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Breeding Beef with Dairy Brings New Value to Marketplace

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Key Points:

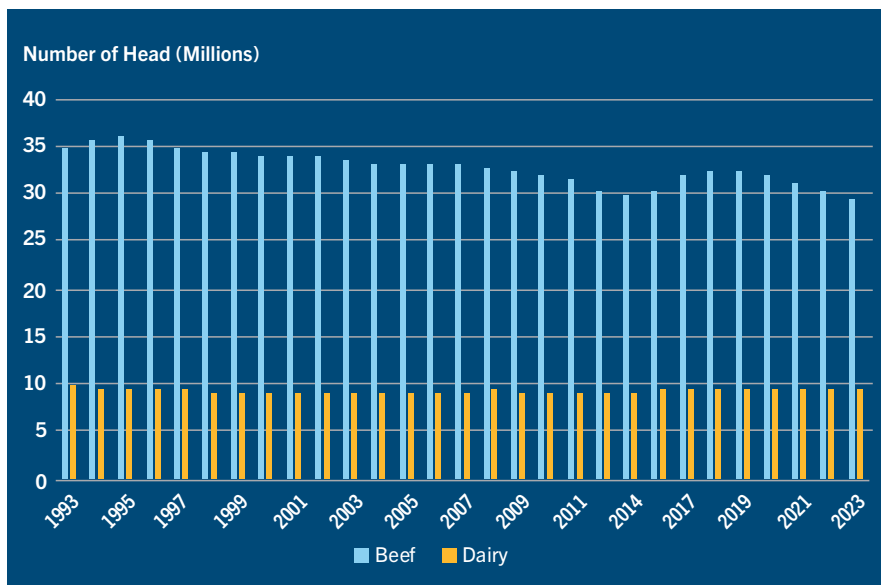
- Abysmally dry weather conditions across the U.S. have led to extensive culling in the beef cow herd and will tighten beef supplies for years to come.
- Beef bulls cross-bred with dairy cows (beef x dairy) will benefit dwindling beef supplies, but the impact will be relatively small.
- We expect the utilization of beef genetics in dairy will add a revenue stream for dairy producers, and adoption of beef x dairy should continue to grow.
- Feeders and packers that feed and process 100% dairy-bred cattle currently could see their bottom lines improve when switching to beef x dairy, but those that feed high-quality 100% beef cattle may struggle to benefit from these technologies.
- Moving forward, technology considerations such as specified mating decisions can lead to more consistent, healthier, higher-quality product to support producers down the beef supply chain.

Introduction

Persistent, wide-spread drought across the U.S. from late 2021 into early 2023 in major cattle ranching regions has been detrimental to pasture conditions, hay supplies, and other feedstuffs ranchers rely on to sustain their cow/calf operations. Abysmally dry weather has led to extensive culling of beef cattle herds for many ranchers. According to the USDA-NASS Jan. 1, 2023, beef cow inventory estimate, the U.S. beef cow herd shrunk by 5% in the last two years to just shy of 29 million head (*Exhibit 1*). The contraction of 3.6% in 2022 is the largest year-over-year percentage drop since 1986. The smaller beef cow numbers will tighten cattle supplies for years to come.



EXHIBIT 1: Beef vs. Dairy Cow Inventory



Source: USDA-NASS

Concurrently, a shift in bull semen sales suggests a growing number of dairy farmers are artificially inseminating dairy cows with beef breed genetics. Beef x dairy crossbred calves on average sell for \$100-\$300 more than their 100% dairy-bred counterparts. Because cross breeding improves dairy producers' revenue stream, their adoption will likely continue to grow. As beef x dairy is more broadly utilized, it will benefit dwindling beef cattle supplies. But the impact will be relatively small, and traditional down-stream cattle feeders and processors could struggle to see much benefit. Adoption in dairy herds could provide a new avenue for genetic improvement, and beef feeder/packer operators will need to pay attention.

Impact to beef supply will be minimal

One of the most crucial aspects of dairy farm management is to ensure that heifers/cows calve every 12-14 months to ensure optimal milk production. Occasionally, these pregnancies are at an economic loss to the dairy producer as the male 100% dairy bred cull calves are sometimes valued at under \$100/head.¹

Dairy farms have always sent cull calves into the beef supply chain. In fact, the dairy industry accounts for an estimated 10%-15% of the nation's calf crop, annually. Therefore, breeding dairy cows with beef sires will not, by itself, change the number of calves sourced from the dairy industry – especially since the U.S. dairy cowherd numbers are remarkably consistent at about 9.4 million head.

