Impact of Proposed Milk Pricing Policy Changes on the Colorado Dairy Industry

Stephen R. Koontz

Department of Agricultural & Resource Economics – Colorado State University

September 14, 2023

The purpose of this testimony is to comment on the proposed changes to the producer milk price surface and the potential impacts on milk production and the dairy industry in Colorado. I am a Professor in the Department of Agricultural and Resource Economics at Colorado State University. I have been on faculty since 1998 and prior to that at Oklahoma State and Michigan State Universities. I am a livestock and commodity market economist. I hold an extension, teaching, and research position. I work on issues relevant to commercial agriculture in Colorado. I have conducted economic education with producers regarding market outlook, risk management, and policy questions. I have worked with the cattle industry and USDA Agricultural Marketing Service – Market News on issues related to fed cattle pricing and price reporting. I was engaged during the transition from voluntary price reporting to the implementation of Livestock Mandatory Reporting and worked with the National Cattlemen's Beef Association in the industry effort to improve cash market participation in fed cattle trade. And I have testified to Congress regarding market structure and conduct in the cattle and beef industries. Working in extension and teaching in Colorado has required me to also develop a sold understanding of the grain and forage markets upon which livestock industries rely.

Agriculture in Colorado contributes approximately 10 billion dollars annually to the state economic output. Approximately 60% of that wealth creation is related to livestock industries – cattle and cattle feeding, dairy, poultry and pork, and specialty livestock – and the remaining 40% is from crop related industries – hay, corn and corn silage, wheat, barley, various fruits and vegetables, and specialty crops. Of the 6 billion dollars associated with livestock, dairy production at the farm level contributes about 800 million dollars annually. These are all value-added contributions.

Dairy production in Colorado is an important contributor and has grown considerably in the past 20 years. As the national dairy industry has migrated west and has transitioned into milk production for dairy product manufacturing, Colorado has participated as have many high plains and western states. There is considerable new milk production for manufactured products in Idaho, New Mexico, west Texas, Kansas, and Colorado.

Prior to 2000, the population of milk cows in the state was less than 85 thousand animals. By January 2023, the population was over 200 thousand animals. Annual growth is regularly between three and 10 thousand animals. The only decrease in the dairy cowherd population was in 2010. Prior to 2000, the annual production of milk was less than 2 billion pounds and by 2022 the annual production was almost 5.5 billion pounds. Dairy is the growth industry in Colorado agriculture and has been since 2000 in terms of the contribution to the Colorado economy. Colorado dairy is also an innovative industry. Annual production per cow was below 21 thousand pounds in 1999 and peaked at modestly

above 26 thousand pounds in 2020. Production per cow was the second largest in the country, behind Michigan, in 2022.

Proposed changes to milk pricing that are being considered by the USDA AMS have the potential to make substantial impacts on, specifically, milk production and the dairy industry in Colorado, if milk prices are lowered substantially. This testimony is offered to communicate the details of feed costs in Colorado versus portions of the U.S. further east, to discuss the economic environment in Colorado as it currently stands and likely future conditions, and outline potential impacts on Colorado of proposed policy changes.

The National Milk Producers Federation has asked me to comment on impact on Colorado dairy farmers if policy changes, resulted in the milk manufacturing "make allowance" increasing about $0.50/cwt and a Colorado producer price surface that followed the Wisconsin Model's output with no adjustments. Ed Gallagher of Dairy Farmers of America has asked me to consider the impact of an approximately $0.50 decrease in blend price/producer price differential values to Colorado dairy farmers if the Wisconsin model's output was followed, with no adjustments. His testimony will cover that estimated decline. According to Mr. Gallagher, the combined impact will result in milk prices price in Colorado, as paid to milk producers, decreasing by about $1.00/cwt. This change in the milk price surface has the potential to be substantially negative upon the Colorado dairy industry. I also would like to note that he has informed me that other potential policy changes could increase make allowances substantially more and, with this change alone, decrease milk prices paid to Colorado milk producers by about $1.45 per cwt. Although, I am not testifying about the various make allowance policy options, it is clear to me that any policy change that results in decrease in Colorado milk prices of $1 or more would be potentially harmful to the Colorado dairy industry.

Colorado achieved a competitive advantage in dairy production due to increases in productivity relative to costs of production and in particular variable cost of production associated with feed costs. Colorado is a relatively high-cost feed cost environment. The magnitude can be illustrated. The USDA Farm Service Agency (FSA) has a dairy margin risk management product the valuation of which is based on national corn prices/costs, national alfalfa hay price/costs, and soybean meal prices/costs from meal in Illinois. (Decatur, Illinois is the U.S. hub of soybean meal production and prices across the nation and closely tied to prices from transactions at this production point.) This margin calculation is the Dairy Margin Coverage (DMC) Program. Dairy animal feed is essentially composed of a roughage component – hay – and usually a high-quality hay such as alfalfa, an energy component made of usually corn or similar related products, and a high protein component such as soybean meal or another high-protein meal. Dairy animal rations can have a multitude of components, and hundreds of potential inputs may be considered when blending a ration, but the multitude of elements in any given ration fed will be priced rather similar to these three main ingredients – alfalfa hay, corn, and soybean meal.

