

Genetic Selection in Dairy Cattle - A Double-Edged Sword?

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Think about the progress that has been made using AI in dairy cattle. Milk production per cow per year has increased from 9,700 lbs in 1970 to over 22,000 lbs. We have improved milk and milk component yield, used 'low somatic cell count' bulls, shifted foot and leg conformation and improved the udder. But, as production has increased, fertility has declined, overall, in dairy cattle. Is there a genetic component?

When we saw that fertility was not improving (or was declining) in the last decade, we could look at the Predicted Transmitting Ability (PTA) of daughter pregnancy rates (DPR) of bulls we wanted to use. For each 1 percentage unit increase in PTA DPR, approximately 4 fewer days open were to be expected. However, using this strategy the rate of change in fertility will be slow because DPR is of low heritability.

Fertility remains an issue in some high producing herds, which may be explained by nutrition, energy balance and perhaps due to a genetic component. In a recent article from Europe looking at genetics and fertility of Nordic Red Cattle, Kadri et al. reported finding a 4-gene deletion that affected fertility. The deletion appears to be recessively lethal for the embryos (if homozygous) when carrier cows are mated to carrier bulls. This would be manifested as conception failure. This particular gene deletion is also associated with increased milk production and is now fairly common in this breed. So, it appears that genetics has an influence, at least in part, on embryonic mortality in Nordic Red Cattle.

Another recent article from a **WSU**-Texas A&M, University of Georgia and LAFUGA, Germany, collaboration, associations with fertility and genetic differences across 6 chromosomes were found. This and other ongoing studies will lead to greater understanding of genetic differences in uterine function and competence to maintain a pregnancy.

There are some current tools to help speed up selection for fertility. Genetic testing can help you select bulls to use or heifers to keep. There are several genetic markers from commercially-available tests that include: DPR, calving ease (because dystocia can reduce fertility), and still birth tendencies.

Additional research is being conducted to find the specific genetic markers of fertility in dairy cattle. In the future, dairy producers will be able to balance the selection for milk yield and fertility, depending on the herd's needs.

References

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