The Evolution of the U.S. Dairy Sector

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The U.S. dairy farming sector is a miracle wrapped in a tragedy. It is a story of amazing success. Since the middle of the 20th Century, American farmers have increasingly specialized their production focus. Since then, U.S. farmers have had an enviable record of increasing production, being more efficient, and providing consumers with a nutritious, high quality product at an affordable price. For much of this time period, retail prices of dairy products increased at half the rate of general consumer price inflation. That is a very good success story for milk producers. The tragedy is in the change in the structure of the farm sector and the transformation of rural communities. Although farms run by families remains the norm, dairy farms have been decreasing in number while increasing in size. The dairy farms of today are generally far more successful than dairy farms of a half century ago, both in terms of productivity and profitability measures, but this has come at the expense of many hard-working farm families who simply could not survive, much less prosper. The ongoing question is how long will these trends endure? Is there a limit to the growth in the U.S. dairy sector? When will dairy farm numbers level off and stabilize, and how soon does that occur?

Let's look at some of the data.

Milk Production and Productivity

Figure 1 illustrates the pattern of milk production and production per cow (yield) since 1950. Production per cow began increasing in a linear trend since the early 1950s at a rate of 125 kg per year. In fact, since 1996, the annual rate has increased to 135 kg per year. These increases have come through continuous improvements in genetics and technologies as well as better day-to-day management of milking, reproduction, nutrition, and health. What is striking is that the linear nature of this trend points to a continuous progression of improvements and not the adoption of one or another specific technologies or management innovations.

As can be inferred from the graph, in the 1950s and 1960s, persistent increases in yield were largely offset by declines in the national herd – milk production was essentially constant during that time period. However, this changed dramatically in the early 1970s. There were two somewhat offsetting factors at play. First, the push towards more specialization following World War II reduced the number of dairy farms dramatically in the 1960s, as seen in Figure 2. While the remaining farms tended to be bigger than those that exited, this at first resulted in rather stagnant total production. In the early 1970s demand for dairy products began to expand dramatically. This was linked to a slow but steady explosion in the sales of cheese that was largely the result of the growth in fast food restaurants and sandwiches smothered in processed cheese. A big expansion in pizza restaurants occurred about a decade later and added more fuel to this growth.

Expanded domestic demand made it possible for the U.S. dairy sector to expand its production, even as the number of dairy farmers plummeted. The U.S. would produce more milk, the only question was how – what kind of production system and under what sort of industry structure.