Figure 1 demonstrates the calculated USDA FSA margin using prices received by farmers from Colorado and South Dakota. USDA NASS monthly prices received are used for corn and alfalfa hay for each state. The soybean meal price is the price used by FSA in the insurance product margin – the

USDA AMS price for meal from Decatur. There are no public price data reported routinely for soybean meal in different states but the delivery costs to Colorado – from Decatur or a crush facility in the upper Midwest – will be greater than that to South Dakota. The variable cost margin converts corn, hay, and meal prices to a variable cost of associated milk production. In essence, this margin measures feed costs in terms of a milk price in dollars per hundredweight of milk.

The average variable cost margin for Colorado across the 2007-2020 period was $10.20/cwt. For South Dakota the average for the same period was $8.90/cwt measured in hundredweight of milk. The minimum and maximum for Colorado is $6.68 and $15.64/cwt. The minimum and maximum for South Dakota is $5.66 and $15.02/cwt. For perspective, the average, minimum, and maximum using the national U.S. prices, and the Decatur soybean meal price, result in the dairy margin is $9.83, $6.21, and $15.29/cwt. These latter values would be the values associated with producers across the country if they used the current USDA FSA product.

South Dakota is used for comparison because it is a close dairy producing region where the proposed changes to milk pricing are not what will be experienced in Colorado. Albeit more recently, South Dakota is also experiencing growing milk production to satisfy the manufacturing milk product market. South Dakota is potentially part of the national region which supplies feedstuffs into Colorado and other high plains livestock producing areas. Other regions in the upper Midwestern U.S. would have comparable statistics and conclusions relevant to, and in their comparisons with, Colorado. Finally, I was asked by Ed Gallagher of DFA to use South Dakota as a reference for comparison in my communications.

Observed in Figure 1 is the fact that Colorado milk production costs are about $1-2/cwt higher than those using prices in South Dakota. Margins from the central midwestern states will be lower again yet. Further, the trend in the feed cost margin is progressing higher. Colorado is a corn deficit state. Livestock demand within the state is generally higher than corn production within the state. Prices are higher compared to neighboring states and corn is transshipped from regions to Colorado. There is a similar situation regarding forage – alfalfa hay prices. The availability of irrigation water and the semi-arid climate allows production of exceptionally high-quality feed alfalfa hay – relative to regions further east. This hay is much in demand in Colorado and is regularly shipped to Nebraska, Kansas, Texas, and New Mexico.

Dairy production in Colorado has grown since 2000 because the animal productivity – the milk produced per cow – was generally higher than costs of production – which are primarily feed costs. And feed costs were low relative to the value of the achieved milk output. But this advantage has been pressured since 2006. 2006-07 is the period where the feed grain market transitioned from being solely an animal feed market to a market which also satisfies demand for biofuels – primarily being ethanol for gasoline blending.

Figure 2 illustrates the difference between the two variable cost dairy margin series for Colorado relative to South Dakota. The difference is $1-2/cwt over time, the difference is increasing, or periodically stair stepping higher. The average from 2007-2022 is a difference of $1.34/cwt. Units of

this calculation are per cwt of milk. And this difference is a conservative estimate using only different corn and alfalfa hay prices in the two regions. Incorporating different protein feed costs would likely increase the difference.

Figure 3 illustrates alfalfa hay prices in Colorado versus South Dakota. Figure 4 illustrates corn prices in the two states. It is observed that neither price series is flat over time – prices are volatile but for the most part increase – and importantly there is a persistent higher cost for Colorado compared to South Dakota. Colorado is generally an animal-feed deficit state. Colorado is competitive in cattle feeding and milk production largely because of higher productivity associated with animal performance in the relatively dry and semi-arid climate. The average from 2007-2022 is a difference of $70.5/T for alfalfa hay. The average from 2007-2022 is a difference of $0.35/bu for corn. Also observed in Figure 3 is the biofuel demand and the resulting feed market transition. Prior to 2006, the demand for corn is primarily livestock feed demand. The demand for corn to be used to produce ethanol for gasoline blending emerged in 2007 and has continued to escalate. The growth rate of this biofuel demand slowed in 2010 and since has grown modestly. Biofuel demand changed to corn market from a long-run average national price of between $3.00-3.50/bu to between $4.50-5.50/bu.

The USDA FSA dairy margin calculations convert feed costs/prices to a measure of variable costs associated with feed. The resulting unit of measurement is dollars per hundredweight of milk produced. The gross margin calculation can be subtracted from the milk price to reveal the contribution to covering fixed costs. Similarly, variable costs and an estimate of fixed costs can be added together, and the result subtracted from the milk price to reveal a measure of industry profitability. The profitability or the margin may not represent any one or even a handful of specific dairy producers, but the measure is a very reasonable summary of economic conditions in the dairy industry and is useful for comparing economic conditions through time and across states. My communication with dairy industry members and my reading of extension publications regarding fixed costs is that these costs are reasonably between $6/cwt to $8/cwt of milk produced. The average variable costs of production for Colorado are $10.29/cwt for the 2007-2022 period. As defined by the DMC. A similar calculation for the entire U.S. is $9.83/cwt. It is commonly communicated that dairy fixed costs are 40-60% of variable costs. (Of course, fixed costs do not change with production volumes like variable costs do – both by definition. Further, producers regularly and aggressively pursue methods to improve efficiency and thereby reduce fixed costs.) With there being some tradeoff between variable and fixed costs – high variable costs and high fixed costs do not persist as the combination is not economically sustainable. Further, it is likely – but not considered here – that fixed costs are the most impacted by inflation. Inflation will elevate fixed costs but variable costs are measured by feed prices.

