < 1.0	DCR < 1.15
		% farms	
2010	21.9	12.4	22.8
2011	10.5	4.8	8.6
2012	12.4	7.6	25.7
2013	6.7	6.7	25.7
2014	2.9	2.9	7.6
2015	7.6	5.7	63.8
2016	12.4	7.6	58.1
2017	15.2	11.4	39.0
2018	20.0	12.4	70.5
2019	16.2	7.6	37.1

Source: Wolf and Karszes, JDS 2023

Cost of Production

Virtually all US farm milk production can be characterized as a commodity in the sense that, aside from some flexibility on quality component and perhaps a volume premium, an individual farmer has little control over the milk price received and essentially takes what the market is offering. In a commodity market, the primary method to increase profit by dairy farmers involves lowering cost of production.

Table 3 (at end of document below) displays the average costs from New York dairy farms from 2013 through 2022. As these are costs per hundredweight of milk produced, they adjust for the quantities used and gains in efficiency. For example, the price of labor has increased greatly in the past decade for these farms through market forces as well as the state of New York increasing minimum wage and instituting overtime rules. In response to increasing input prices, dairy farm managers may have the ability to more efficiently utilize that input—or perhaps substitute away from that input. In the case of increased labor costs, farms may be able to adopt new production technologies that can replace some hired labor. Even so, as the table displays the cost of labor per hundredweight increased 16 percent over the past decade.

Most costs have increased steadily over the time-period examined, even accounting for changes in technology and management. Total accrual costs adjust for changes in inventories, prepaid expenses and accounts receivable and payable. Total farm operating costs are estimated by deducting non-milk accrual receipts from the total accrual operating expenses including expansion livestock purchased. These would be the operating costs that would have to be covered by the sale of milk only. Milk marketing costs including hauling costs more than doubled over the time period examined.

The average gross milk price, revenue and net farm income (NFI) are also displayed in the table but, as they are primarily driven by the national farm milk price, they vary greatly depending on the market conditions. Consistent with the discussion above, in years such as 2015, 2016 and 2018, the net farm income realized was very low. Accounting for unpaid factors including family labor, management and owner equity capital invested in the farm allows an estimate of the total economic cost of production. Returns above the total economic cost of production may be thought of as a true economic profit. The table does not display true economic profit but it would be less than the NFI.

Summary and Conclusions

In summary, the farm milk price received is a primary determinant of farm profitability and farm financial resilience. Even the "best" managed dairy farms struggle financially in years of low milk price. Financial stress from low milk prices can cause dairy farm managers to exit the dairy industry whether undertaking other agricultural enterprises to or leaving farming entirely. Large amounts of farm exits would have impacts on those families as well as their local communities. My hope would be for USDA to be cognizant of these aspects when considering Federal Milk Marketing Order changes that will significantly impact farm milk price.

Thank you for allowing me the opportunity to testify and contribute.

Table 3. Cost of Milk Production, NY Farms 2023-2022

	Year										% Change
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2013-22
	$/cwt										
Total Farm Operating Costs	19.62	20.48	19.03	17.31	17.58	17.55	17.50	18.08	19.07	22.53	14.8
Total Farm Accrual Costs	21.23	22.31	20.78	19.08	19.48	19.30	19.18	19.71	20.66	24.30	14.5
Operating cost to produce milk	16.60	17.31	15.77	14.75	14.95	15.19	15.43	15.87	16.16	19.73	18.8
Purchased input cost	18.12	18.96	17.42	16.38	16.63	16.81	17.02	17.43	17.66	21.33	17.7
Total cost of produce milk	20.40	21.38	19.91	18.71	18.97	19.08	19.20	19.64	19.92	23.75	16.4
Purchased grain	7.08	7.37	6.60	5.74	5.71	5.81	5.66	6.02	6.69	7.83	10.7
Hired labor cost	2.83	2.98	3.00	2.87	2.95	2.96	2.96	3.04	3.08	3.28	15.9
Milk marketing cost	0.84	0.91	0.96	0.95	1.06	1.17	1.15	1.32	1.34	1.69	100.2
Crop input costs	1.34	1.36	1.34	1.12	1.08	1.04	0.97	1.03	1.13	1.56	16.1
Fuel	0.87	0.89	0.87	0.44	0.52	0.60	0.55	0.41	0.53	0.94	7.7
Gross milk price	21.60	25.43	18.30	17.05	18.48	17.26	19.42	18.56	19.82	27.09	25.4
Total revenue	24.70	28.77	21.65	19.75	21.32	19.75	21.59	22.83	22.81	30.07	21.7
NFI w/o appreciation	3.48	6.47	0.88	0.67	1.84	0.45	2.40	3.12	2.15	5.77	65.7

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