Figure 1. U.S. Milk Production and Yield since 1950, adjusted for leap years

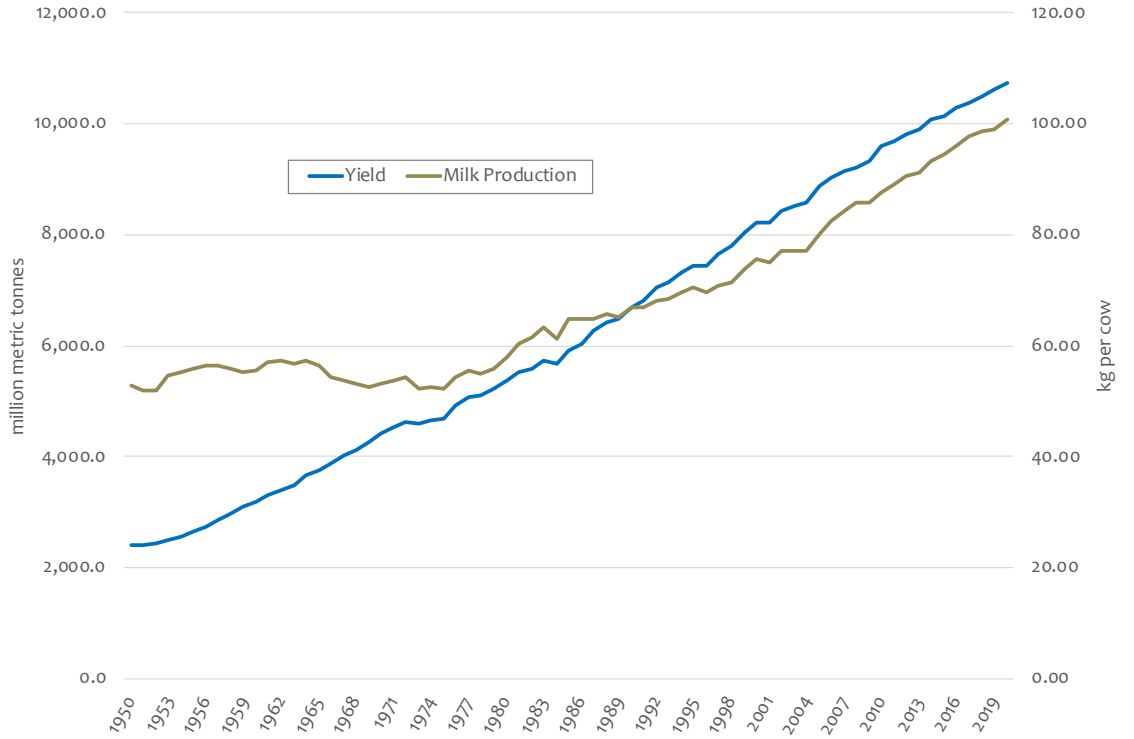
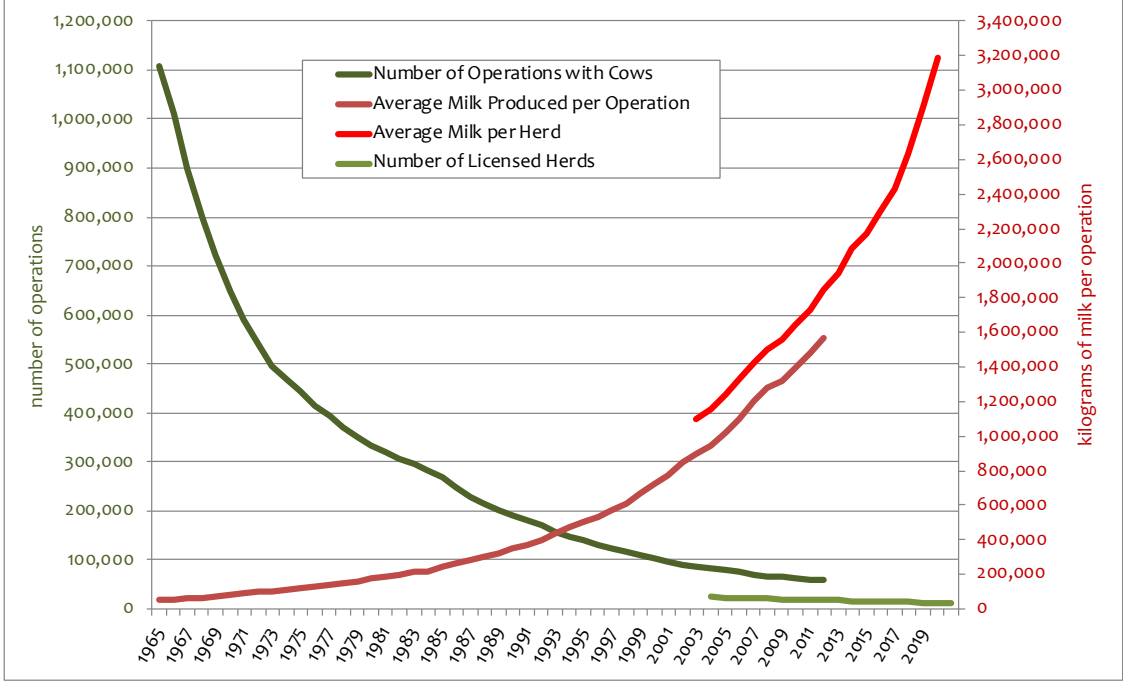