To provide an estimate of what impact beef x dairy cross calves may have on overall beef supply, we studied red meat yield data of beef x dairy calves compared to 100% dairy

calves assuming no increase in the number of cattle being marketed. A 2022 study conducted by Texas Tech University concluded the dressing percentage of beef x dairy calves is 63% compared to 61% in straight-bred dairy cattle,² which calculates to a 3.3% change in red meat yield. But even if the 10%-15% of U.S. beef production from the dairy industry entirely transitions to breeding for beef x dairy in their cull calves, it would only yield an increase of 0.33%-0.5% in overall beef production – a small increase, but not negligible.

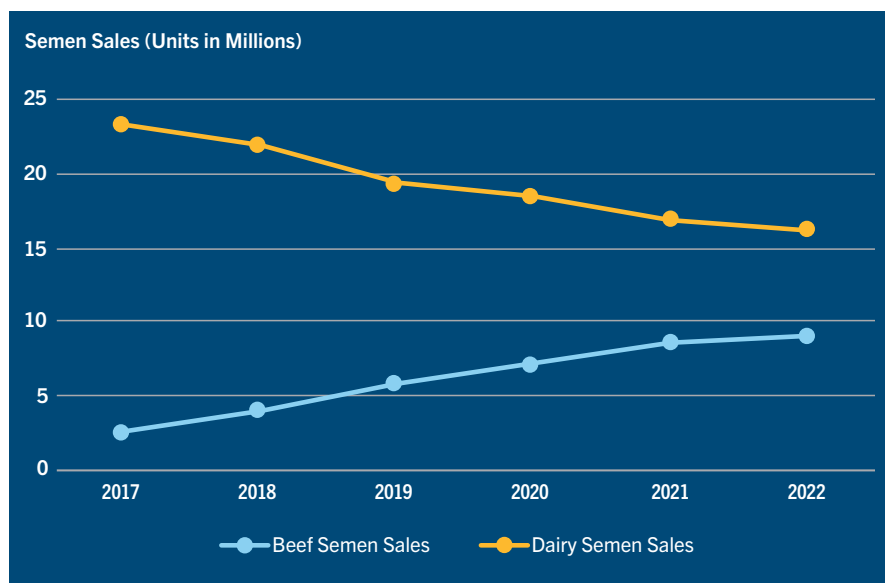
Impact to individual sectors varies

For all parties involved, we expect adoption of beef genetics in dairy will mostly benefit dairy producers as they see positive return on cull calves. A day-old 100% dairy calf is usually worth \$85-\$125 compared to a beef x dairy calf that can be sold at upwards of \$400 to a calf ranch. An increase in revenue of \$200-\$300 per cow bred per year is not insignificant, and we expect more dairy producers to jump on board.

Another sector of the industry that will continue to see growth with the increased adoption of beef x dairy is



EXHIBIT 2: Beef vs. Dairy Semen Sales



Source: National Association of Animal Breeders' Semen Sales Report

beef semen sales. According to the National Association of Animal Breeders Semen Sales Report, domestic beef semen sales from 2017 to 2022 increased at a rate nearly equal to the rate that domestic dairy semen sales decreased (*Exhibit 2*). As mentioned earlier, the dairy cowherd is incredibly consistent, leading us to believe that much of that increase in beef semen sales is due to dairymen purchasing beef semen for use in dairy cows, giving semen and beef seedstock companies another avenue to sell high-quality genetics.

The benefits from beef x dairy becomes more complex as dairy-cross cattle enter the feedlot. Feeders that are already set up to handle 100% dairy cattle may see increased feed efficiencies in beef x dairy compared to 100% dairy calves, and may be willing to pay the premium price for beef x dairy genetics. (In basic terms, beef breeds tend to convert feed to muscle while dairy breeds convert feed to milk production.) However, conversations with industry experts suggest these feed efficiency values in beef x dairy cattle are quite variable and highly dependent upon origin. A University of Wisconsin extension article reports that some

feedlots are taking a direct approach in an effort to acquire a more consistent, healthier product: They are offering dairies contracts or purchase programs for beef x dairy calves that are produced following specific health protocols and using the genetics the feedlot selects or provides.³

Additionally, a glimpse at the USDA-Cattle Contracts library shows beef x dairy cattle are worth increasingly more at harvest compared to straight-bred dairy cattle (*Exhibit 3*). Not only are beef x dairy facing fewer discounts than straight-bred dairy cattle, they'll receive a premium of

\$5.44/cwt on average if they meet the 10 requirements for Certified Angus Beef – more than offsetting even the highest discount for beef x dairy type cattle. This allows feeders who may not be set up to feed dairy cattle the opportunity to feed some higher-quality beef x dairy cattle to offset the expected decrease in 100% beef cattle being placed into feedyards in the next few years.

