Why dairy farms are exiting the industry

by

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ABSTRACT

Dairies in the last twenty years have increased from eighty-five cows to 337-cows in 2022 (O'Leary 2023). Cow numbers are over nine million with more cows on fewer dairy farms. Production per cow has increased in the past twenty years by 138 pounds to an average of 24,067 pounds. The nine million dairy cows used to be on over 500,000 farms and now are on 27,932 dairies. The increase of production per cow has contributed to the oversupply of milk on the market. Aggregate cow numbers have remained the same for over the past ten years.

There are multiple reasons why dairy farmers sell out. Number one is financial reasons and there are historical reports to back up this claim. There were only two profitable years in the last twenty years according to the Farm Bureau analysts report (Nepveux 2021). The variable costs of dairy farming make it very volatile, thus a high-risk business model. Transportation has become expensive in the last twenty years as dairy farmers pay for hauling, added stop fees, and a newly added fuel surcharge. The changing American diet to plant-based foods may also add to the decline in demand for dairy products.

A survey was conducted to look at reasons dairy farmers have quit milking. A survey with eighteen questions tailored for why dairy farmers have quit was conducted with the questions ranging from what state your dairy is located, to acres farmed, labor, adverse financial, family transition, divorce, disease, management practices, profitability, retirement, and milk price. One hundred seventeen responses were obtained from the survey. The farm sizes ranged from forty cows to 2,700 and owning no land to owning

5,000 acres. There are many factors that contribute to why a farmer sold the dairy but the main reason to sell the dairy cows were financial reasons.

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I want to thank all of my respondents for participating in my survey because without your participation this thesis would not be possible.

I was born on a dairy farm in rural Nebraska. My parents restarted the dairy farm with twenty dairy cows in 1990. My great-grandparents and grandparents farmed until my grandfather was diagnosed with Muscular Dystrophy, in the seventies this prognosis was thought to be terminal. So, my grandparents sold the cows and cash rented until my mother returned after college. My parents unfortunately struggled from day one until the last day the cows were milked. I once had a dream to continue as the fourth-generation dairy farmer and raise my kids on the farm. That dream has since become just a dream that will not be fulfilled. I wanted to transition the farm and put in robots but continued low prices and the new pricing for milk as well as poor management practices ended dairy farming for my family.

CHAPTER I: INTRODUCTION

1.1 Purpose

One hundred years ago, everyone used to be very diverse on the farm, many farm families had pigs, chickens, cows, horses, and row crops. Over the past 100 years, farmers have been able to specialize in one industry. With the advancement in technology, horses were replaced with tractors, four wheelers, side by sides, and trucks. Most animal agriculture has become specialized as animals are expensive and require much labor. Row crops are easier to manage and allow for more free time. Many row crop farmers can also work off the farm. As farmers are becoming less diverse in agriculture, and specializing in one industry, they can do a better job at managing one commodity. The first mass exodus in the dairy industry was in the 1970s when the bulk tank was mandated to sell grade A milk. Many farmers couldn't afford the bulk tank and pipeline system, so they sold off the dairy cows, as the average dairy cow size were twelve cows. The second mass exodus was in the 1980s as all farming commodities suffered from low prices. Many dairy farmers built the famous blue silos that stored silage. These silos today are known as the tombstones of the dairy industry, as the silos were too expensive to build and the upkeep was also costly.

The purpose of my thesis it to collect data and analyze why dairy farmers are exiting the industry. There has been a mass exodus in the dairy industry for farmers in Wisconsin, Minnesota, and Michigan and other states, but these states stand out as they are three of the top five dairy states in the United States. I wanted to learn about why producers are quitting. Over the years I sat on the steering committee for Dairy Farmers of America where we spent hours talking to fellow dairymen and women around the country and most

had the same struggles. The one common problem was financial issues. Milk prices were not high enough to pay the expenses on the dairy.

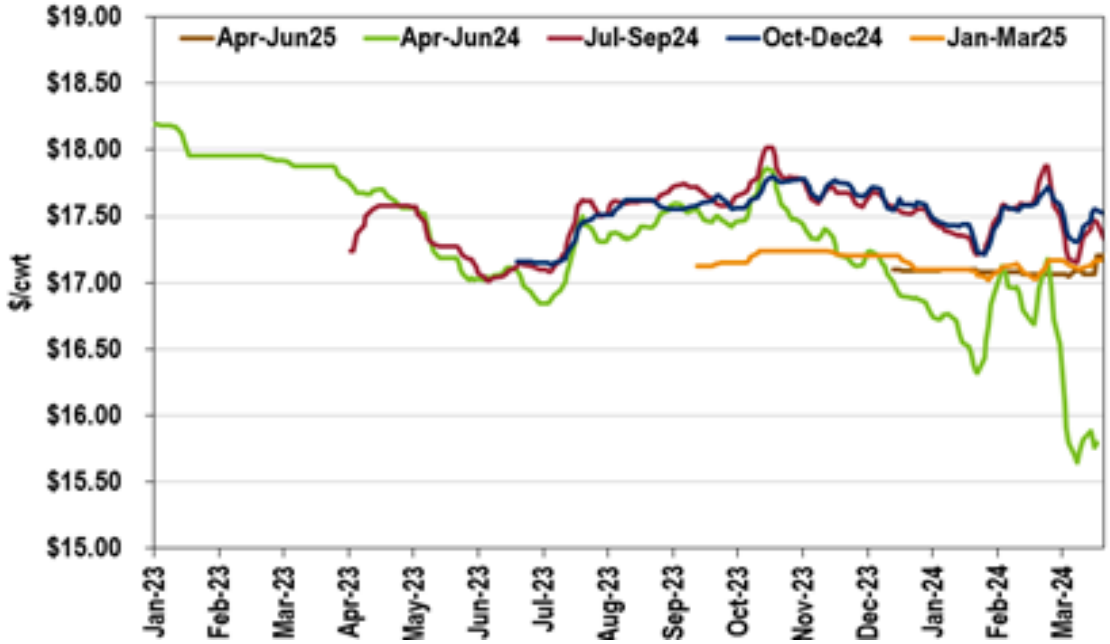
1.2 Background

The dairy industry has been struggling for the past twenty years as the American diet has changed, the everyday lifestyle of the American has changed that has contributed to less dairy products being consumed. "Milk consumption is down 42% from what it was a half-century ago — from 247 pounds per person in 1975 to just 144 pounds today, and that has put a squeeze on dairy farms. There are about half as many dairy farms as there were in 2003, a loss of more than 38,000 licensed operations." This has led thousands of dairy farmers to go out of business (Murray 2022). They are not just small dairy farms going out of business, but large ones as well. Milk pricing has changed in the last five years. Dairy producers are no longer paid premiums for protein and butterfat. Instead, producers are paid the blend price of class III and IV milk. This pricing system has led in the decline in milk price for dairy producers.

There are four classes of milk. Class I covers milk used for fluid, or beverage, milk products. Class II milk refers to milk going into soft manufactured products such as sour cream, cottage cheese, ice cream, and yogurt. Class III milk is cream cheese and other spreadable cheeses, as well as hard cheeses that can be sliced, grated, or crumbled. Class III milk makes up forty-one percent of the milk market. Class IV milk is used to make butter and dry products such as non-fat dry milk. Figures 1.1 and 1.2 below show the class III and Class IV market prices. The blend price that dairy farmers are paid is taking the average price of Class III and IV market prices. With a decrease in demand for milk and milk

products and a lower pricing system, these factors have led dairy farmers to exit the industry (Figure 1.3).

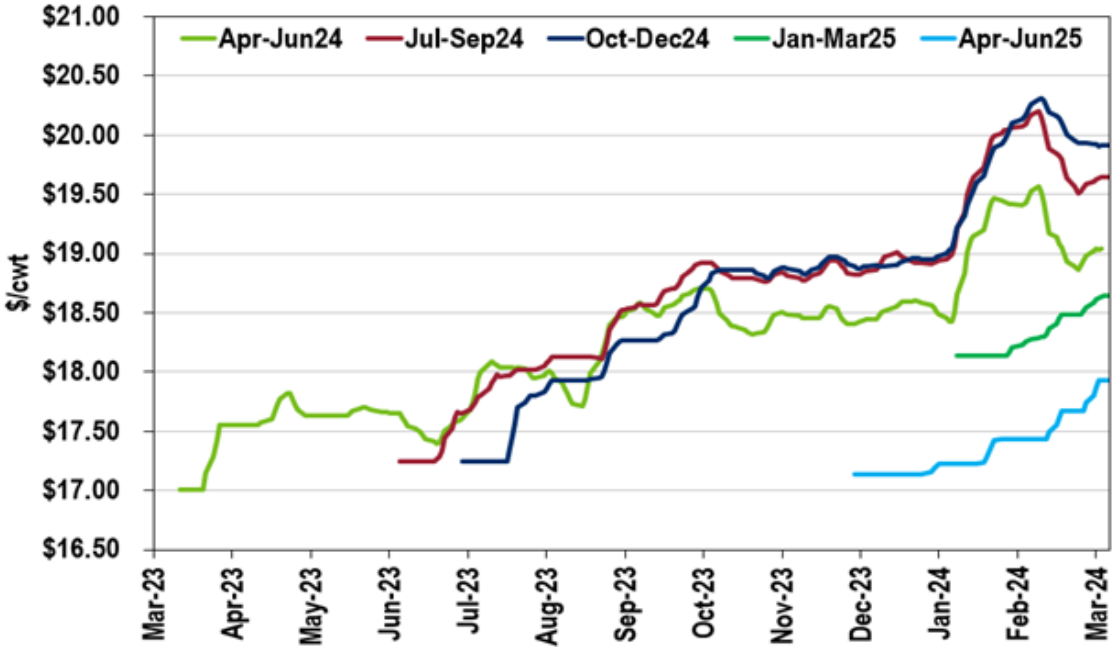
Figure 1.1 Class III Dairy – RP Floor Price, January 2023 – March 2024



Note: The data for an example of Class III milk price "(Dairy Farmers of America Risk Management)".