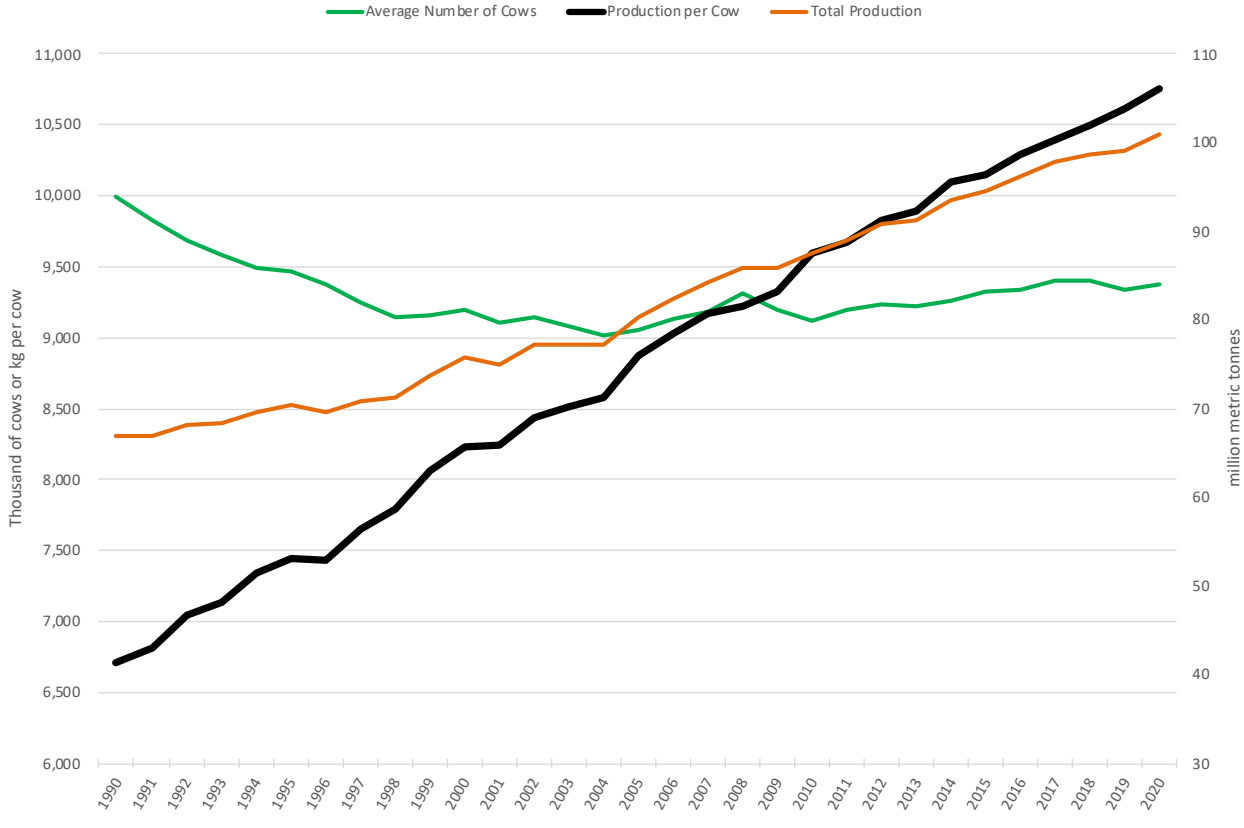
Figure 2. Comparison of Number of Dairy Farms vs Average Amount of Milk Produced per Farm, adjusted for leap years, 1965 to 2020



More recently, both the miracle and the tragedy have continued and also strengthened. Figure 3 illustrates total U.S. milk production and its two primary constituents: production per cow and the total number of cows. Each variable has a distinct pattern and trend.

1. Total production continues its half century of steady, very linear trend growth. Since 1995 the rate is about 136.5 MMT per year
2. Similarly, yield continues its 70-year upward, linear trend, with perhaps a small increase in the growth rate occurring in the mid-2000s.
3. Most notably and remarkably, the nation's herd halts its 60-year decline and not only stabilizes but even grows. Since 2004, the trend growth rate in the total number of cows is 20,500 per year.