Figure 5 presents this measure of industry profitability whereby the variable cost feed margin and a given fixed cost – first $6/cwt, second $7/cwt, and last $8/cwt – is subtracted from the national Class III milk price. (USDA NASS does not have a continuous price series for a given grade of milk and specific states.) We see that milk production profitability is highly variable and modest. The profitability of this industry is not substantial. The month-to-month variability in profitability is both

large and centers only modestly above zero. Milk production is an acceptable model or representation of a competitive industry. Monthly profits vary around zero and have persistent periods of good profits and strong losses. The month-to-month profitability with the three fixed costs is different by the assumed $1/cwt difference in fixed costs across that triple. Inflation is also not considered, and the profits barometer would therefore be conservative.

Because the month-to-month profitability does not communicate well industry economic health and wellbeing an alternative measure is offered. That measure is cumulative profitability over time. This is the simple summing of the month-to-month profit. This process would measure the cumulation of income or wealth from marketing one hundredweight of milk each month. Thus, this measure can be scaled up to think about the impacts on an industry in a state – provided the dairy margin formula is reasonably accurate and as is the assumed fixed cost. Figure 6 presents the cumulative profitability of the three assumed fixed costs. Dairy profitability within Colorado was its strongest in 2004, 2006, and 2007. Profitability eroded in 2009-2013. And profitability has been stable from 2015-2022 and some growth recovery in 2014.

As seen in Figure 6, the cumulative wealth with a $7/cwt fixed cost is modest and for all thought purposes is flat. Caution must be used with cumulative profits or wealth. The starting point is very important. But this is also what is experienced by producers – when a producer enters the industry or achieves a substantial size is very important. The cumulative profitability also illustrates the importance of continuous improved productivity – that ability for animals to produce more milk per animal over time. Improved productivity will gradually reduce fixed costs faced by dairies. And it is this improved productivity that results in profitability, but the profitability is not substantial and nor does it persist. Improved efficiency is and must be pursued continuously.

A $8/cwt fixed cost reveals the issues for higher cost producers. Higher cost producers are simply not economically successful. The $1/cwt increase in fixed cost from $7/cwt to $8/cwt also well-represents the potential impact of the proposed milk pricing policy change. Feed costs are relatively high in Colorado and improved productivity can offset some of this disadvantage. But a $1/cwt reduction in the manufacturing milk price would have a substantially negative impact on the dairy production industry in Colorado. Figure 6 reveals the market barometer moving substantially lower in this cost or price environment. This implies that the revenue from milk is not covering variable feed costs or fixed business costs. Reducing the milk price in Colorado by $1/cwt would have a substantial negative impact on the industry.

Similarly, the low fixed cost amount of $6/cwt can result in the business or regional industry accumulating substantial wealth. The swings in cumulative profitability are similar but the underlying difference in cost determines industry success. The same statement can be made about the price. Both the $1/cwt increase and decrease in cost from a base of $7/cwt reveal very different economic outcomes. The same result would occur with a $1/cwt change in the price at which milk is sold.

In summary, if the proposed policy changes are adopted dairy production in Colorado would most likely decline and the industry will have to transition to a composition of a rather few, very large and

extremely efficient operations. Dairy production in total would decrease and the remaining businesses would have the absolute lowest fixed costs and the absolute highest productivity. These requirements can only typically be met by the few largest businesses.

Further, it is also important to recognize that the economic climate associated with Colorado is not simply overwhelming advantageous for agriculture and especially in the long run. In the remaining testimony the intention is to transition into a more general discussion or recognition of the environment which agriculture faces in the west. A portion of that environment is economic related. The feed that is produced in Colorado relies on irrigation and surface water irrigation specifically. In contrast to Nebraska, Texas, and Kansas, ground water from aquifer pumping in Colorado is limited. Surface water is replenished annually from snow fall and snowpack. Total supplies depend on snowfall the prior winter. Spring and summer snow melts result in the entire availability of surface water for irrigation. This water developed Colorado agriculture. But the population growth in the west and especially the Front Range of Colorado is creating strong demands on available water supplies. What agriculture can pay for surface water is much less than what urban and suburban use can pay for water. Agriculture is at a competitive disadvantage for the long-term securing of water resources. And in the end water supplies will be reduced for agricultural use. The result is that feed production in the state will likely never see reduced water costs. And it is irrigated crop agriculture through its production of corn silage and high-quality forage that is essential for livestock feeding and, in particular, milk production.

There is also general uncertainty about the long-run availability of surface water. Climate change is thought to most likely result in less winter snowfall and less reliable snowfall. Agriculture developed water in Colorado, but agriculture will likely be the residual claimant to what water is available.