Source, Chicago Board Mercantile Exchange, (2024) (https://dfariskmanagement.com/risk-management-tools/dairy-rp-pricing-perspectives)

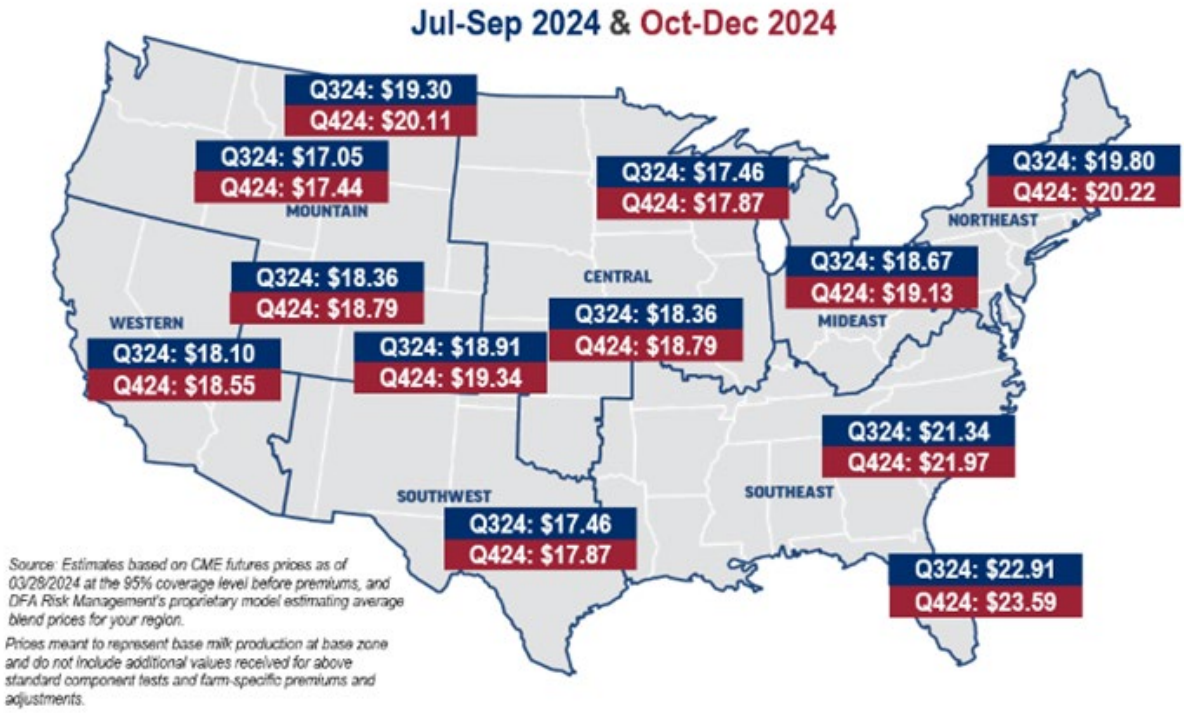
Figure 1.2 Class IV Dairy – RP Floor Price, March 2023 – March 2024



Note: The data for an example of Class IV milk price "(Dairy Farmers of America Risk Management)".

Source, Chicago Board Mercantile Exchange, (2024) (https://dfariskmanagement.com/risk-management-tools/dairy-rp-pricing-perspectives)

Figure 1.3 Blended Prices of Class III and IV Milk by Area, 2024



Note: The data for an example of Blended Class III and Class IV Milk Price "(Dairy Farmers of America Risk Management)".

Source, Chicago Board Mercantile Exchange, (2024) (https://dfariskmanagement.com/risk-management-tools/dairy-rp-pricing-perspectives)

Research Question

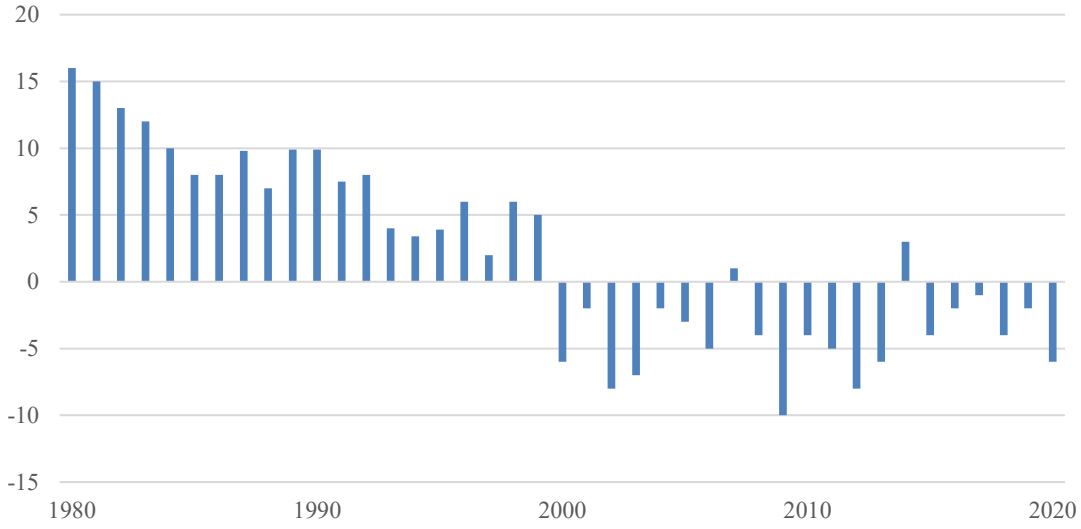
For the analysis portion of the thesis, a survey was conducted to capture why dairy producers have quit. Questions were tailored for reasons on why they quit, asked in a manner to reduce bias. The questions were based on why the participant quit dairy farming. The questions ranged from profitability, labor, family transition, disease, divorce, and management. An essay option was at the end of the survey if any of the questions didn't fit their situation in deciding to quit.

1.3 Assumptions

Based on conversation with many dairy farmers, it is assumed that most of the decisions to exit the dairy industry were because of financial reasons. The historical

profitability of dairy farming shows only two profitable years from 2000 to 2020 (Nepveux 2021) as seen in Figure 1.4. The other eighteen years are negative as shown in Figure 1.4.

Figure 1.4: Profitability of Dairy Farms in the United States, 1980-2020



Note: The data for an example of Profitability of Dairy farms in the United States "(The average US dairy farm managed to turn a profit just twice since 2000)".

Source, The Guardian, (2023) (https://www.theguardian.com/environment/2023/jan/31/us-dairy-policies-hurt-small-farms-monopolies-get-rich)

Dairies in the last twenty years have gone from eighty-five cow average farms to 337 cow farms in 2022 (O'Leary 2023). Cow numbers in the U.S. are over nine million with more cows on fewer dairy farms. Production per cow has increased in the past twenty years from an average of 17,100 pounds of milk per year to an average of 24,067 pounds (O'Leary 2022), 7,000 pounds of milk more per cow per year. This increase production per cow relates to an increased supply of milk that is occurring with a decrease in demand for milk.

A cow that produces more milk will have increased feed costs to increase her output of milk. Genetic selection programs have transformed the dairy industry worldwide. The

genetics of the dairy cow have changed in the last fifty years and milk production has more than doubled per cow. “The current dairy cow produces more than twice as much milk as the dairy cow of 50 years ago, and more than half of that improvement is due to genetic selection” (Penagaricano 2020). Not all cows that produce over 24,000 pounds of milk will have a large increase in feeds costs. The genetics of the cow are also a contribution to production (Gross 2022). Sexed semen has led to the increase of milk supply on the markets as more heifers means more milk. “Widespread application of sexed semen will increase the supply of milk, which would result in lower milk prices” (A. De Vries 2008).

Cooperatives are trying to market milk products, but the American diet is leaning to non-dairy products and the latest trends are plant-based diets. Americans’ daily life is also changing as mom and dad are both working. Milk as a beverage is usually not selected. Energy drinks and coffees are the average beverage of choice. Producers are making management decision to increase milk production, such as increasing per cow milk production, selectively breeding more heifers, and selecting breeds that are genetically known to be efficient milk producers. These management decisions paired with the changes in consumer demand for dairy products has led to a situation of an oversupply of milk in America.

CHAPTER II: LITERATURE REVIEW

2.1 Historical Reasons Why Dairies Sell Out

Dairy producers are exiting the industry at a faster rate than new producers are entering. Most of these producers are exiting due to age; however, there are a few older generations who are successfully transitioning the family dairy farm to the next generation. New entering producers are also selling out because of low milk prices. Because of the capital intensity, the dairy farmer must spread out fixed costs over more cows. Thus, dairy producers have to increase the size of the dairy farm. Fixed costs for the dairy farmer are land, buildings, and equipment. Variable costs for a dairy farmer are feed, utilities, equipment maintenance, veterinary costs, and supplies for the dairy barn, i.e., acid, soaps, barn towels, and dips. As the number of larger operations are increasing, operators produce milk for less by spreading out fixed costs and diversifying.

As stated above, a large producer allows the costs to be spread out over more assets. The assets are more dairy cows and equipment that can be used in a number of ways. Semi-trucks can be used to haul milk and commodities. Construction equipment can be used to build more barns, clean up around the farm, and can hire a crew to outsource those jobs. Not only are fixed costs spread out, it is possible to generate more income with other assets. Being larger opens channels to market milk and the larger dairies can negotiate for better pricing as large dairies can ship large loads of milk so they can negotiate with other cooperatives. Large producers can buy feed commodities in bulk and that may come with a discount.

Dairy Farmers of America (DFA) has been trying to reduce the oversupply of milk on the market by developing solutions to effectively market milk. Marketing campaigns to increase consumer demand have not had the results expected as this was discussed at the

Annual Milk meeting in 2019. DFA voted to implement the milk quota system to manage milk supply. The milk quota was to alleviate producers from adding any more cows to the dairy, and a producer must own quotas to sell milk to DFA. This was a technique voted on by the members to control dairy cow milk production on the existing dairy farms producing milk for DFA. If you want to expand, you must ask permission from the board and buy quotas from other farmers that have sold out or buy quotas from other farmers that have quotas they do not use. The milk quota system was new, and the goal was to lower the supply of milk.

