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Dwindling Dairy Heifer Numbers May Inhibit New Milk Production

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Inside…

Key Points:

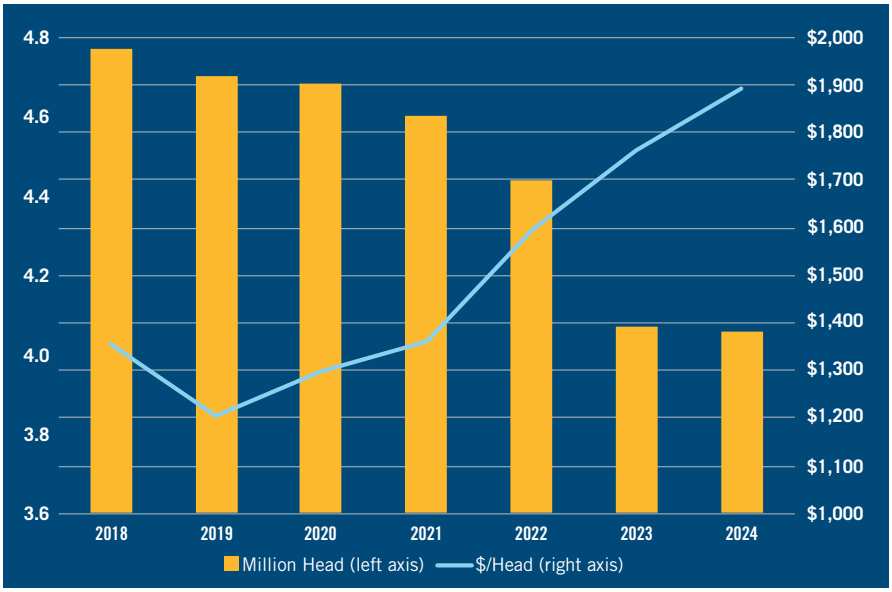
- Just behind feed and labor, the cost of raising a dairy heifer is the third-highest expense on dairy farms.
- In the past 20 years, dairy rearing costs have climbed by more than 50% to over $2,000 per head. Less than a decade ago, dairy heifers sold for a tidy profit but rearing costs today mean they sell at a loss.
- To better manage their on-farm heifer inventories and investment, dairy farmers have turned to a more profitable opportunity: Using beef semen on a portion of their dairy herd to produce and sell beef-on-dairy calves.
- Due to the shift to beef-on-dairy, dairy replacements expected to enter the milking herd have shrunk by almost 15%, or 709,100 head, in the past six years to reach a 20-year low.
- The reduced number of heifers eligible to enter the milking herd – plus their higher purchase price today of $1,890, an eight-year high – could limit the upside on expanding U.S. milk production.

A new manifest

Once loaded and out to sea, large cargo ships cannot turn on a dime. The same holds true for what is the "ocean liner" US(S) Dairy Replacements. A new course correction has altered dairy heifer inventories as dairy producers from across the country have shifted to breeding a portion of their dairy-cow herd to beef semen to capture additional value from beef-on-dairy crossed calves.

As a result, the number of dairy heifers weighing over 500 pounds – a proxy for the number of dairy replacements expected to enter the U.S. milking herd over the next year – have fallen almost 15% during the past six years to settle at 4.06 million head, according to USDA's Cattle report. The shift has taken place so fast that USDA revised its dairy heifer inventory figure in the past 12 months from 4.34 million to 4.07 million head, a remarkable decline of 263,600 head.

EXHIBIT 1: U.S. Replacement Dairy Heifers: Inventory and Price



Source: USDA-NASS Cattle and Agricultural Prices reports

This trend represents a significant reduction; the entire U.S. dairy herd has been stable over the past six years, with 9.3 million to 9.4 million head of dairy cows. This shrinking replacement pipeline, now at a 20-year low, will impact the ability to grow U.S. milk production in the coming years. The gestation and growth cycle for dairy animals mean a course correction will take two-and-a-half to three years to chart and fully realize, if that's even feasible with the evolving market conditions.

How did we get here?

Rising rearing costs became the first factor in charting a navigational correction on dairy heifer inventories and it took place due to mounting pressure to reduce the cost to produce milk. Because the wait for the return on investment in rearing costs is about two years, compared to immediate returns on cows in the dairy herd, dairy heifers have been a logical focus for tight dairy farm balance sheets. In many instances, dairy replacement costs could be adjusted more easily than the two other largest dairy farm expense categories – feed and labor.