The value of water to irrigated agriculture in Colorado can be seen in data available through the USDA. The NASS collects and reports the valuation of irrigated land to non-irrigated, pasture, and all farmland in Colorado. For the most recent year 2023, irrigated land is valued at $6,000 per acre, pasture is valued at $980 per acre, non-irrigated land at $1,700, and all farmland (without buildings) at $2,610 per acre. Most farmland in Colorado is non-irrigated or dryland. Irrigated lands are much sought after and highly valued. These valuations are not transactions but rather a survey of reported valuations by producers. This contrasts farmland values in Wisconsin, which report no separated irrigated and non-irrigated, which values cropland at $6,710 per acre and pasture at $3,150 per acre. NASS reports the following for South Dakota. Irrigated land values are not reported to avoid revealing valuations of specific individuals. Pasture is valued at $1,340 per acre, non-irrigated cropland at $4,520, and all farmland at $4,550 per acre. We see Colorado has low overall valuations, high valuations for irrigated land, therefore a large difference between the two. It is irrigation water that drives the high values. And it is the irrigated land in Colorado that produces high-quality and high-volume feeds, and where dairies operate.

The issue is rather similar with respect to land availability and other important inputs such as labor. The most productive land in Colorado is in the South Plate River basin. The productivity is due to the proximity to the river and availability of surface irrigation water. This is the region between Fort

Collins, Denver, and Greeley and extending eastward to Sterling and Fort Morgan. These are the areas with the most productive farmlands, the most dairies, many cattle feedlots, and also the greatest urban pressures. These are the areas with the most population pressures and with the most availability of job offerings. Manual labor, construction, farm labor, and harvest labor are the hardest to fulfill in this area as compared to any other areas in Colorado – and compared to neighboring regions in neighboring states. Farming and livestock production communities in northeastern Colorado face serious pressures with respect to land availability, water availability, and labor availability. The dairy production and animal feeding in the state that persists in this region will have to have productivity and productivity growth greater than these pressures. These are difficult headwinds for agriculture. And more than that, these will be persistent pressures for the foreseeable future.

The commercial agriculture in Colorado that has been successful is animal agriculture – animals are productive in the semi-arid high and dry climate. Also successful is irrigated crop agriculture. High quality food crops are produced, and high-quality and volume forages are produced. But the environment is simply not just in agriculture's favor. Agriculture developed because of the limited alternatives and lack of human use pressures. Successful agriculture is more efficient and efficient relative to environmental constraints.

In the longer run, the pressures on water demand, the pressures on demand for land which is also productive farmland, and the relative opportunities for labor and employment are not in favor of agriculture. Improvements in productivity are needed in all animal agriculture in Colorado to simply maintain important contributions to the economy and specifically the rural economy. It is difficult to see how the Colorado dairy and milk production industry could adapt or make other adjustments to absorb the proposed policy change.