2.2 Transportation

Even though transportation costs are not the largest cost to dairy producers, it is an expense aside from quotas that the producer must pay to sell their product. Most goods when sold, the shipping is paid for by the consumer. In the case of fluid milk, the seller has to pay the shipping of the commodity. Transportation costs were a hot topic when producers were told by field representatives that they would be charged for hauling the milk they produced. The milk is hauled from the farm to the cooperative or processor to be processed. When fuel prices spiked in 2008, hauling costs were put on the dairy farmer. Cooperatives would charge the hauling to the dairy farmer for the milk that the cooperative purchased. In addition to the hauling fees, trucking companies added a stop fee to pick up milk. The stop fee is collected for stopping by a farm. Hauling charges are based on pounds of milk picked on your farm. The more milk you ship, the less the hauling fee per unit. For larger dairies, the more you ship, the less you pay per unit. An additional fuel surcharge was implemented after the pandemic to cover the cost of truckers needing to fuel up their trucks.

The milk produced by small dairy farms is declining because it is more work to coordinate milk pickup from multiple small farms that are becoming farther and farther apart. Smaller dairy farms that are farther apart have a fuel surcharge. The average size of a dairy farm in Mississippi is145 cows, which does not produce enough milk to fill a tanker. A dairy producer needs 250 cows to ship a tanker every other day or a 500-cow dairy to ship a tanker daily. Hauling would cost around $1,800 to $2,000 per month with $150 more in stop charges. Larger dairy farms can fill a tanker and they do not have the added costs for travel from farm to farm to fill a tanker like a small dairy.

Some of the large dairy farms have become vertically integrated and can have their own trucking company and haul their own milk to cooperatives. Owning the trucking company reduces per unit hauling costs, eliminates the stop charge and fuel surcharges, allowing savings for the dairy farm. Larger dairy farms that own their trucks make them more diverse as well. This allows the farmer to haul commodities they feed their animals, cutting costs while spreading fixed costs over more assets. Cooperatives contract the hauling to trucking companies for pick up from dairy farmers. It is also more efficient for the trucking company to make one stop and not multiple stops on a route. It is getting harder for small family dairy farms to compete on an industrial scale of dairy farming.

2.3 Cooperative Trouble

Talerico (2018) goes into detail how Dean Foods was “ending contracts and closing milk plants”. Farmers were worried about what would happen if they could not sell their milk to the plant. Dean Foods filed bankruptcy leading to plant closures and farms were left with no cooperatives or processors to ship their milk (Farm and Dairy 2018). The Ohio extension office was offering mental health service contact information because they knew that this news came at an already hard time for dairy farmers (Farm and Dairy 2018). With

Dean Foods closing and “fluid milk consumption down twenty-two percent” (The Dairy Crisis 2022), finding a new cooperative to market milk looked bleak for many farmers. Walmart built a dairy processing plant near Fort Wayne, IN in 2018, but it contracted with 31 dairy farms within a 210-mile radius of the new processing plant to supply the fluid milk. The 100 dairy farmers in the Mideast that did not obtain rights to ship to Walmart’s new processing plant still did not have buyer for their milk. Without a buyer for their milk or a organization willing to transport their milk for them, these 100 small dairy farms were left with few options and, as a result, all of them decided to exit the industry.

The dairy farmers from Kentucky were only a few of the “42,000 dairy farmers who have gone out of business since 2000, casualties of an outdated business model, pricey farm loans and pressures from corporate agriculture (McCausland 2022).” During these changes in the industry, mental health struggles increased among dairy farmers. Milk companies included a suicide hotline number with the monthly milk check and veterinarians were trained to watch for signs of depression in dairy farmers.

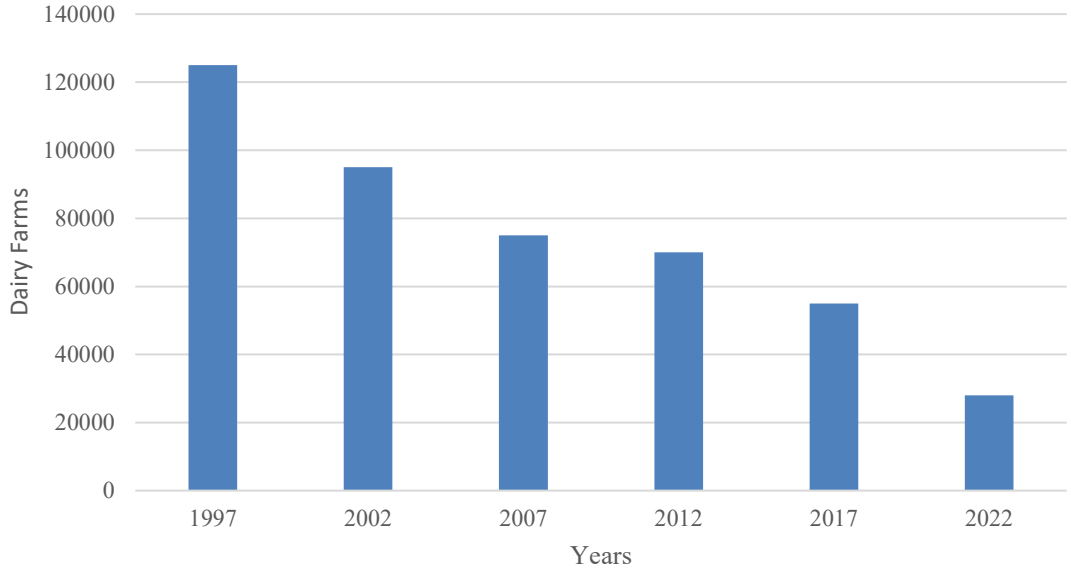
2.4 Dairy Farm Decline Due to Price

An article titled “Get Big or Get Out” was published in the Guardian (2023) showing why the family farm is in sharp decline. For the last twenty years, dairy policy has been set on increased milk production and exports. The Guardian stated in the past 20 years, “US dairy exports rose eightfold – more than almost any other commodity – which has coincided with rapid consolidation across the industry” Lakhani (2023). With the oversupply of milk in the domestic market, the United States has been a key leader in dairy exports USDA (2022). The U.S. is third in dairy export sales. The United States can offer milk for lower prices to reduce the oversupply. The oversupply of milk has led to low milk prices for over twenty years. Not only with the dairy farmer doing an excellent job of

producing more milk per cow the average milk consumption per person in the United States has dropped by over twenty percent. With milk consumption down and production up per cow, with the same number of cows in the industry we have the problem with an oversupply of milk that in turn has led to lower milk prices. Figure 1.4 shows that the average dairy farm in America had only two years of profitability after 2000. The two years profitable years, 2007 and 2014, were because of low input prices. These lower prices translated into lower feed costs for the dairy producer. Feed contributes over 75 percent of a dairy farm's expenses. With very low feed prices, the dairy farmers in 2007 and 2014 were profitable even with low milk prices.

From 2000-2020, the number of cows per farm has increased by 139 percent (Figure 2.1) Lakhani (2023). The graph below shows the last twenty years with the shift of more cows per farm and less farms (Figure 2.2). Cow numbers have remained the same and have grown from year to year because of sexed semen. Dairy farmers can buy sexed semen to increase herd numbers, or they can sell the extra heifers they do not need. More heifers mean more milk on the market. The extra heifers on the market with the increased production per cow has also contributed to the oversupply of milk.

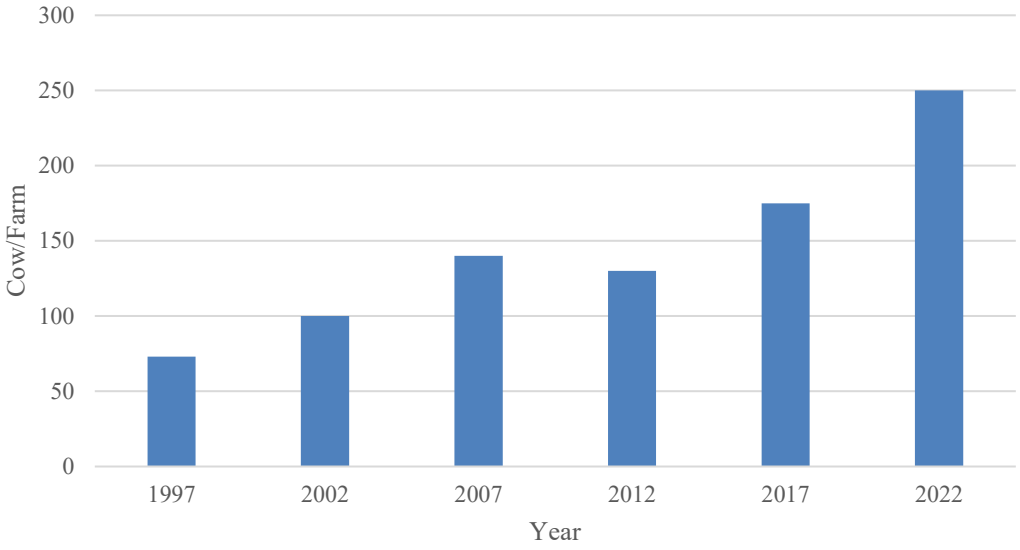
Figure 2.1: The Number of Dairy Farms in the United States, 1997-2022



Note: The data for an example of the Number of Dairy Farms in the United States "(As the Number of Dairy Farms Decreased, the Average Number of Cows per Farm has More Than Doubled)".