The packing sector is the most difficult facet of the beef industry to determine a benefit for. Like feedlots, the packers already processing dairy cattle or lower quality 100% beef cattle will see a benefit in processing beef x dairy cattle as they generally maintain a better dressing percentage. Beef x dairy cattle also maintain a more consistent size and shape to their ribeye and overall muscle confirmation in contrast to straight bred dairy cattle. However, for packers that process high quality, 100% beef cattle, the benefits may not be clear, and standard grading mechanisms may not be sufficiently sophisticated to properly value beef x dairy cattle. For instance, beef x dairy cattle have higher instances of Yield Grade 2 carcasses in contrast to 100% beef cattle due to a lower fat-to-red-meat yield, requiring



EXHIBIT 3: Discounts and Premiums for Beef x Dairy vs. Straight-Bred Dairy

	Beef x dairy bred	Straight-bred Dairy
Avg. Discount/cwt.	\$2.57	\$28.62
Range of Discount/cwt.	\$1.75-\$4.13	\$11.42-\$40.00
Premium/cwt. for meeting Certified Angus Beef standards	\$5.44	0

Source: USDA Cattle Contracts library data, CoBank

less trimming later in the harvesting process.⁴ However, this grading system may put too much emphasis on fat deposition and not enough emphasis on red meat yield for boxed-beef packing plants that already feed high-quality cattle. There is simply less red meat going into the box at the end of the day by processing beef x dairy cattle compared to high-quality 100% beef cattle.

Another area of concern for the packing industry is condemnation of livers due to abscesses that occur prior to harvest and occasionally burst during the harvesting processes, thus requiring trimming of the infected areas. Condemned livers due to abscesses are estimated to cost \$409 million to the beef industry, annually, and occur in 10%-20% of beef cattle and up to 50% of Holsteins.⁵ It is difficult to determine whether this is truly a genetic factor or more of an environmental effect. Dairy and beef x dairy cattle are fed a higher concentrate diet at calf ranches and feedlots for the majority of their life in contrast to beef cattle that graze pasture for much of their early days.

Factors that may contribute to increased adoption

Though the widespread adoption of beef x dairy breeding likely won't have a significant impact on overall beef production volume, there are a few areas that, if focused on correctly, could assist producers down the beef supply chain, and possibly result in a larger overall increase in beef supply. Beef x dairy has become part of a triple play that began over a decade ago. That triple play involves sexed semen, genomic tests, and beef on dairy.

First came sexed semen that delivered more heifer calves. On a growing number of U.S. dairy farms, a large portion of virgin heifers are bred with sexed semen to produce future replacements from the best genetics on the farm. In addition, those resulting newborn heifer calves, which are smaller than male calves,

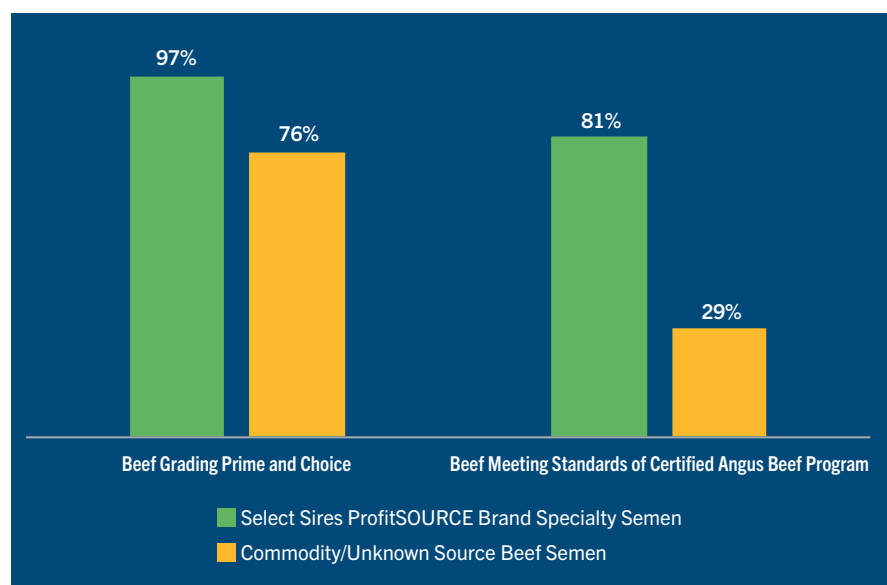
allow their first-time dams to have an easier birthing process and subsequently transition into the milking herd with fewer health issues. As a result, sexed dairy semen now represents 49% of the dairy units used by U.S. dairy producers, according to the National Association of Animal Breeders (NAAB).