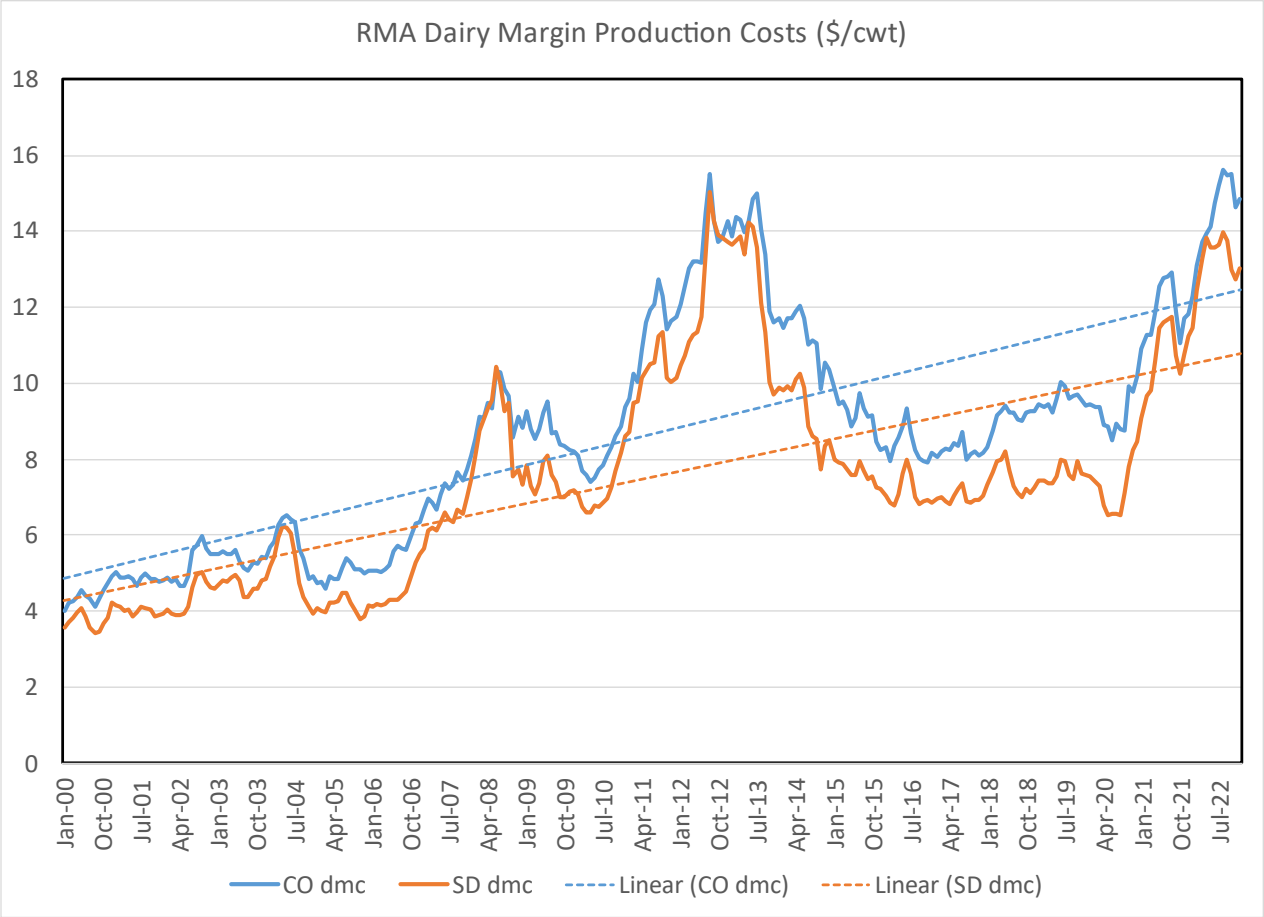

Figure 1: USDA FSA Dairy Margin Production Costs using USDA NASS State Prices Received.

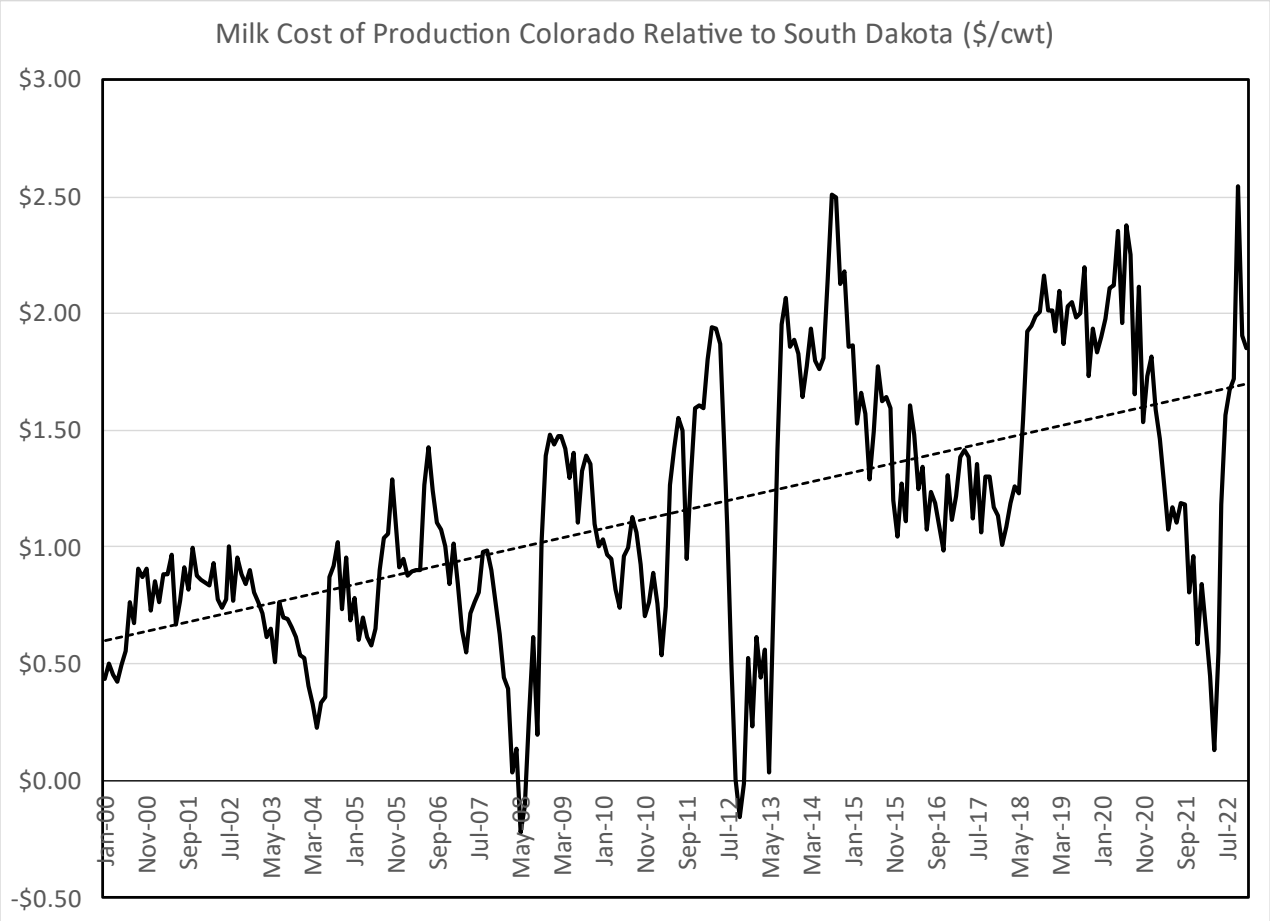

Figure 2: Difference between Colorado and South Dakota Dairy Margin Production Costs.