Source, The Guardian, (2023) (https://www.theguardian.com/environment/2023/jan/31)

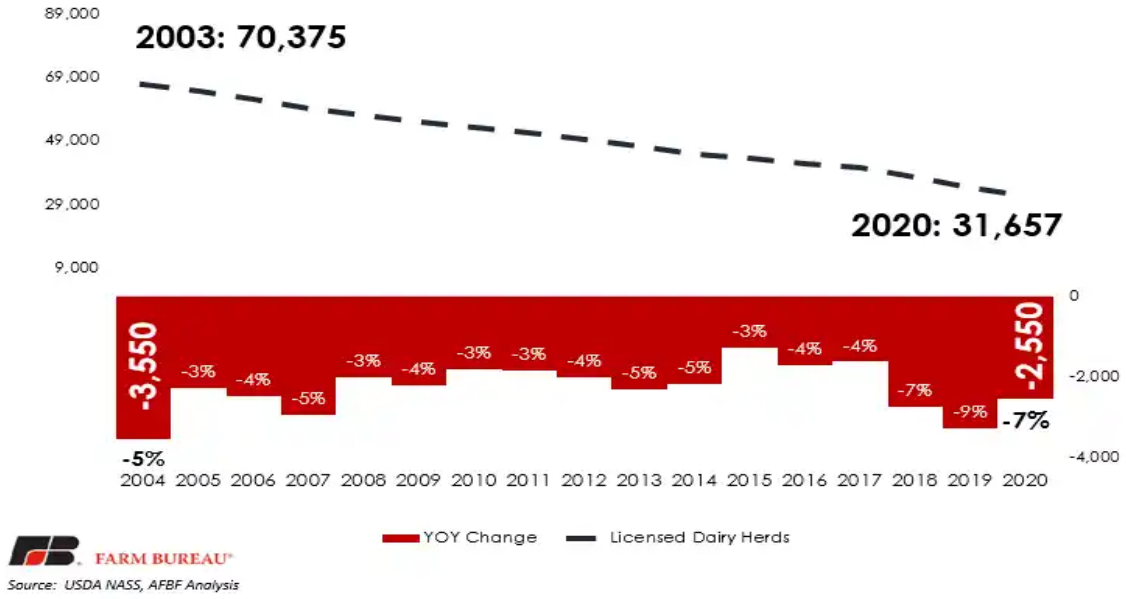
Figure 2.2: The Number of Dairy Cow per Farm in the United States, 1997 - 2022



Note: The data for an example of the Number of Dairy Cow per Farm in the United States, "(As the number of dairy farms decreased, the average number of cows per farm has more than doubled)".

Source, The Guardian, (2023) (https://www.theguardian.com/environment/2023/jan/31)

Figure 2.3: Correlation of profitability and dairy license renewals from 2004-2020



Note: The data for an example of dairy farm decline are from "(U.S. Dairy Farm Numbers Continue to Decline)".

Source, Farm Bureau, (Michael Nepveux 2021), (https://www.fb.g/market-intel/usda-report-u-s-dairy-farm-numbers-continue-to-decline)

Figure 2.3 shows the decline in milk licenses. This decline follows the decline in dairy farms in America. It is interesting to compare the Figure 1.4 and Figure 2.3 during the productive years of farming, there are more licenses renewed in the years following 2007 and 2014 that were the only profitable years for the average dairy farm. YOY is the year over year change in dairy farm licenses.

CHAPTER III: COSTS OF PRODUCTION AND THE EFFECTS OF PLANT-BASED MILK ALTERNATIVES

3.1 Cost

Costs associated with dairy farming are the input costs to run the operation. The costs include feed, labor, vet supplies, barn supplies, barn maintenance and upkeep, water, utilities, loan payments, repairs on equipment, and other expenses. O'Leary (2018) predicted that "2022 would be another tough but challenging year for dairy farmers as the price of everything is going up." Dairy farmers need to maximize efficiency to stay afloat. Dairy feed costs are over $6 per hundred weight, labor is over $4 per hundred weight, of milk, and milk has been around the $16 and $17-dollar mark for the past few years. This leaves just under $10 of hundred weight to pay for hauling, vet supplies, barn supplies, barn maintenance, and upkeep, water, utilities, repairs on equipment, loan payments, and other expenses. Breakdowns can be very costly for a dairy farm, as the parts are not cheap to fix.

Small dairy farmers are not only struggling in the United States but in other areas like New Zealand and Europe. With global inflation and the new environmental laws in Europe, it is a challenge for dairy farmers to earn a profit. In New Zealand, dairy farming is the number one industry, but labor issues have become a problem in the dairy country. Global inflation has also had an impact on dairy products on New Zealand as they export 95 percent of their milk products.

3.2 Efficiency

U.S. Dairy Farm Transition and Exits, 1987–2017 (Son 2022) states that farms with "500 or more cows produced 10 hundredweight of milk per labor hour compared to 2-4 cwt of milk per labor hour on farms with herds of 50-500 head". Labor is expensive and if labor is not efficient, profit is difficult. Efficiency is key on a dairy farm. Small dairy farms may

not account for the cost of labor and try to do all the work themselves to reduce input costs. This can cause farmers to become overworked, tired, and stressed. The average size dairy farm profit is $125 to $175 per cow but on a large farm, the return is $500 to $700 per cow (Son 2022). This shows how much more profitable a large-scale farm is. “Milk is being produced on bigger farms because they are more efficient than the small family farm” Milk Production (2019).

The large producer is also more efficient as they can contract commodities. They can contract corn, soybeans, cotton seed, hay, silage, and some can contract water, and electricity. Large farms that milk over 500 cows can buy commodities in bulk for large savings. The small farm cannot use contracts as they cannot consume commodities bought in contracts on the lifespan on the contract. Another reason is when the commodity is feed, it can spoil before it can be consumed by the dairy cow.

3.3 Demand for Product

The dairy industry tries to stay on top with the ever-changing diets and lifestyles of the consumer. There is a trend for non-animal foods that has led to the production of plant-based foods. Plant-based foods has led to the decrease in dairy product consumption. Plant-based foods are becoming more popular. Starbucks has answered the call for more plant-based products. Starbucks has been marketing and using oat milk since March of 2021. Starbucks uses oat milk as the base for the last five new flavored drinks they have launched. The Oat Milk Shaken Espressos that Starbucks has been marketing are popular drinks. Starbucks is not the only chain to use more plant-based foods as other restaurants and food companies are providing more plant-based options. Burger King launched the Impossible Whopper, Panera has the Mediterranean Bowl, Taco Bell has the Black Bean

Burrito, and White Castle's Impossible Sliders are just a few alternative foods that one can purchase on the market.

Alternative or plant-based food are a hot topic in the agricultural industry. This new technology is a $19 billion industry. Consumers think they are making the right decision by choosing food that was not killed or harmed by choosing an alternative that might be a safer option than a food that could be contaminated by disease (Croney and Swanson 2023). Some consumers believe that eating plant-based alternatives is a healthier option. There is research that states plant-based alternatives increase gut health and food absorption Alexander (2019). "According to the United States Department of Agriculture (USDA) data, per capita fluid milk consumption has plummeted 40 percent since 1975. That year, Americans drank 247 pounds of milk per person. In 2018, that number dropped to 146 (Smith 2022)." But the consumption of cheese and yogurt has increased. One may think that the switch would offset, but non-dairy products have entered that market as well.

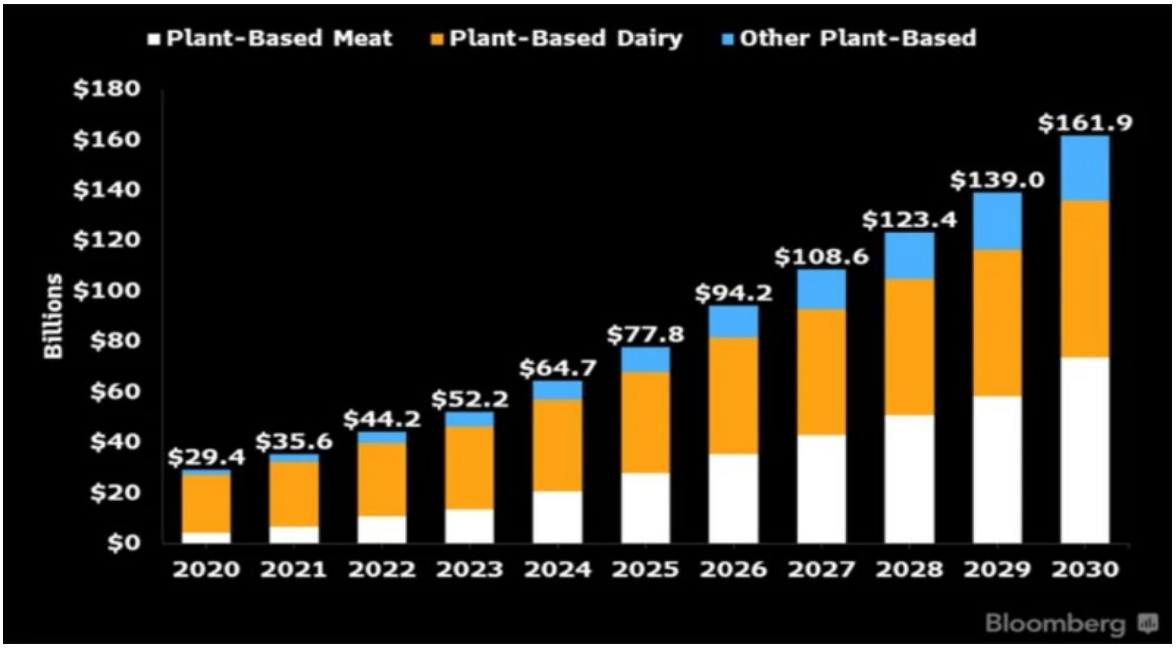
Son (2018) states that "changes in the consumer preferences for dairy and nondairy products evolve faster than conventional dairy markets can respond." This is causing a problem for the industry, as the domestic demand for dairy products is declining. This decline in consumption is contributing to the increased supply of milk.

The lifestyle changes at home in the mornings have contributed to the decrease in milk consumption and adding to the oversupply of milk. As parents may be in a rush to get everyone out the door for school drop off and get to work on time, sitting down to a bowl of milk and cereal in the morning is no longer a convenient meal for many families. They prefer to consumer more convenient, pre-packaged options like granola bars and pop tarts, that can be easily eaten when in transit to work or school. Milk with cereal contributes to

over 60 lbs of milk consumed per person (Smith and Yonkers 1990). Milk consumption is the highest in the mornings. If milk is not consumed in the morning, it most likely is not consumed later in the day.