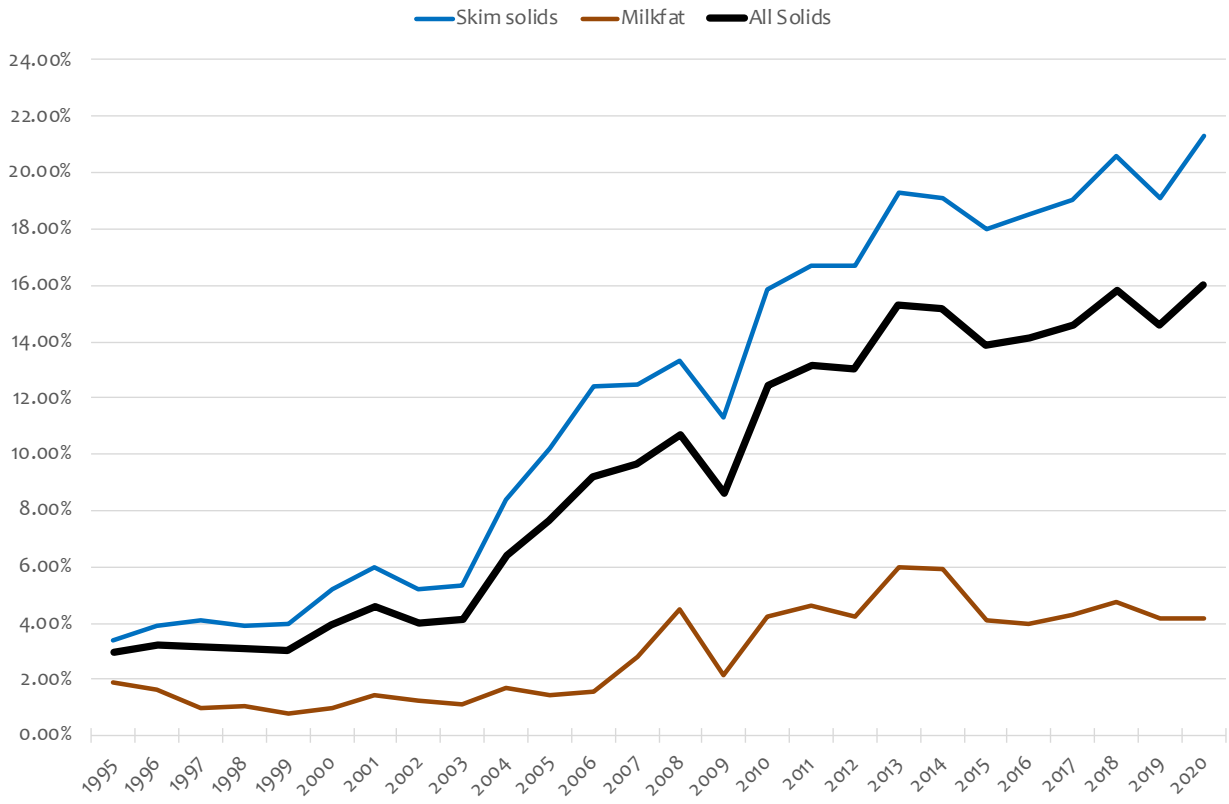
Figure 3. U.S. Production, Yield, and Cow Numbers, 1990 to 2020



As in the 1970s, the growth in milk production is not the result of unusually high profits or other common supply side variables so much as it has been driven by demand. The Uruguay Round Agreement on Agriculture took effect in the U.S. in 1995. The U.S. dairy sector was a rather reluctant participant in those discussions, which effectively completed the dismantling of a half century of U.S. policies built around closed markets and domestic price supports. In the beginning, the industry was not entirely sure if it

would end up a net exporter or a net importer. It sought to be a net exporter, but it was not at all convinced that it could, or should, become a world player. By the early to mid-2000s, it was becoming clear that the U.S. would not only be a net exporter, it would be an increasingly large player in world markets. Primarily due to its large role in exporting milk and whey powders, the share of total U.S. milk solids ending up in world trade has steadily increased since 2004. Over the last decade, the share of all milk solids in exported dairy products relative to all solids in farm milk marketed to commercial markets has been 12-16% and trending upward, as shown in Figure 4. The trend rate has been an additional 0.8 MMT of milk solids per year. Even with all the difficulties of the pandemic, U.S. exports increased to a new record high in 2020, both in total amount and as a share of domestic marketings. While there are year-to-year fluctuations to be sure, the U.S. anticipates increasing its international sales over time and becoming more competitive in cheeses and butter. At some point, freer trade with Canada and growing household incomes in Mexico would lead to a new shift in sales of all kinds of dairy products to our North American neighbors, who are already among our top 3 trading partners.