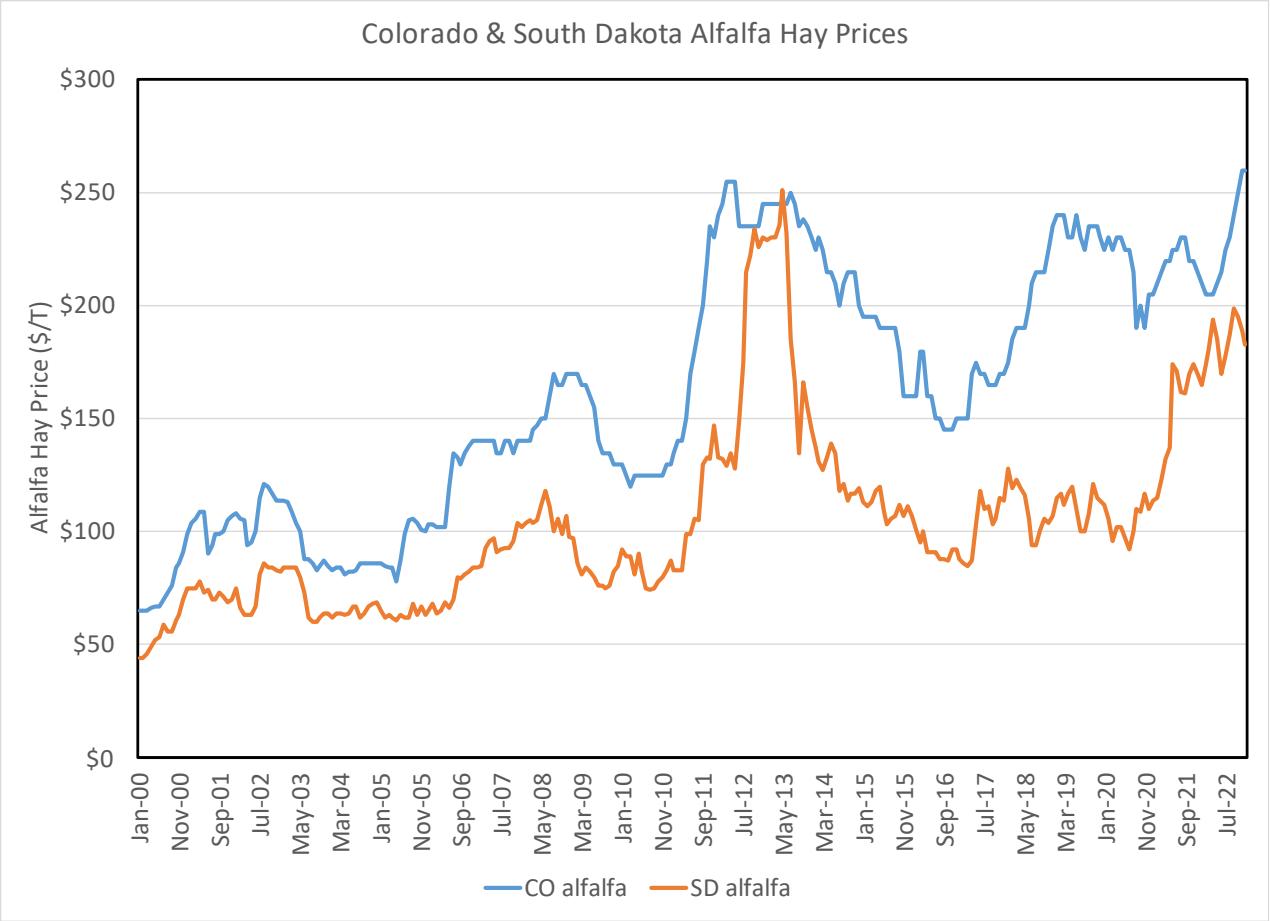

Figure 3: USDA NASS Monthly Alfalfa Hay Prices Received for Colorado and South Dakota.