There is a global increase for dairy exports and experts are predicting a "growth of 5-10 percent of global sales of plant-based milk in the next decade" (Bartashus 2021). With increased exports, this may create a lower supply of products in the domestic market and producers should see higher prices for the goods they produce. Since there is increase in global demand for milk products and a decrease in U.S. demand for milk products, prices should remain the same but in this case they do not. Prices remain low for farmers in the U.S. because there is an oversupply of milk. The U.S. can sell milk cheaper on the global markets while paying low prices to farmers in America. The American consumer is not consuming enough of our own dairy products creating an oversupply of dairy. To remain a global powerhouse in exports, the American dairy farmer will face lower prices to remain competitive with global rivals in milk commodities for export. Figure 3.1 shows the predicted revenue increase in global demand for plant-based milk products.

Figure 3.1: Predicted Financial Growth of Plant-base Foods, 2020 – 2030

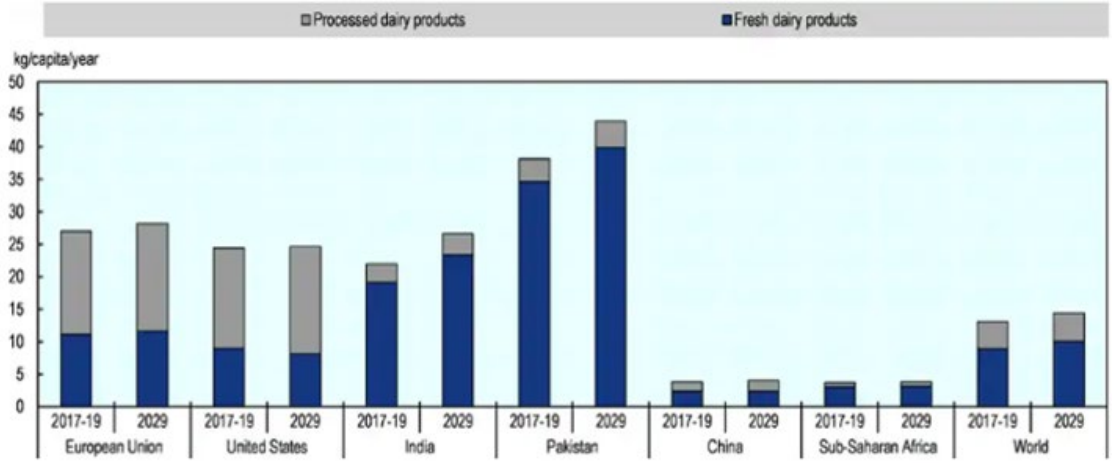


Note: The data for predicted financial growth of plant-base foods is from (Plant-Based Foods Poised for Explosive Growth)

Source, Bloomberg, (Bartashus, 2021) (https://www.bloomburg.com/plant-based-foods-market-to-hit-162-billion-in-next-decade-projects-bloomberg-intelligence/)

With world population on the rise, there is also the increase of demand for fresh milk products in Pakistan, India, and Africa. Butter is expected to have the strongest growth in Asia. “Animal protein consumption is growing faster than it can be produced” on the Eastern side of the globe (OECD iLibrary n.d.). Figure 3.2 shows the predicted per capita consumption growth over the next ten years.

Figure 3.2: Per Capita Increased Consumption of Dairy Products



Note: Milk solids are calculated by adding the amount of fat and non-fat solids for each product; processed dairy products include butter cheese, skim milk powder and whole milk powder.

Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), (http://www.doi.org/10.1787/agr-outl-data-en)

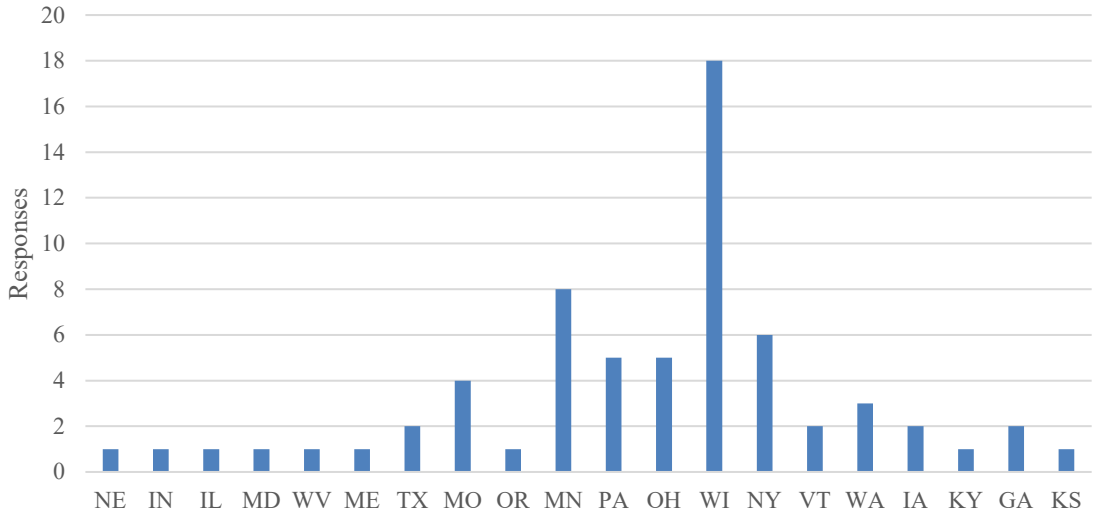
Figure 3.2 shows the consumption of dairy products from 2017-2019 and predicts the dairy consumption levels in 2029. India and Pakistan consume the most dairy products on a global scale with the majority of the consumption allocated to fresh dairy products. India and Pakistan also show the largest growth in fresh dairy products consumption by 2029.

CHAPTER IV: METHODS

To determine the factors influencing a dairy farmer's decision to exit the industry, an online survey was conducted. The survey was open for two weeks in April 2023. Dairy Farmers of America, Farm Bureau, and multiple dairy magazine sources were not able to distribute the survey for privacy reasons. In addition, good contact information from dairy farmers that have sold out is not maintained. One hundred and seventeen people responded to the survey request. I was only able to send the survey out through a Facebook group called "Dairy Moms." The survey consisted of eighteen questions that focused on dairy farmers' decision to exit the industry. The questions included what state the dairy is located, acres farmed, labor, adverse financial condition, family transition, divorce, disease, management practices, profitability, retirement, and milk price. Questions regarding the socio-economic and demographic characteristics of the respondents were also asked. The farm sizes have ranged from 40 cows to 2,700 cows. Respondents in the survey ranged from owning no land to owning 5,000 acres. The average respondent's age was thirty-eight years old, younger than the nations average farmer age. The oldest respondent was sixty-six years old.

The 117 respondents represented twenty different states. All five milk regions in the United States were represented. The five regions are Southeast, Northwest, Midwest, Southwest, and Northeast. The top ten dairy states are California, Wisconsin, Texas, Idaho, New York, Michigan, Minnesota, Pennsylvania, New Mexico, and Washington. Four out of the top five states are represented in Figure 4.1. The top five dairy states are California, Wisconsin, Texas, Idaho, and New York. It is also noted that there are six states in the top ten for dairy production in the United States.

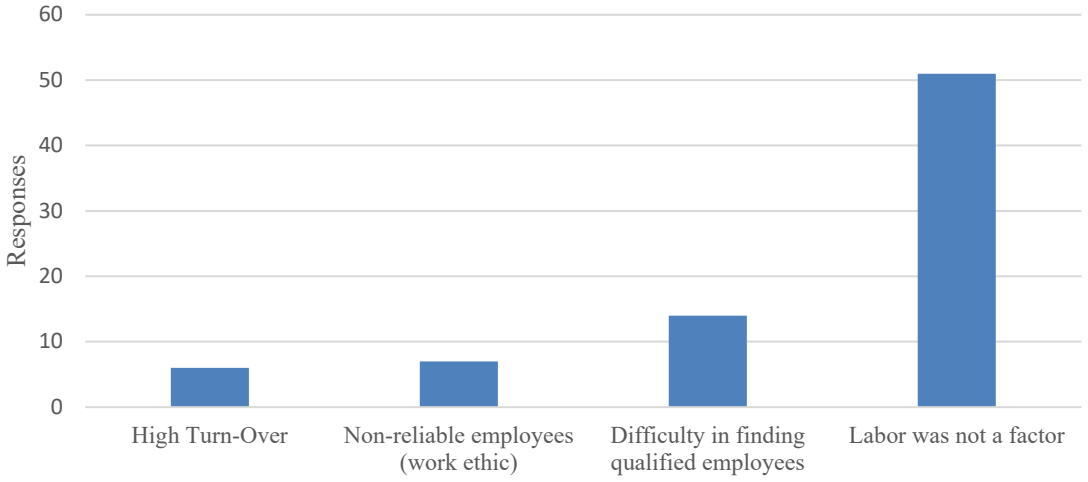
Figure 4.1: Respondent's Location by State (n=117)



4.1 Labor

From the survey, 35% of dairy farmers quit because of labor issues they faced on their farm. Figure 4.2 shows the labor factors that led to the decision to quit.

