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BEEF ON DAIRY: SUPPLYING BEEF TO THE CONSUMER

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Introduction

After decades of declining reproductive efficiencies, the U.S. dairy herds pregnancy and conception rates are on the rise. This increase in efficiencies is bringing about management changes and shifting paradigms within the industry. Until recently it was a common practice to retain as many replacement heifers as possible. Excess heifers could then be used for expansion or sold later as springers or after freshening resulting in additional revenue for the operation. The cost to raise a dairy replacement heifer from a day-old calf to first calving has been estimated to be approximately $1,200 to $1,850 (Tozer et al., 1999; Karzes, 2005; Heinrichs et al., 2013). Because of increased reproductive rates and the use of sexed semen there are excess heifers on the market driving prices down, resulting in current market prices for replacement heifers being at or below breakeven. To control costs and heifer inventories, producers are re-examining their replacement heifer management protocols. Many producers are using genomics or some other selection criteria (such as a custom index) to select cows that will be used to generate replacement females (Halfman and Sterry, 2019). The selected animals are then bred using sexed semen to generate heifer calves. In most cases these are the younger cattle on the farm; heifers to second-lactation cows as they are expected to possess the highest genetic merit in the herd. This leaves a certain segment of the herd that will not be used to generate replacements, but still need to get pregnant to remain in the herd and contribute to profitability (Halfman and Sterry, 2019).

Revenue from the sale of cull cows and cull calves can represent 10% to 20% of the gross income for an operation (van der Werf et al., 1998). This has changed the paradigm that a dairy's profitability is solely based upon the revenue from pounds of milk shipped.

Dairy is a major component of the U.S. beef production system. In 2018, dairy animals contributed 22% total beef production in the United States. Generally, this value varies based on the size of the native cattle herd and has ranged from 18% to 24%. Finished dairy steers are the largest contributor to this total followed by cull cows and lastly finished heifers. In 2018 finished dairy steers contributed 12.6% of the total pounds of beef harvested, cull dairy cows contributed 7.0% and finished dairy heifers contributed 1.53%. Dairy animals also contribute significantly to the prime beef supply. Between 2002 and 2018, Holstein steers have contributed between 32% and 60% of prime beef harvested in the United States. In 2018, the lowest percentage of prime beef (21.3%) was contributed by Holstein steers. The overall percentage of beef that graded prime increased to its highest level ever in 2018, at 8.3% of total U.S. beef production (Boetel, 2019).

The Options

There are several options available for a producer to maximize the value associated with pregnancies generated from cattle not being used for replacement generation. The best option for the operation will vary based upon breed of cattle, cost of production and other factors. It is important for an operation to examine all these factors before choosing the best option or combination of options. Traditionally the value associated with the straight dairy bull calf has fluctuated based on the market of native beef calves available to the packers and feedlots for beef production. This has resulted in considerable variability in pricing. When analyzing what a dairy producer can offer the beef industry the lowest value animal is a straight dairy animal. Straight-bred dairy calves are commonly sorted against due to reduced feed efficiencies and red meat yield at the packing plant. However, the meat quality associated with the carcasses of straight dairy calves is quite good. (Foraker et al., 2021)

The second highest value calf on a retail basis is a beef dairy cross. Many producers have turned to the use of beef semen in their operation. This is evidenced by the sharp increase in beef semen and decrease in dairy semen sales. Up until 2017 annual domestic U.S. semen sales had been constant for both dairy and beef semen (NAAB, 2021). In 2020, sales of beef semen were 4.9 million units (200%) greater while sales of dairy semen were 4.7 million units less (NAAB, 2021).

Initially there was no focus on the quality of a sire used nor the traits that a bull possessed to create a beef dairy cross animal. This created a product that was variable in the qualities it possessed from a feeding and a meat quality standpoint. As more was learned about the product, focus was put on bull selection to tailor them to create a more efficient animal that produces high quality beef. This has resulted in the creation of beef on dairy cross calf programs by the different AI or feeding operations. All the programs tailor the sire to the dam that will be used to generate the calf. There will be different sires used for each of the breeds that make up the dairy herd. Dairy beef cross cattle are predominantly from sires of Angus, Simmental, Limousin, Charolais or any of their crossbred combinations (Pereira et al., 2022). The two key traits of interest to dairy farmers when selecting beef bulls for use on their herds are calving ease and gestation length (Crowe et al., 2021).

Some of these programs offer a premium, usually using the current day-old Holstein bull calf prices. Questions remain about the appropriate value of the resulting calves especially from a meat and carcass perspective. Because of this and the volatility associated with the straight dairy breed bull market buyers are moving away from the tie to the Holstein day-old market.

A relatively new and emerging, third option is the use of a full beef embryo to generate a full beef calf that would be fed through the calf-fed system to the feedlot much like a beef x dairy cross or a straight dairy calf (Crowe et al., 2021). Artificial insemination with beef semen results in the generation of a calf that is 50% beef. The use of embryos results in a 100% beef calf. This can be accomplished by using oocytes derived from slaughterhouse ovaries or oocyte pick up from beef cows and heifers for IVP-embryo production. The oocytes are fertilized using a high genetic value beef sire to maximize the value of the calf (Crowe et al., 2021).