Flush with heifer calves, the second part of the triple play – genomic testing – gained significant momentum. First introduced to the industry in 2008, it took a full seven years in order for 1 million tests to be run in the collective U.S. dairy herd. Then testing took off, as 6 million tests were run in the next eight years. The U.S. passed the 7 million threshold in December 2022 as well over 1 million genomic tests were performed on females in the U.S. last year. These 1-million-plus genomic tests are taking place in a national dairy herd of 9.4 million cows, according to the Council on Dairy Cattle Breeding (CDCB).

With plenty of replacements and equipped with the ability to sort out the very best heifers with over 70% accuracy by running a genomic test at birth, farmers are now preselecting the heifers and cows that will generate their replacements. Many of the other members of the dairy herd get bred to beef to capture additional value in the beef market.

Conception rates when artificially inseminating dairy cows are less than ideal. The average conception rate for the dairy industry is between 40%-55%.⁶ Additionally, conventional semen ranges in cost from \$8-\$25 per unit, while sexed heifer semen averages around \$30.

EXHIBIT 4: Difference in Beef Grading for Dairy x Beef Genetics: Specialty vs. Commodity



Source: Select Sires company research

As the amount of services used to impregnate a cow increases, the dairy producer's incentive to pay for high-quality genetics decreases. As technology advances and becomes more economically feasible in dairy reproduction, a smaller percentage of the dairy herd will need to be utilized for replacement dairy females. This, in turn, will allow dairy producers the opportunity to breed more of their cows with beef semen, leading to an increased number of cattle raised for beef entering the food supply chain.

With advancements in technology, dairy producers should consider the quality of sires selected for mating to dairy cattle. Utilizing cattle associations' and semen sales companies' expected progeny difference metrics and genetic indexes – tailored specifically to beef x dairy – can improve performance throughout the beef supply chain. An article written by an expert with semen sales company ABS explains that strategically selecting beef genetics for use in dairy cows compared to generic

beef semen can pay off.⁷ The ABS figures show that average days to reach 400 lbs. at the calf ranch decreased by nearly 20 days, and the improved feed conversion ratios provided cost of gain savings of about \$75/head in the feedlot.

Research done by another semen sales company, Select Sires, again shows the impact of high-quality genetics: The company found that 97% of beef x dairy cattle produced with its specialty ProfitSOURCE-branded genetics graded prime or choice quality as opposed to 81% of the generic beef x dairy beef.⁸ The difference

was even more dramatic among dairy x beef cattle meeting the standards for the Certified Angus Beef program (*Exhibit 4*).

Conclusion

Overall, while we expect the utilization of beef genetics in dairy will add a revenue stream for dairy producers, the impact to the overall beef supply will be small. The feeding and packing industries may see benefits of utilizing beef x dairy cattle if those companies are already utilizing dairy genetics in their operations, but those who already process high-quality beef cattle may struggle to adopt this practice, especially in the beef packing sector. Moving forward, technology considerations such as specified mating decisions can lead to more consistent, healthier, higher-quality product to support producers down the beef supply chain. ■

References

- ¹ “USDA-AMS Livestock, Poultry and Grain Market News, National Dairy Comprehensive Report for Month Ending July 31, 2023. 7 Aug 2023. <https://www.ams.usda.gov/mnreports/lsm dairycomp.pdf>
- ² Foraker, Blake & Frink, Jenna & Woerner, Dale. “Invited review: A carcass and meat perspective of crossbred beef × dairy cattle,” *Translational Animal Science*, Feb 2022. https://www.researchgate.net/publication/358793466_Invited_review_A_carcass_and_meat_perspective_of_crossbred_beef_dairy_cattle
- ³ Cauffman, Amanda & Sterry, Ryan. “Considerations for Breeding Dairy Cattle to Beef Breeds for Meat Production,” *University of Wisconsin Extension*, 2019. <https://livestock.extension.wisc.edu/files/2021/11/Beef-on-Dairy-Sire-Selection-07-16-19.pdf>
- ⁴ Foraker et al Ibid
- ⁵ R. G. Amachawadi, T. G. Nagaraja. “Liver abscesses in cattle: A review of incidence in Holsteins and of bacteriology and vaccine approaches to control in feedlot cattle,” *Journal of Animal Science*, April 2016. <https://doi.org/10.2527/jas.2015-0261>
- ⁶ “Artificial Insemination of Cattle,” *University of Minnesota Extension*, 2020. <https://extension.umn.edu/dairy-milking-cows/artificial-insemination-cattle>
- ⁷ Schmidt, Mandy. “Beef-on-dairy crossbred calves through the supply chain,” *Progressive Dairy*, 23 March 2021. <https://www.agproud.com/articles/35854-beef-on-dairy-crossbred-calves-through-the-supply-chain>
- ⁸ “Introduction to ProfitSOURCE” video, *Select Sires* web site, accessed 15 July 2023. <https://www.selectsires.com/genetics/programs/profitsource>.

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