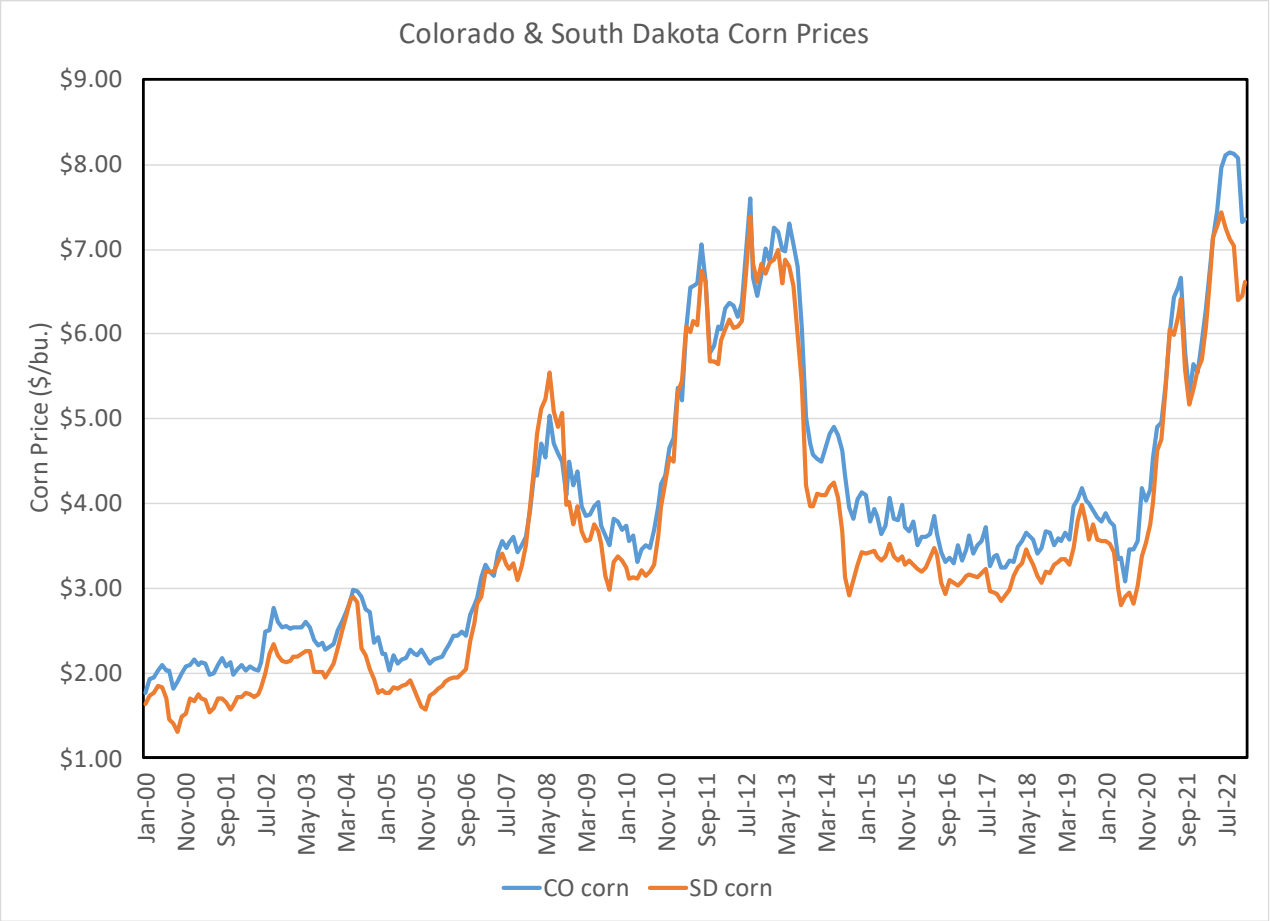

Figure 4: USDA NASS Monthly Corn Prices Received for Colorado and South Dakota.