A producer can purchase a full beef embryo from a supplier of their choice and the embryo is transferred into a recipient cow by a trained technician. This option has the greatest potential to

generate income, but also has the greatest input cost associated with it. Since this practice is newer and it has very little data available associated with prices paid for calves. This option may however provide the most marketing options. The resulting calves can be retained and marketed at various points in the beef supply chain to maximize ROI.

The Data

Much of the data available for these three options and how they perform is either outdated or from parts of the world where production practices are not similar to U.S. systems. In the case of the full beef calf there is very little data of a full beef calf raised in a calf-fed system. However, in each of the options mentioned, where there are data, it appears to agree with the initial data that is being generated here in the United States (Foraker et al., 2021). Generally, the breeding of a beef bull to a dairy female increases the feed efficiencies associated with growing the animals to a finish weight. It changes the carcass characteristics in a way to improve the carcass from a red meat yield perspective and muscle shape.

There are many ongoing research projects at public universities and private companies focused on the beef dairy cross calf and full beef calves resulting from a calf-fed system. There are many segments of the U.S. beef supply chain, including packers, foodservice purveyors, retailers, and branded program managers paying close attention to this research.

Conclusion

“Beef on Dairy” is here to stay and will play a vital role in beef production for the foreseeable future. The dairy beef crossbred is more efficient in the production of beef than the straight dairy calf and provides an additional revenue stream for the dairy operation, and a year-round supply of calves to the feedlot/packer. A full beef embryo is emerging as another viable option to increase calf value and will continue to grow. As with many of the products of our food systems, there is a need for continued research and analysis of the data to sustainably produce the best product for consumers.

References

Boetel, B. In the Cattle Markets: Beef Contribution in 2018 from dairy cattle https://sites.udel.edu/canr-animalscience/2019/05/07/in-the-cattle-markets-beef-contribution-in-2018-from-dairy-cattle

Crowe, A. D., P. Lonergan, and S. T. Butler. 2021 Invited review: Use of assisted reproduction techniques to accelerate genetic gain and increase value of beef production in dairy herds, *J. Dairy Sci*. 104:12, 2189-12206. doi:10.3168/jds.2021-20281

De Vries, A., et al. "Exploring the impact of sexed semen on the structure of the dairy industry." *J. Dairy Sci*. 91.2 (2008): 847-856.

Foraker, B. A., J. L. Frink, and D. R. Woerner. "Invited review: a carcass and meat perspective of crossbred beef× dairy cattle." *Translational Animal Science* 6.2 (2022): 027 -027.

Halfman B., and R. Sterry. Dairy 2019, Farm use and Criteria for use Beef Genetics on Dairy Females. https://livestock.extension.wisc.edu/files/2021/11/dairy-beef-survey-white-paper-Final-4-4-2019.pdf

Heinrichs, A. J., C. M. Jones, S. M. Gray, P. A. Heinrichs, S. A. Cornelisse, and R. C. Goodling. 2013. Identifying efficient dairy heifer producers using production costs and data envelopment analysis1, *J. Dairy Sci.* 96:11:7355-7362.

Huuskonen, A., M. Pesonen, H. Kämäräinen, and R. Kauppinen. 2013. A comparison of the growth and carcass traits between dairy and dairy × beef breed crossbred heifers reared for beef production. *Journal of Animal and Feed Sciences*. 22(3):188-196. doi:10.22358/jafs/65987/2013.

Karzes, J. 2005. Dairy replacement programs: Costs and analysis. Pages 10–23 in Proc. from Dairy Calves and Heifers, Integrating Biology and Management. NRAES 175. Ithaca, NY.

McCabe, E. D., M. E. King, K. E. Fike, and K. G. Odde. 2022. Effects of Holstein and beef-dairy cross breed description on the sale price of feeder and weaned calf lots sold through video auctions. *Appl. Anim. Sci.* 38:70–78. doi: 10.15232/aas.2021-02215

NAAB. 2021. Annual reports of semen sales and custom freezing. NAAB. Available from https://www.naab-css.org/semen-sales.

Pereira J. M. V., D. Bruno, M. Marcondes, and F. Ferreira, F. 2022. Use of beef semen on dairy farms: A cross-sectional study on attitudes of farmers toward breeding strategies. *Frontiers in Animal Science.* 2. 10.3389/fanim.2021.785253.

Van der Werf, J. H. J., L. H. van der Waaij, A. F. Groen, and G. de Jong. 1998. An index for beef and veal characteristics in dairy cattle based on carcass traits. *Livest. Prod. Sci.* 54:11–20. doi:10.1016/S0301-6226(97)00167-X.

Tozer, P., M. Gabler, T. Schriefer, and J. Heinrichs. 1999. Heifer economics. Penn State Univ. Ext. Publ. DAS 99-14. http://www.das.psu.edu/dairy/documents/heiferecon.pdf