Figure 4. Exports as a Percentage of Farm Milk Marketed, calculated by milk solids volume, 1995 to 2020 (not adjusted for leap year)



As noted earlier, the question in the U.S. is not so much will it continue its growth in milk production but rather how it will do so. Growth rates will continue to be impacted positively by increasing domestic and world populations, economic development especially among lower income households, and freer trade rules. They may be moderated by competition from alternative foods, including plant-based and

products of cellular agriculture, which in turn may be influenced by public concerns broadly related to animal agriculture and the environment or climate change. New and clarifying knowledge about the relationship between diet and health holds promise for positively presenting dairy foods, but it is not a simple story. For example, the recently refreshed dietary guidelines from the U.S. Department of Agriculture clearly states that Americans over the age of 2 should drink more milk than they currently do, but the guideline is also very clear that this milk should be nonfat or lowfat. The issue is not that whole milk or other dairy foods are linked to cardiovascular or other health problems directly but rather that one gram of fat contributes over twice as much calories as a gram of protein or carbohydrates. The caution relates to obesity, which is undeniably a problem for Americans.

At this point, the U.S. industry is making investments on the assumption of continued growth but also a need to be increasingly cost competitive while at the same time adopting practices favorable to public perceptions. Much of the world imagines that the U.S. dairy sector consists entirely of very large farms – thousands of cows – in a very intensive production environment. They are often derisively identified as factory farms. The fact is that there are still a considerable number of smaller sized farms, with a 2020 average size of just under 300 milking cows. Nevertheless, it is also true that the majority of milk is made on those very large farms. But, these farms are not owned by large corporations. They are owned and operated by families and extended families. None of these farms started overnight. They were built up over time as family owners prospered and felt that they could increase their earnings and be even more cost competitive with more cows. Some grow in size because they simply enjoy the challenge. The point is that these farms got bigger because they were really good when they were smaller. Being big, by itself, does not ensure anything about being better. A number of smaller sized farms have adopted other strategies to survive and create a profitable business for their families. Some have diversified into farmstead processing of dairy products. Some diversify in other directions – trucking, building trades, etc. Some have chosen to differentiate their product by becoming organic or converting to all A2 milk or grazing. These sorts of strategies are not available equally around the U.S. Farmstead cheese production is an easier proposition for farms located near major urban centers, for example. Grazing has a consumer following, but it is difficult to accomplish in northern states that have short growing seasons.

It is also the case that policies to financially support dairy farms tend to tilt more favorably to smaller sized operations. Contrary to news reports that talk about how much money goes to larger farms, the key is the subsidy per unit of milk produced. Big farms tend to get big checks because, well, they are big, but those big checks may translate to pennies on each kilogram produced compared to dollars on the volumes produced on a smaller scale farm.

For all these strategies and programs, it remains undeniable that the structure of U.S. farms is continuing to change in the direction of fewer and larger farms. This does not mean that every smaller scale farm is destined to exit, but the strategies to allow those smaller sized businesses to succeed are challenging.

Figure 5 shows the most recent data for farm exits, both as absolute and relative annual changes. Generally, farm exits increase after a year of low returns, such as

occurred in 2003, 2006, 2009, 2012 and the extended low period from 2015 through 2018. Farm prices began to rise in the second half of 2019 and were expected to be well above average in 2020. Then the pandemic hit. Offsetting the disruptions in commercial markets, the government provided unheard of amounts of direct subsidies to dairy farmers in 2019 and 2020. The earlier checks were to compensate for lost export sales during the early days of the trade war, particularly as it related to Mexico. Despite these huge subsidies, which for some farms represented 40% or more of total profits, farm exits in 2020 were among the highest in the last 20 years and the year-over-year relative change was the second highest, following 2019. We aren't very confident about our ability to predict 2021, much less beyond that, but a reasonable expectation is that the U.S. dairy sector will continue to innovate and grow as long as there is a growing demand worldwide, and it will be increasingly dominated by very large scale farms who can keep their costs low as well as respond to challenges related to animal welfare, climate change, worker compensation and benefits, and so on.

Figure 5. Number of Licensed Dairy Operations, 2003 to 2020,
Absolute and Percentage Annual Change