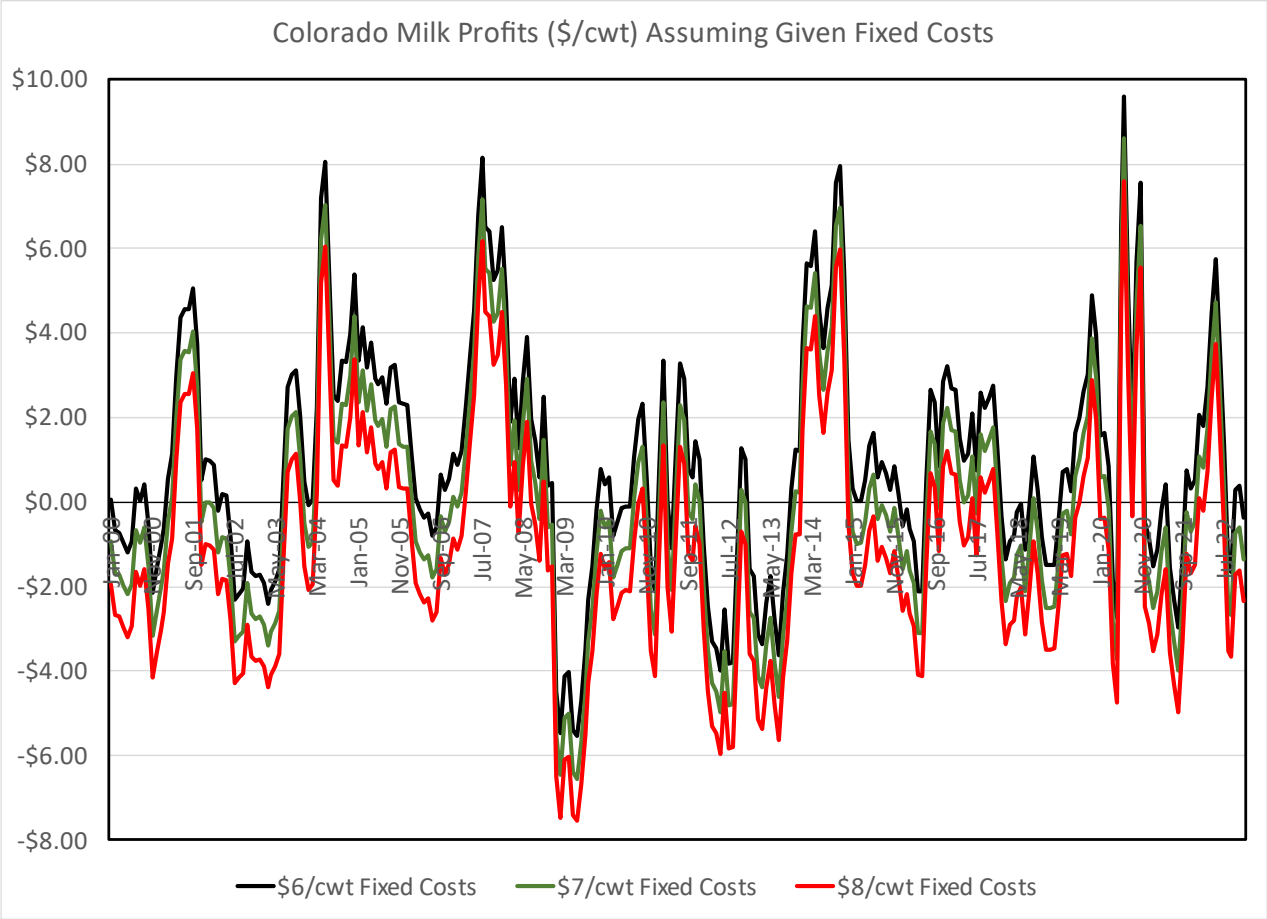

Figure 5: Month-to-Month Profit Margins using Feed Margin Variable Costs and Assumed Fixed Costs.

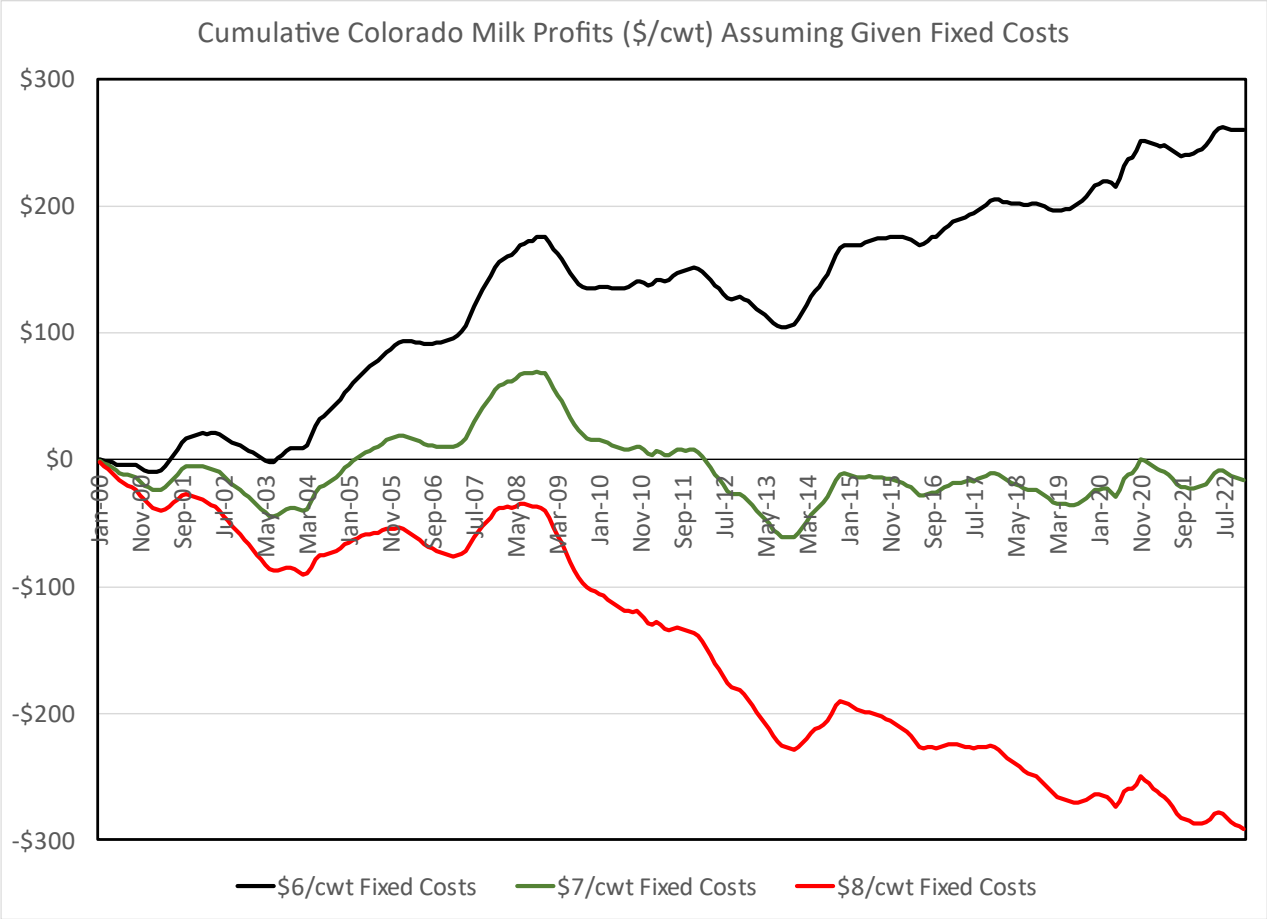

Figure 6: Cumulative Profit Margins given Assumed Fixed Costs.