Figure 4.2 Labor Issues on Dairies Leading the Exit (n= 78)



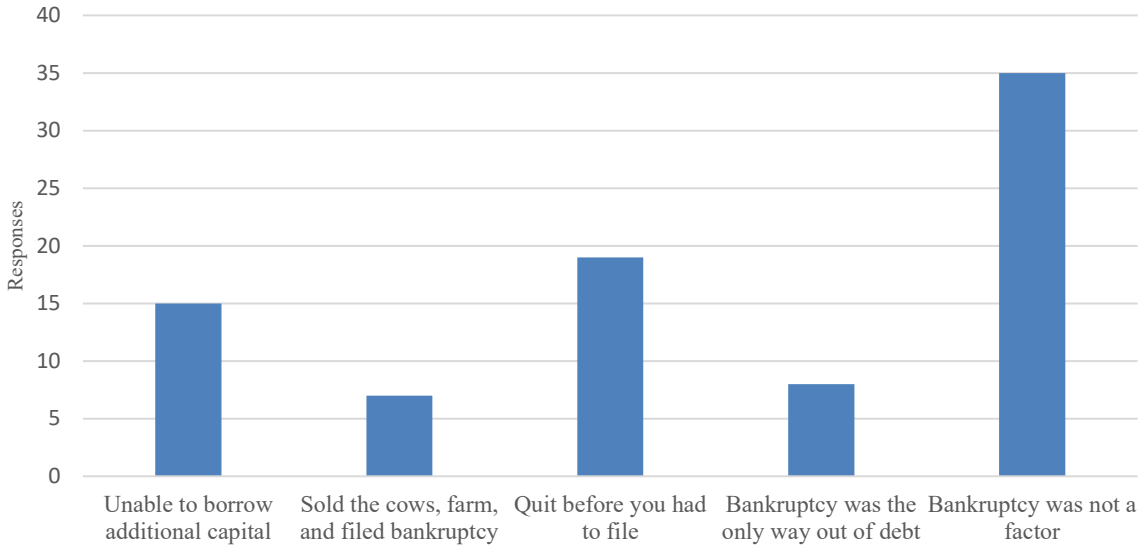
Looking at Figure 4.2, 27 respondents stated that they quit because of labor issues. Thirty-nine respondents did not respond to this question. Of the 27 respondents who

indicated that labor was a factor influencing the decision to quit, 6 respondents stated high employee turnover as an issue, seven stated employee work ethic, and 14 stated, difficulty in finding qualified help. The majority of respondents 51% stated that labor was not an issue in their decision to quit dairy farming.

4.2 Adverse Financial

An adverse financial situation question was asked to determine if dairy producers had to file bankruptcy, or if they ran out of capital and could no longer afford to run the operation. When asked about an adverse financial situation, 15 respondents indicated they decided to sell the dairy farm after running out of capital (Figure 4.3). There were 19 responses where dairy farmers sold the cows before they had to file bankruptcy. There were eight farms that were saved by bankruptcy. There were seven responses where dairyman sold the farm along with the cows and still had to file bankruptcy. Thirty-five responses indicate that bankruptcy was not a factor in their decision to quit the industry. Thirty-three respondents did not answer the question.

Figure 4.3 Adverse Financial Reasons to Quit (n=84)



4.3 Milk Price

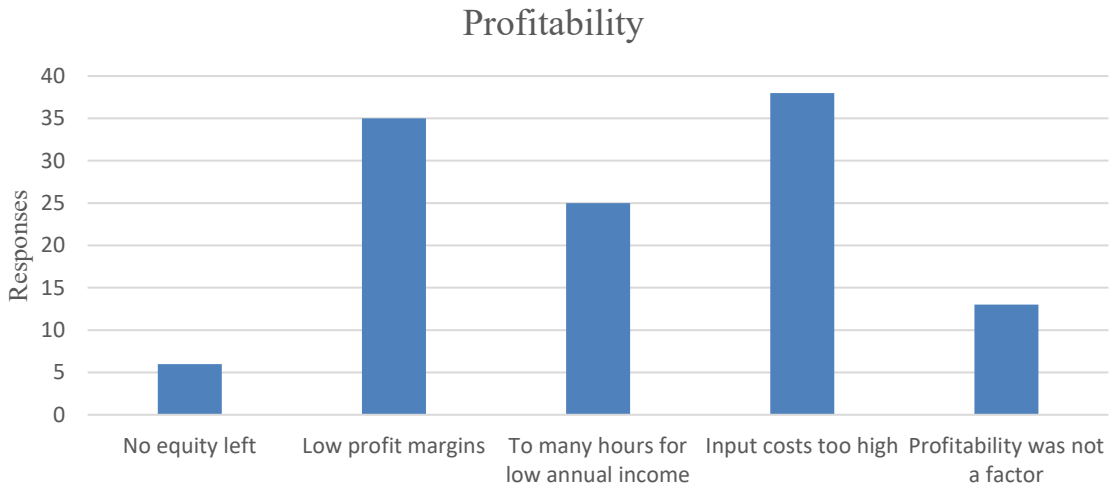
Of the 72 number of respondents who answered the question on the level of milk prices influencing their decision to sell the dairy farm, 37 indicated that low milk prices played a role in their decision to sell (Figure 4.4). Eighteen respondents indicated that milk price volatility was a factor in the decision to the dairy cows. Nineteen respondents stating that milk price was not a factor in why they exited the dairy industry. Forty-three respondents did not answer the question.

Figure 4.4 Milk Prices are Too Low to Continue the Dairy Farm (n=74)

4.4 Profitability

For profitability, 88% of the farmers state profitability was a factor in the decision to sell the cows. High input costs and low profit margins accounted for 77 respondents' decision to sell the dairy farm. Six respondents stated they ran out of equity to borrow against. To break it down by profitability, there were thirty-five respondents that made the decision on low profit margins, 37 sold out based on high input costs, while 25 sold out based on not enough pay for the hours worked on a dairy farm. Thirteen respondents said that profitability was not a factor that led to their decision to quit.

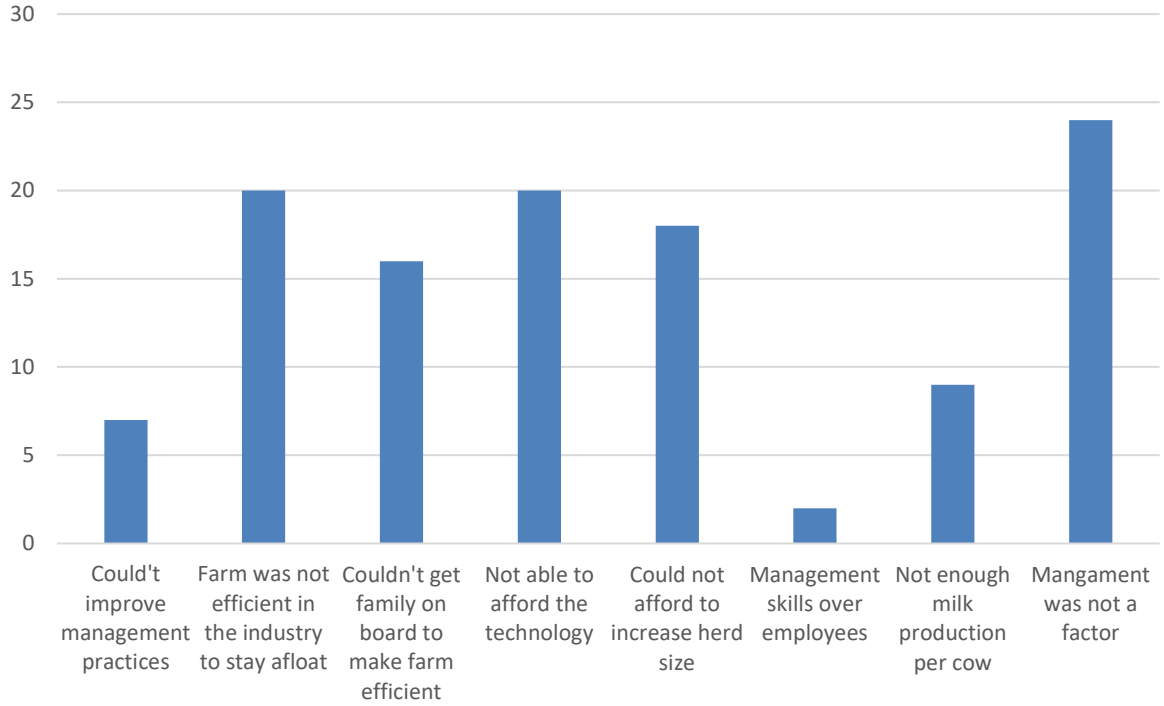
Figure 4.5 Management Practices Influencing the Decision to Quit (n=117)



4.5 Management Practices

Management is key to success of a dairy farm. From the survey 76% percent of the responses stated management played a factor their decision to quit dairying. There were seven different management options. Six stated that they could not improve management practices on the farm. Seventeen stated that the farm was not efficient in the industry to stay afloat, fourteen stated that the family was not on board to make the farm efficient, and seventeen stated that they could not afford the technology for updates needed for the dairy. Fifteen could not afford to buy more cows that were needed to increase profit margins. Only two stated management skills of employees were a factor. Nine stated that milk production per cow was not enough to sustain the farm. This statement is based on the cows do not give enough milk to pay the input costs of the dairy. Only one did not answer the question.

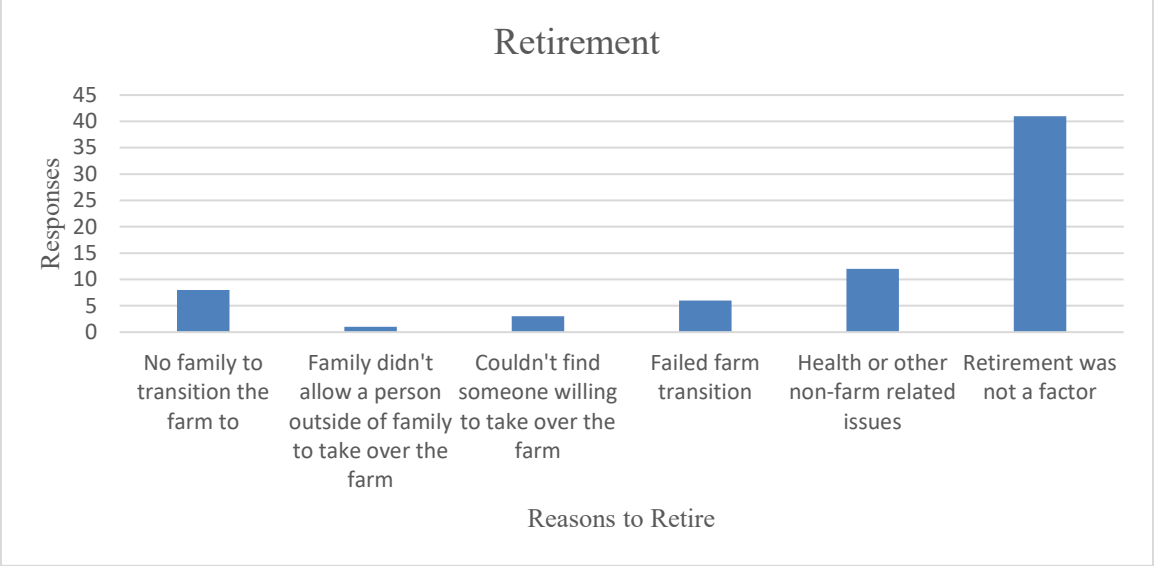
Figure 4.6 Management Practices That Affected Profitability (n=116)



4.6 Retirement

Retirement is a goal that Americans contemplate. The retirement question was not answered by all respondents. Sixty of the respondents listed retirement was not a factor (Figure 4.7). Twenty retired because of health issues. Ten retired because of failed farm transitions. The remaining twelve had no one to transition the farm to. I have one respondent that the family didn't allow an outside member to take over the farm. Forty-six respondents did not answer the question.