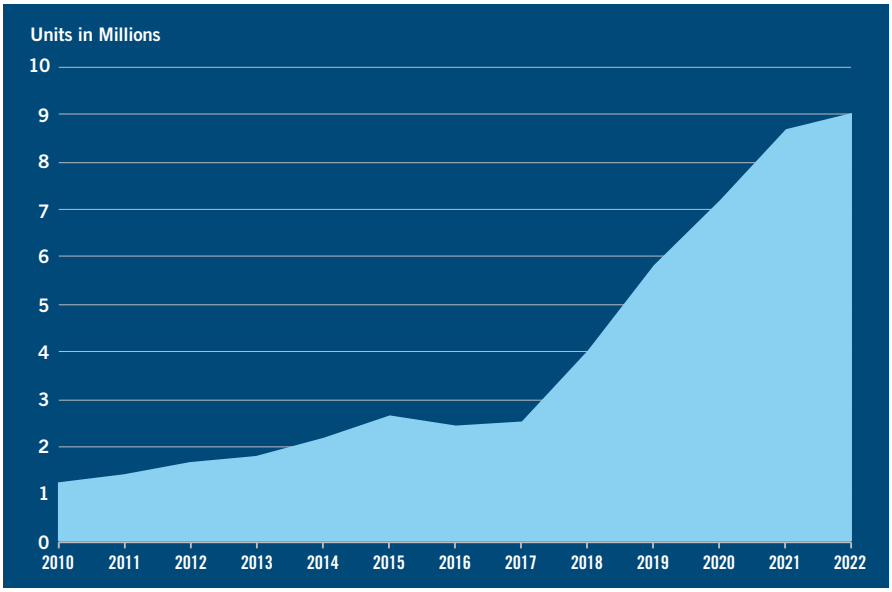
Reported figures on heifer rearing costs vary, but all point in one direction: up. University of Wisconsin Extension survey data from 1999 to 2015 found the total cost to raise a dairy heifer from birth to first calving and entering the milking herd climbed from $1,360 to $2,510 per head, an 85% increase. In a similar analysis looking at 2016 to 2021, Penn State Extension specialists calculated heifer rearing costs averaged $2,034 with a range of $1,411 to $2,301 between the lowest and highest of the five quantiles.

Whether $2,000 or $2,500 per head, the cost of raising heifers has been a losing economic proposition for most dairy farmers in recent years. From April 2018 to January 2022, the sale price of dairy heifers never exceeded $1,400 per head according to USDA's *Agricultural Prices* report. Given this $600 to $900 loss per heifer, dairy farmers reevaluated the entire replacement enterprise. That's when heifer replacement numbers began their steady, downward trajectory *(Exhibit 1).*

To reshape dairy heifer inventories and realize new income opportunities, dairy farmers have embraced a more profitable opportunity: Using beef semen on a portion of their dairy herd to produce and sell beef calves. They employed a triple play from the dairy-farm toolbox that includes sexed semen, genomics, and beef semen – easily done because the supermajority of dairy farmers use artificial insemination on their dairy heifers and cows. These three tools combined to help farmers keep fewer, but better, heifers on the farm and send the remaining calves to feed-out facilities for beef. This evolution began to unfold as retail beef prices climbed to record highs. (For additional background, see Knowledge Exchange reports *Breeding Beef with Dairy Brings New Value to Marketplace* and *Dairy Cattle Genomics is Quietly Improving Sustainability.*)

Dairy heifer ratios began to change when sexed semen was introduced into the marketplace in 2003. While the product yielding 90% to 95% heifer calves didn't become mainstream for another decade, eventually more heifer calves were born. Flush with heifer calves

EXHIBIT 2: Domestic Beef Semen Sales Have Climbed Substantially



Source: National Association of Animal Breeders (NAAB) U.S. sales data

due to shifting the heifer calf to bull calf ratio, dairy farmers began sorting out the best young heifers via genomic tests. Armed with those DNA-test results where farmers could determine with over 70% accuracy which young heifers would later make the best dairy cows, animals with low-end genetics were culled by either being sold to other dairy farmers, sent to slaughter, or exported to other countries to reduce expenditures in the heifer-raising enterprise.

Economics drove the course change

Yield rates at the packer quickly became another economic driver as Texas Tech University research determined beef-dairy crossed calves are 30% more efficient than Holstein steers at converting feed to beef. Plus, beef-dairy crosses are on feed fewer days. This data helped drive dairy farmers to double down on beef-dairy cross calves given the value change from a conventional Holstein or Jersey bull calf.

The economic change has transcended into a demographic shift on the farm. Beef semen sales have grown from 2.5 million units to 9.0 million units from 2017 to 2022 *(Exhibit 2),* based on data from the National Association of Animal Breeders (NAAB). Dairy farmers purchased the vast majority of those units as overall beef semen used on U.S. dairy farms climbed by 457,000 units in 2022 alone, reported NAAB.