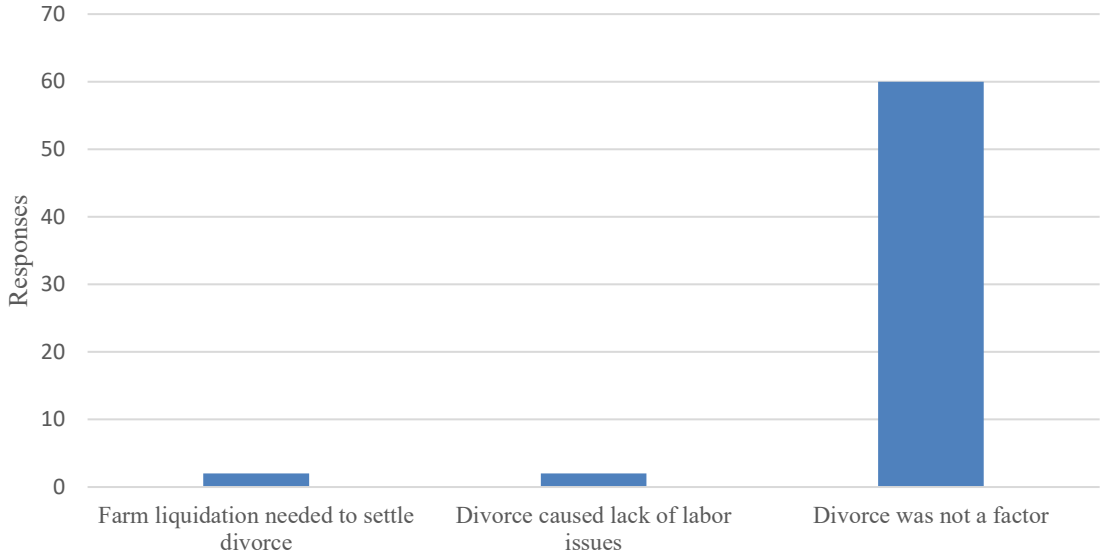
Figure 4.7 Retirement on the Dairy Farm (n=71)



4.7 Divorce

There were only sixty-four respondents that answered the divorce question (Figure 4.8). There were only four farms that sold out because of divorce. Two respondents quit dairying because of divorce and two other respondents sold because labor became an issue after a divorce. There were sixty respondents that stated divorce was not a factor in the decision to sell the dairy farm. Only six respondents showed that divorce played a part in a factor to sell the farm. Sixty respondents stated that divorce was not a factor. Fifty-seven respondents did not answer the question.

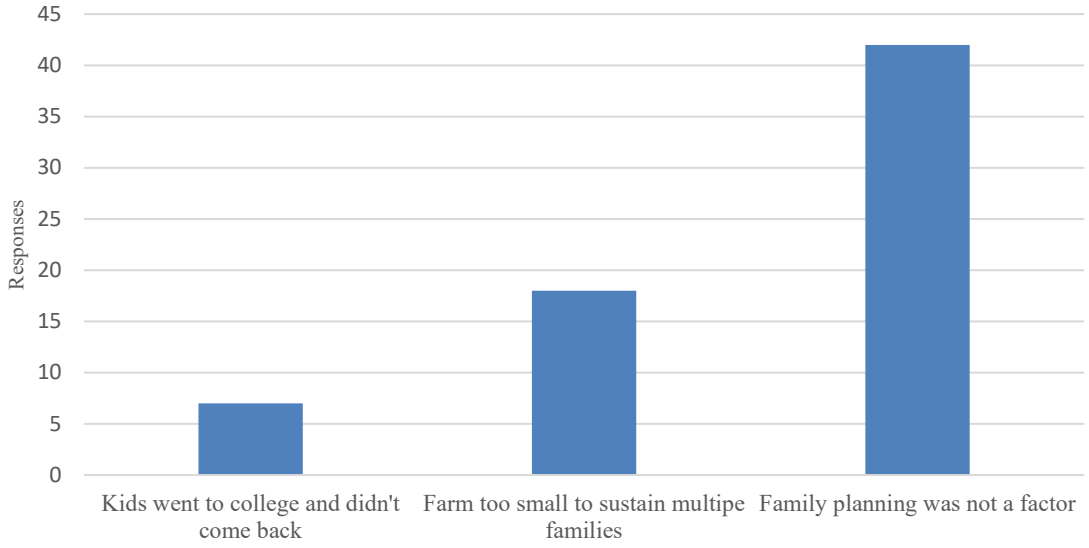
Figure 4.8 Divorce Can Play a Role in the Decision to Sell the Cows (n=64)



4.8 Family Transition

Family transition was the third lowest reason to quit the industry (Figure 4.9). Seven respondents stated that their children went to college, and no one came back. Eighteen respondents stated that the farm was too small to bring back the next generation. With already small profit margins, it would be hard for a dairy to support another family. Forty-two respondents stated that family transition was not a factor in the reason to quit the industry. Fifty respondents did not answer this question.

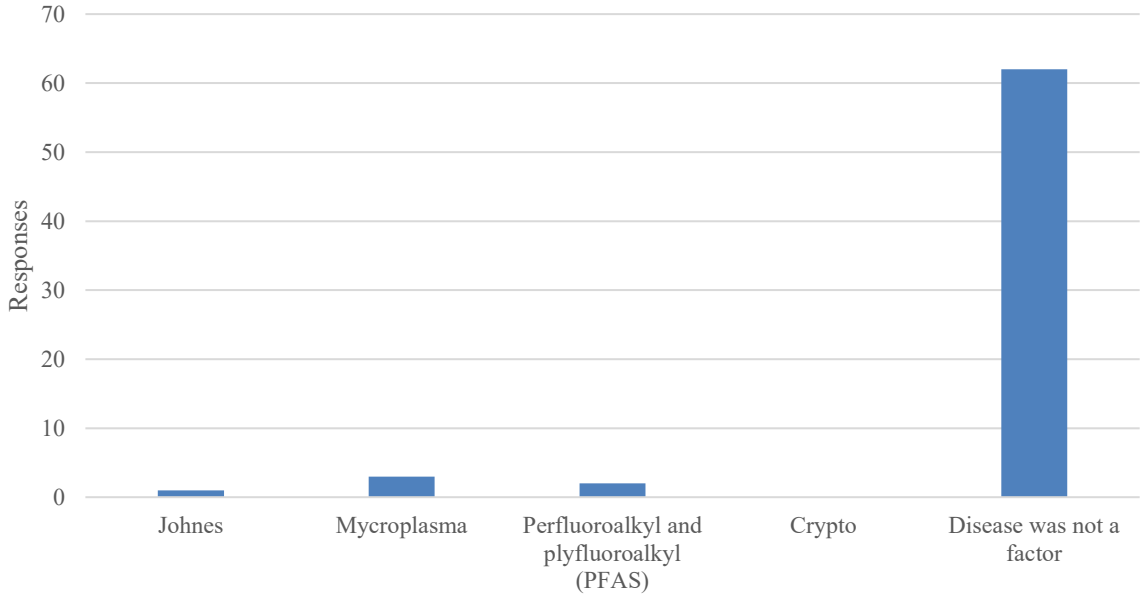
Figure 4.9 Family Transition (n=67)



4.9 Disease

Disease played a big part in dairy exits in the 1990s with the Johnes outbreak in dairy cattle. Johnes was thought to be transferred to humans and the cows had to be put down. There were many herds exterminated when a positive cow was found. Disease was not a significant factor in why survey respondents quit dairy farming (Figure 4.10). There was one respondent that sold out because of Johnes, three respondents from mycoplasma, and two respondents from perfluoroalkyl and polyfluoroalkyl (PFAS), and the remaining 60 respondents stated that disease was not a factor in why they chose to sell the cows. PFAS is a fire retardant that is used by the Army and fire fighters. It can be transferred in ground water, and it can contaminate crops that are grown on contaminated ground. PFAS can be transmitted through the cow in her milk. Herds that are contaminated with PFAS must be sold. Forty-nine respondents did not answer the question.

Figure 4.10 Disease Can Disqualify a Farmer From Shipping Milk (n=68)



4.10 Other Reasons to Exit the Industry

If none of the survey questions covered the factors influencing a respondent's decision to leave the industry, respondents were asked to briefly explain the factors influencing their decision-making process. One producer started a wedding venue for extra income and could not find reliable labor to help with the dairy operation when the producer was preoccupied with hosting weddings.

> *"We started a wedding barn, but as much as we loved the farm, we could not find reliable help (despite paying really good prices, being flexible with schedules, training well, having a low labor parlor/feeding system and safe workplace). We would get people that called in all the time because they didn't feel like working on a Saturday night (when we are hosting weddings). All people were hired knowing Saturday PMs were the most important milkings. It got to be too stressful. Even the ones that were reliable to show up, were not always good with animal care."*

Demands imposed by the producer's creamery were factors influencing producers to exit the dairy industry. One respondent indicated that their creamery preferred to not do business with smaller dairy herds. The respondent was "offered fair price for the farm and did not want to continue to add more cows to keep in demand with the creamery".