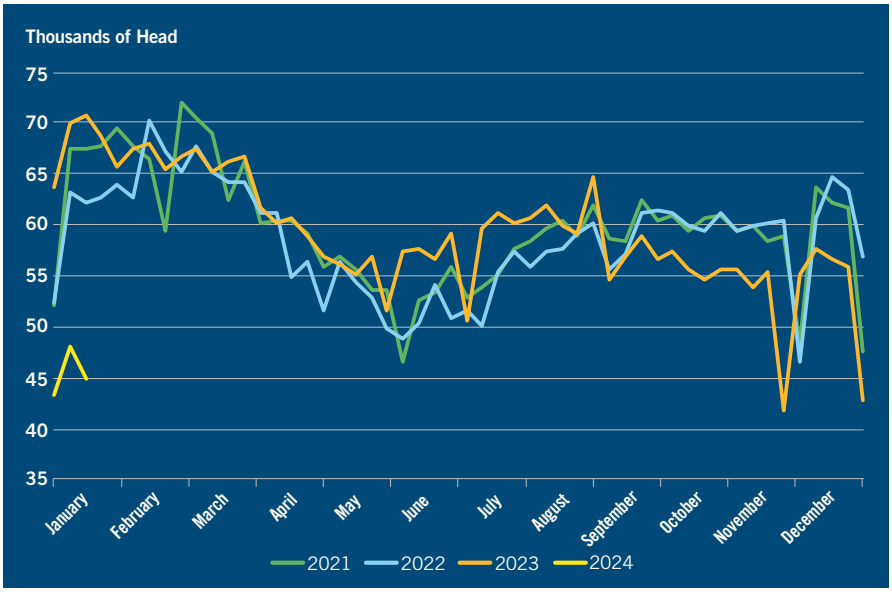
On the flip side, dairy semen sales declined 5% in 2022, dropping just over 800,000 units to settle at an overall market size of 16 million units. This market shift came in addition to reduced sales volume in 2020 and 2021 by 1.2 million and 1.0 million units, respectively. So, over the past three years, the U.S. market declined by 3.0 million units of dairy semen with the beef category picking up the market share. Overall, NAAB sales data represents 95% of the U.S. artificial insemination industry.

While the reduction in dairy unit sales could be considered alarming, sexed semen does balance the demographic picture and dairy heifer calf population. NAAB notes that sexed dairy semen has grown steadily and now represents 49% of the 16 million dairy semen units used by U.S. dairy farmers.

CattleFax has put some solid numbers on the beef-on-dairy calf population. The organization estimates 220,000 beef-on-dairy calves were born in 2016; by 2018, the number nearly doubled to 410,000 beef-on-dairy calves. In 2020, the number quadrupled to 1.6 million and then grew to 2.6 million by 2022. To be fair, these relative newcomers did not entirely replace dairy heifer calves. However, beef-on-dairy crosses certainly placed a dent in the population.

By 2022, the beef-on-dairy crosses had climbed to 7% of the entire fed slaughter market, reported CattleFax. Forecasted growth puts that number at 15% of fed beef slaughter by 2026.

EXHIBIT 3: U.S. Dairy Cow Slaughter



Source: USDA NASS, AMS, FSIS

Dale Woerner, one of the leading experts on the beef-on-dairy movement, acknowledges the challenge of pinning down exact animal numbers. However, the Texas Tech University specialist confidently estimates the figure at 3.0 million to 3.25 million head of beef-on-dairy cross animals. Before 2017, all those animals had been from dairy sires. In any case, that's a significant shift in the population.

The looming iceberg

Dairy cow culling, as measured by USDA's *Weekly Dairy Slaughter* data, largely followed traditional patterns in recent years *(Exhibit 3).* That's partly because values of dairy replacement heifers remained below $1,400 per head from April 2018 through January 2022 as tracked by USDA's *Agricultural Prices.* Dairy cow culling rates kept pace even as heifer replacement prices crept over $1,500 in April 2022 and into the $1,700 range through July 2023. In fact, due to economically challenging margins to produce milk, the number of dairy cows sent to slaughter moved well past historical averages from May to August 2023.

That's when markets flipped. Even though the "icebergs" of replacement numbers had been looming, dairy replacement scarcity didn't become evident until dairy farmers began looking to purchase replacement heifers in the fall of 2023.

By October 2023, dairy replacement values leapt to $1,850 per head and reached the highest prices in eight years. By January 2024, the national average jumped to $1,890 per head, according to USDA data. That's the highest cash total since July 2015 when dairy replacements fetched over $2,000 a head, which was well before the beef semen on dairy cow phenomenon became a noticeable market trend. Reports from the countryside and auctions indicate top-quality dairy replacements are bringing as much as $2,700 to $2,800 per head as heifers have become in short supply in recent months.

These replacement values will likely be with us for the foreseeable future as dairy replacement inventories stand at the lowest levels in decades. Even if U.S. dairy producers reverse course and back down from beef semen on dairy cows and use more dairy bull semen in the coming years, it will be two to three years before the resulting dairy calves would reach the milking barns.

Faced with lower replacement prospects, the only other option to prop up dairy cow numbers is to back down on dairy cow culling. To do that, dairy farmers would have to employ strategies to improve cow longevity that currently stands at five years or 2.8 lactations, based on Michigan State University research. While that's possible due to improving genetics and productive life metrics, reduced dairy replacement inventories may limit growing milk production in the coming years. However, dairy farmers could employ a combination of using even more gender-selected dairy semen or backing off using beef semen on dairy heifers and cows. ■

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