Another respondent stated that the creamery wanted the dairyman to upgrade their facilities to continue selling to them [the creamery]. The husband in this dairy farming family also has health concerns. The respondent decided it best to sell the dairy farm to spend more time with their children.

> *Family relationships were suffering. Creamery wanted us to upgrade our barns and build three different buildings on $15 milk after milk prices were at $11. Husband has RA and couldn't continue. Schedule difficult to match to kids' school, homework. And activities schedule, we want to work while they are gone and be available when they are home from school. Also, able to travel more".*

Two respondents indicated exiting the dairy industry was their decision alone and they had other income generating income activities that required less time and stress and generate sufficient income. One respondent stated:

> *We retired in our 60's because we went out on our terms. We did not want to wait until we had to sell for health reason at a moment's notice, we had side hustles generating more income in less time and other market opportunities".*

Another respondent stated:

> *"We had no debt and did not see the point of investing in a volatile market while we had other markets available, so we shifted to hay and beef. Dealing with employees was super stressful".*

CHAPTER V: SUMMARY AND CONCLUSION

The purpose of this survey was to determine the factors that are influencing many dairy farms to exit the industry in recent years. An online survey was conducted. There were 18 questions to answer. All the questions were focused on why the producers sold the cows. The questions included what state the dairy is located, acres farmed, labor, adverse financial condition, family transition, divorce, disease, management practices, profitability, retirement, and milk price. Questions regarding the socio-economic and demographic characteristics of the respondents were also asked. One hundred and seventeen dairy producers responded to the survey. The current survey results support previous research findings that profitability is the number one reason why producers quit milking cows. Profitability and management are key to success in the dairy industry.

There are multiple reasons dairy farmers sell out. There are many issues that dairy farmers are facing. Volatile/low milk prices, over supply of milk on domestic market and low domestic demand for milk due to changing consumer preferences.

Management has a direct correlation on profitability. If one can manage expenses and stay on top producers can afford the new technology. When farmers are already struggling it can be hard for them to figure out how to better manage what they have, as milk price is volatile and input costs are on the rise.

The following are some things I would like to change if I would ever research this topic again. I would contact multiple dairy magazines and put in a QR code for producers to scan and take the survey to get a bigger population pool. I would tailor questions that are not repetitive. I should have asked what class of milk the producers marketed. I would ask what milk cooperative they sell their milk too, and what milk marketing region they are in for a better picture of milk pricing. I would also ask if they sign up for programs like Dairy

Revenue Protection (DRP) and/or if they take Federal Insurance on their milk through their local Farm Service Agency (FSA).

WORKS CITED

Bauer, Kathleen. 2018. "Big Milk' Brings Big Issues for Local Communities." *Civil Eats.*

Blayney, Don. 2002. " USDA Agricultural Marketing Service. Federal Milk Marketing Orders. The Changing Landscape of U.S. Milk Production." *USDA Statistical Bulletin Number 978.*

Bartashus, Jennifer. August 2021. Accessed November 21, 2023. https://www.bloomberg.com/company/press/plant-based-foods-market-to-hit-162-billion-in-next-decade-projects-bloomberg-intelligence/.

Broom, Brian. 2011. ""Worse than it's Ever been': Rising Costs Taking their Toll as Family Dairy Farms Face Hard Times."." *The Clarion Ledger*.

Chrisman, Siena. 2018. "Is the Second Farm Crisis Upon Us? ." *Civil Eats.*

Dairy Products Manufacturing. 2022. "Quarterly Update." Report, Fort Mill.

Douglas, Leah. 2018. "How Rural America Got Milked." *The New Food Economy.*

Dukehart Coburn, Whites-Koditschek and C. 2019. "Most Nitrate, Coliform in Kewaunee County Wells Tied to Animal Waste." *Wisconsin Center for Investigative Reporting.*

Farm and Dairy. 2018. "What is the Federal Milk Marketing Order?"

Farm and Dairy. March 12, 2018 Accessed November 21, 2023. https://www.farmanddairy.com/news/dean-foods-drops-more-than-100-dairy-farmers/475392.html.

Food and Water Watch. 2011. " What's in the Water? Industrial Dairies, Groundwater Pollution and Regulatory Failure in California's Central Valley."

Gipson, Andy. 2022. "High Costs and Low Prices Stress State Dairy Industry." *Mississippi Market Bulletin* 24.

Jones, Leah. 2018. "Farmers Are Struggling To Make Ends Meet. This Controversial Policy Could Help." *Mother Jones.*

Lakhani, Nina. 2023. "US Dairy Policies Drive Small Farms to "Get Big or Get Out" as Monopolies Get Rich." *The Guardian* 1.

McCausland, Phil. 2022. "Best advice to U.S. dairy farmers? 'Sell out as fast as you can'." .

"Milk Cow Herd by Inventory and Size; Milk Production (March 12, 2019); Number of Monthly Milk Cow Herds, Wisconsin, 2004 to Current, 1/." *USDA National Agricultural Statistics Service. 2017 Census of Agriculture.*

Nepveux Michael. 2021. *USDA Report: U.S. Dairy Farm Numbers Continue to Decline.* Washington, D.C.: Farm Bureau.

Nargi, Lela. 2018. "What's Behind the Crippling Dairy Crisis? Family Farmers Speak Out." *Civil Eats.*

OECD iLibrary. Accessed November 21, 2023. https://www.oecd-ilibrary.org/sites/aa3fa6a0-en/index.html?itemId=/content/component/aa3fa6a0-en#figure-d1e19347.

O'Leary, Fran. 2023. *FarmProgress.* April 17. Accessed November 21, 2023. https://www.farmprogress.com/marketing/u-s-dairy-herd-numbers-fall-to-27-932-.

O'Leary, Fran. 2018. ""Milk Prices Climb Along with Production Costs."." *Corn and Soybean Digest* 1-5.

Pearson, Jeffrey S. Bracker and John N. 1986. "Planning and Financial Performance of Small, Mature Firms." *JSTOR.*

Pitman, Lynn. 2018. "History Of Cooperatives In The United States: An Overview." *University of Wisconsin-Madison Center for Cooperatives.*

Purdy Barry M., Michael R. Langmeier, Allen M. Featherstone. 2015. "Financial Performance, Risk, and Specialization." *Cambridge University Press.*

Schulz, Kevin. 2003. ""Family Keeps Dairy Tradition Alive"." *Farm Industry News* 3.

Smith, Kat. 2022. "The Dairy Industry is Collapsing before our Very Eyes: This is Why." *LiveKindly*.

Son, Miyeon, Jessica Richard, and Dayton M. Lambert. 2022. ""U.S. Dairy Farm Transition and Exits, 1987-2017"." *Journal of Agricultural and Applied Economics*.

Stam, Jerome, and Bruce L. Dixon. 2004. "Farmer Bankruptcies; and Farm Exits in the United States, 1899-2002." *USDA.*

Talerico, Kate. 2018. "As Dean Milk contract ends, some farmers pick up a last-minute hope." *Courier Journal*.

"The Dairy Crisis." *National Family Farm Coalition.* (2022).

USDA Agricultural Marketing Service. Federal Milk Marketing Orders. Don Blayney. "The Changing Landscape of U.S. Milk Production." USDA Statistical Bulletin Number 978, June 2002.

Wang, E. 2017. "Farm Communities Face Contaminated Water From Manure, Nitrates, Records Reveal." *The Oregonian.*

Watkins, Steve. 2017. "Kroger price cuts hammer milk company's outlook." *Charlotte Business Journal*.

APPENDIX A

Survey Questions

I am Cassandra Armknecht a student at Kansas State University. I am currently writing my thesis to finish my master's degree in Agribusiness. I am currently looking for data for the analysis of my thesis. If you would like to participate, please fill out the questionnaire below. Your answers will only be used in my analysis. I you would like to be anonymous that is fine too.
What was your reason to quit dairying? Feel free to select one or more options. You may go into more detail if you would like. Or add other reasons.

List the state you are from with the alphabetic abbreviation.

How many cows were you milking? Select one.

- 25-149
- 150-299
- 300-499
- 500-1000
- Over 1000

Labor. Select one.

- High turn-over
- Non-reliable employees
- Difficulty in finding qualified employees.
- Labor was not a factor.

Adverse Financial. Select one.

- Unable to borrow additional capital.
- Quit before you had to file.
- Bankruptcy was the only way out of debt.
- Bankruptcy was not a factor.

Milk Price. Select one.

- Milk Prices have been too low.
- Milk Prices have been too volatile.
- Milk Price was not a factor.

Profitability. Select one.

- No equity left.
- Low profit margins.
- To many hours for low annual income.
- Input costs to high.
- Profitability was not a factor.

Management Practices. Select one.

- Couldn't improve management practices.

- Farm was not efficient in the industry to stay afloat.
- Couldn't get family on board to make farm efficient.
- Not able to afford the technology.
- Could not afford to increase herd size.
- Management skills over employees.
- Not enough milk production per cow.
- Management was not a factor.

Retirement. Select one.

- No family to transition the farm too.
- Family didn’t allow a person outside of family to take over the farm.
- Couldn’t find someone willing to take over the farm.
- Failed farm transition.
- Health or other non-farm related issues.
- Retirement was not a factor.

Divorce. Select one.

- Farm liquidation needed to settle divorce.
- Divorce caused lack of labor issues.
- Divorce was not a factor.

Family Planning. Select one.

- Kids went to college and didn't come back.
- Farm too small to sustain multiple families.
- Farm too small to sustain multiple families.
- Family planning was not a factor.

Disease. Select one.

- Johnes.
- Mycoplasma.
- Perfluoroalkyl and Polyfluoroalkyl (PFAS).
- Crypto.
- Disease was not a factor.

Other reason on why you quit dairy farming. This is an essay question.